Understanding the Extent of Poverty in Rural Scotland

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Declaration

I declare that none of the work contained within this thesis has been submitted for any other degree at any other university. The contents found herein have been composed by the candidate, Michael D Wilson.

Abstract

This thesis, motivated by the paucity of previous research in this subject area, describes an attempt to better understand the extent of poverty in rural Scotland and how the factors associated with that poverty may differ in the rest of the country. By identifying factors showing association uniquely with rural as opposed to urban poverty so policy decisions on targeted rural poverty alleviation could be made. Few such factors appear to have been tested formally for their association with poverty in rural Scotland. Using data from British Household Panel Survey (BHPS) datasets I create an income-based measure to compare levels of poverty across the rurality domain for the general population and several sub-populations. I also test the levels of association that factors found in the literature exhibit with households being in poverty, entering poverty and exiting poverty in both rural and non-rural Scotland. In so doing I highlight some of the data limitations within BHPS, particularly in the number of households in the remote and rural categories of the Scottish Government rural classification system.

Under the current Scottish Government rural classification system it is evident that poverty in rural Scotland is lower than in the rest of the country. However, in-work poverty and fuel poverty are significantly higher in rural Scotland, where fluctuations in household fuel prices also appear to have a much quicker impact on poverty levels and levels of workless households than in the rest of the country. This thesis identifies evidence that the current definition of rural Scotland excludes parts of Scotland typically described as rural, with the result that the high levels of poverty in these areas goes unreported in most rural poverty analysis. Areas for further research are suggested, as is an alternative regional typology that may better reflect differences in poverty related factors across Scotland.

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Chapter 1: Introduction

Background

This thesis is an empirical examination of poverty in rural Scotland. It is sponsored by a research department within the Scottish Government, which in part explains my study focus on Scotland. However, the primary reason for this study is that at the time this thesis was started (October 2012), very little quantitative research had been carried out that looked specifically at poverty in rural Scotland. This was exemplified in a report by McKendrick et al. (2011), 'Our Rural Numbers Are Not Enough', which illustrated how rural poverty in Scotland had slipped under the radar of not just policy makers but the wider research community too.

The move to an urbanised society[1] throughout the 19th and 20th centuries had arguably resulted in the issue of rural poverty taking a back seat to poverty in those areas with high population concentrations. In part this could be a result of the way in which areas suffering poverty and deprivation in Scotland were identified. A key tool in the identification of areas suffering deprivation was until recently the Scottish Area Deprivation Index. This was an area index actually designed for urban areas (Gibb et al. 1998). Even its 2003 replacement, the Scottish Index of Multiple Deprivation (SIMD) is regarded as less than ideal when attempting to understand the nature and scale of poverty and deprivation where it is spatially dispersed, such as occurs in rural areas (McKendrick et. al., 2011). Rural poverty is typically diffuse and an area based measure like SIMD is insensitive to such poverty.

While rural poverty is not a new problem, the degree of attention it has received in Scotland has been sporadic, at best, over the last twenty years. Such lack of attention is reflected most recently in the press[2], yet reports produced by Shucksmith et al. (1994), Shucksmith et al. (1996) and The Scottish Executive Poverty Inclusion Working Group (2001), plus more recently the work of Bailey et al. (2016), all illustrate why rural poverty is an important issue in Scotland.

How poverty and rural Scotland are each defined is going to be pivotal both in deriving the number of individuals or households suffering poverty and in identifying factors particularly

[1] Champion (2003) provides some evidence of weak counter-urbanisation across the UK during the first half of the 20th century, but it is unclear the extent to which counter-urbanisation in this UK-wide evidence is reflected in Scotland.

[2] 'The Harsh Lives of the Forgotten Rural Poor' The Guardian 24th February 2013 (accessed 16.11.2015). http://www.theguardian.com/commentisfree/2013/feb/24/rural-poverty-invisible.

associated with rural poverty. Various definitions of poverty exist in the literature, ranging from absolute measures, generally restricted in their use to developing countries, through to relative poverty measures that are more appropriate for developed countries such as Scotland. Among these relative measures is an income based measure defined as 60% of median equivalised household income. This is the definition currently used by both the UK and Scottish Governments and forms the basis for the poverty levels reported annually in the official poverty analysis document 'Households Below Average Income' (HBAI). The same definition forms the basis for most of the data analyses in this thesis.

The definition of 'rural' is more difficult to pin down. As Weisheit et al. (1999) point out:

> *Like concepts such as 'truth', 'beauty', or 'Justice', everyone knows the term rural, but no-one can define the term very precisely (p213).*

Such vagueness is reflected in the Oxford English Dictionary definition of rural as relating to, or characteristic of, the countryside rather than the town. This follows the Latin *ruralis*, derived from *rūs* meaning countryside plus the adjective *alis*. The definition of rural Scotland currently used by The Scottish Government is a straightforward one; all land outside of settlements with a population of more than 3,000 people (Scottish Government 2014). Under the National Records of Scotland (NRS) definition, settlements are a group of one or more contiguous localities, which are determined according to population density and postcode areas (NRS 2001). The 3,000 person threshold rural Scotland definition is used in all official statistics that include a rural element. According to official statistics, using the above definitions of poverty and rural Scotland, the poverty rates in rural Scotland have been consistently lower than in the rest of Scotland, averaging more than 2 percentage points lower throughout the early years of the 21st century (Skerratt et al. 2014).

Many factors of rural life in Scotland have been identified in the literature as showing association with increased likelihood of poverty in rural Scotland compared to the rest of the country. However, many of these factors were identified using a definition of rural Scotland that clearly did not match the official definition described above. An example of this mismatch, even referred to in an official Scottish Government report, are comments by Lord Smith of Kelvin referring to his report on youth unemployment[3]. Lord Smith talks of 'astonishing poverty' in rural areas such as Peebles and Galashiels. Neither of these towns are considered

[3] http://www.bbc.co.uk/news/uk-scotland-south-scotland-17536615 Accessed 27/05/2016

rural under the Scottish Government urban-rural classification. Peebles, with a population in 2011 of 8,376 is considered a 'remote small town', while Galashiels with a population of 14,994 is classified as 'other urban area'. At the time of writing it would appear that few of the factors identified in previous research have actually been tested empirically for their association with rural poverty, regardless of the definition of rural used.

To date, little quantitative research appears to have been carried out that explicitly looks at the differences in circumstances between urban, rural and remote areas, be that across Europe, in the UK or more specifically in Scotland. Qualitative research taking a rural Scotland focus to poverty, in the form of focus groups, questionnaires and in-depth interviews, has been carried out over recent years and has an important influence on this thesis in the identification of factors associated with rural poverty. The existence of this wide ranging qualitative analysis of rural poverty has negated the need for me to do something similar. Any gains from my repeating such work would likely be minimal at best and would actually relate to a time period different to that covered by my quantitative analysis.

Recent quantitative work that does to some extent look at differing circumstances across Scotland has been produced by the Scottish Government since 2010 in their Rural Scotland Key Facts documents (Scottish Government 2010; Scottish Government 2012b; Scottish Government 2015b). These publications highlight differences in socio-demographics, services & lifestyle, and the economy between rural and the rest of Scotland but also provides some data dividing rural Scotland into accessible and remote. There are considerable differences across many of the measures reported in these publications. In later chapters I have illustrated some of these differences and shown that analysis using a simple rural/urban divide can be misleading when attempting to identify differences in poverty and its associated factors across the urban and rural domains, particularly so when looking at poverty among sub-populations. I show that under the current definition of rural, many of the factors identified in the literature as associated with rural poverty no longer show such association once other factors are taken into account.

The Scottish Government currently adheres to a National Performance Framework (NPF). One of the national indicators in the NPF measurement set is a reduction in the proportion of individuals living in poverty. Another is a reduction in the number of children suffering

deprivation[4]. The National Performance Framework also includes a 'wealthier and fairer' Strategic Objective and a National Outcome 'We have tackled the significant inequalities in Scottish Society'. A lack of understanding of rural poverty could impact negatively on this performance framework and it would be a shame, and possibly counter-productive, therefore if measures put into place by the Scottish Government to reduce poverty and deprivation did not take account of the nature, incidence and factors associated with being in poverty, entering poverty or exiting poverty in the rural areas of Scotland.

Research Problem and Hypotheses

The central aim of this thesis involves gaining a better understanding of poverty in rural Scotland by studying the definitions & measurement of poverty and rurality, assessing such measures for their suitability in identifying levels of poverty and poverty dynamics across the urban-rural domain in Scotland, and assessing how factors of rural life impact on these measurements. Do the factors identified in the literature continue to show association with poverty once the effect of the other factors are accounted for and the relatively new Scottish Government definition of rural Scotland is applied to the data? If these factors do continue to show association with poverty, is there a similar association in urban Scotland? This could have an important impact in identifying poverty alleviating policies that address factors associated specifically with rural poverty, or on such policies addressing factors associated with poverty at a national scale.

Two clear considerations need addressing when attempting to understand the extent of poverty in rural Scotland: one is the means by which an individual or household is deemed to be in poverty; another is how rural Scotland is defined. An understanding of the theories underlying poverty and what constitutes rurality are going to be central to these definitions. Scotland, as part of the UK, is what may be regarded as a free trade liberal economy and within this a widely used measure of poverty is a household income based poverty line below which households are deemed to be in poverty. The reasons for this choice of measure are outlined in chapter two.

The way in which rurality is defined will impact on which areas of Scotland are deemed to be rural and thus the number of individuals or households regarded as suffering rural poverty. As already stated, the Scottish Government presently defines rural Scotland as settlements

[4] The National indicators that form a part of the National Performance Framework can be downloaded from http://www.gov.scot/About/Performance/scotPerforms/indicator Accessed 13/10/2015

with a population of fewer than 3,000 people. Poverty levels within this rural classification have consistently been lower than the national and urban area averages.

The first analytical step I have taken in an attempt to understand the extent of rural poverty in Scotland is to compare the poverty rates across the urban-rural classification, to test the null hypothesis that poverty levels in rural Scotland do not differ from that in non-rural Scotland. This is on the basis that rural Scotland is as defined and used by the Scottish Government and that poverty is defined as 60% of median household income before housing costs (BHC).

Hypothesis 1: Poverty rates in rural Scotland are the same as they are in non-rural Scotland.

Within this initial analysis I also test whether poverty rates among several sub-populations remain the same regardless of living in rural or non-rural Scotland, again using the definitions of rural and poverty described above. The definitions of poverty for each of these sub-populations are described in chapter 2. The first of these sub-populations is poverty by gender. An issue here is that poverty is typically measured at the household level in most national statistics so in a household with an adult couple, either both partners are in poverty or neither is in poverty. Any differences in poverty rates by gender are only going to be observable in single adult households. There are two hypotheses that need testing, that poverty rates among male single person households are higher or lower than poverty rates among female single person households, and that poverty rates among single person households in rural Scotland are higher or lower than they are in non-rural Scotland. Expressed as null hypotheses:

Hypothesis 1a: poverty rates among male single person households are the same as they are among female single person households; and

Hypothesis 1b: poverty rates among single person households in rural Scotland are the same as they are in non-rural Scotland.

The next sub-population I examine for poverty levels is households with children. As I show in a later chapter, addressing child poverty is a central plank of the Scottish Government poverty alleviation strategy.

Hypothesis 1c: child poverty rates in rural Scotland are the same as they are in non-rural Scotland.

To test how in-work poverty varies by rurality, rather than compare the rates for individuals in work and in poverty, it is more appropriate to look at the proportion of individuals living in a low income household that has at least one person in work. The hypothesis is then worded as follows:

Hypothesis 1d: the proportion of individuals living in a household where someone in the household is in work and the household is in poverty, is the same in rural Scotland as it is in non-rural Scotland.

I go on to test three other types of poverty for their difference by rurality:

Hypothesis 1e: poverty rates among the elderly in rural Scotland are the same as they are in non-rural Scotland;

Hypothesis 1f: household fuel poverty rates in rural Scotland are the same as they are in non-rural Scotland; and

Hypothesis 1g: persistent poverty rates in rural Scotland are the same as they are in non-rural Scotland.

Any difference in poverty rates in rural Scotland and non-rural Scotland then raises the question of why this is so. What are the factors of rural life that makes the poverty rate in rural Scotland different to the rest of Scotland? The review in chapter two identifies in the literature several factors deemed to be particularly associated with poverty in rural Scotland, plus others associated with rural poverty in other developed countries. Several questions present themselves at this point. Do the factors found in the literature actually show association with poverty in rural Scotland when rural Scotland is as currently defined by the Scottish Government? Further, do the factors that show such association with poverty in rural Scotland also do so in the rest of Scotland? Similarly, does any change in these factors associate with entry into or exit from poverty when the Scottish Government definition of rurality is applied, and again is there similar association in non-rural Scotland? If none of the factors show any difference in association with poverty, or moving in or out of poverty, then there is little point in separate rural/non-rural analyses, doing away with the need for poverty alleviating policies targeting rural poverty.

The hypothesis that therefore needs to be tested is whether each of the factors identified in the literature show significant association with both rural poverty AND non-rural poverty,

and then to also test the extent to which these associations differ by rurality. In other words is the 'impact' of each factor significantly larger or smaller in rural households? The two resulting hypotheses are:

Hypothesis 2a: poverty factors significantly associated with a rural Scotland household being in poverty are also associated with a non-rural Scotland household being in poverty; and

Hypothesis 2b: the extent of association of each factor with a household being in poverty is the same in rural Scotland as it is in non-rural Scotland.

The above hypotheses are tested in chapter 4. The hypotheses outlined so far only consider households being in poverty and the associated factors. A more thorough understanding of rural poverty may be gleaned from treating poverty as a process rather than as a state (Ruspini 1998), by analysing the dynamic processes connected with poverty. Longitudinal data allows such an analysis, and in this thesis I show how year on year changes in the factors associated with rural poverty impact on a household's entry into and exit from poverty. First though, I test whether the rates of entry into and exit from poverty differ by rurality. I then go on to test whether factor changes through time show different associations in rural Scotland than in urban Scotland for households entering and exiting poverty. For households entering poverty I therefore have three hypotheses to test. Re-worded as null hypotheses I test:

Hypothesis 3: Rates of entry into poverty in rural Scotland are the same as they are in non-rural Scotland;

Hypothesis 4a: the change in poverty factors associated with a household's entry into poverty in rural Scotland are also associated with a household's entry into poverty in non-rural Scotland; and

Hypothesis 4b: the extent of association of each factor with a household entering poverty is the same in rural Scotland as it is in non-rural Scotland.

For households exiting poverty I test that:

Hypothesis 5: Rates of exit from poverty in rural Scotland are the same as they are in non-rural Scotland;

Hypothesis 6a: the change in poverty factors associated with a household's exit from poverty in rural Scotland are also associated with a household's exit from poverty in non-rural Scotland; and

Hypothesis 6b: the extent of association of each factor with a household's exit from poverty is the same in rural Scotland as it is in non-rural Scotland.

Ideally I would like to test any differences in the rates of entry into and out of poverty across the rurality domain for each of the sub-populations, as tested in hypotheses 1a-1g in the in-poverty models. However, the number of rural households within each sub-population that move into and out of poverty is low, too low to have any degree of confidence in the rates calculated and therefore the hypotheses tested. For completeness the rates of entry into and exit from poverty for each of these sub-populations has been included in the relevant sections within chapters five and six but not formally tested by hypotheses.

Outline of the Study

In the first section of chapter 2 I examine literature pertaining to poverty in rural Scotland from the late 17th to the end of the 20th centuries. This section is intended as background information, to illustrate how rural Scotland and the poverty therein has changed and been addressed over that period. The research questions in this thesis are informed by the theories of poverty. The next section of chapter two considers the five primary theories of poverty and provides points of engagement between aspects of these theories and my research questions. Following that, I identify from the literature how poverty is defined and measured nationally and for various sub-populations in Scotland. I then explain the Scottish Government's urban-rural classification system and how to derive from this the definition of rural Scotland. The Scottish Government's urban-rural classification system is based on the same small scale geographic areas as used in the Government's measure of multiple deprivation so it is appropriate to also include a description of this in chapter 2. Next, I describe an important element of this research, the identification in the literature of factors thought to be associated with poverty in rural Scotland. I then go on to review the literature on the previous use of secondary data in poverty analysis.

Chapter 3 describes the methods I have employed and the methodological issues that have been addressed. I start by outlining the advantages of using longitudinal data in poverty

analysis and the choice of datasets for my research[5]. I then go on to describe the data management steps taken in preparing the data for analysis plus the analytical methods employed, including how I have identified household poverty status and derived transitioning variables from my poverty related factors. Some methodological issues are then described, along with the necessary steps taken to alleviate their impact.

Chapter 4 is the first of three analysis chapters testing hypotheses, with the objective of testing whether factors identified in the literature actually show association with poverty when the Scottish Government definition of rural Scotland is applied. My first step is to derive a GB-wide poverty line from British Household Panel Survey (BHPS) and supplementary datasets. From this, household poverty states are derived, and poverty levels across Scotland and in various sub-populations are calculated and compared across the rurality domain. There then follows a comparative analysis of the prevalence of the factors in rural and non-rural Scotland, identifying those that exhibit statistically significant differences. I then examine the extent to which factors associate with a household being in poverty, running separate models for rural and non-rural Scotland. Following this I examine any difference in the depth of association with a household being in poverty between rural and non-rural Scotland before carrying out some sensitivity analysis testing different operationalisations of the poverty threshold, poverty measure and rurality threshold. I then conclude the chapter by summarising the findings from the chapter.

Chapters 5 and 6 follow a similar layout with the exception that they respectively report analysis of individual's entry into poverty and exit from poverty rather than a household being in poverty. Analysis in these two chapters is at the individual rather than household level as it is difficult to follow households when examining poverty dynamics. The reasons for this approach are explained in more detail in the methodology and methods chapter. The primary objectives in these two chapters are to test that the transitioning of factors identified in the literature do show association with a household moving into poverty (in chapter 5) or exiting poverty (in chapter 6) when the official definition of rural Scotland is applied to BHPS data.

As a conclusion, in chapter 7 I summarise the key findings from my research. Also included in this chapter are some reflections on my analyses and on some of the data and methodological issues that have presented themselves over the period of this thesis. At the end of this chapter I offer ideas for future research and present some concluding remarks.

[5] A short description of the available datasets is available in Appendix A.

Chapter 2: Literature Review

Introduction

In this chapter I first provide an historical perspective on poverty in rural Scotland for the period covering the 18th, 19th and 20th centuries. Following that I discuss the theories underlying poverty and go on to review how poverty is currently defined and measured, across the general population and among various sub-populations. I then outline how rurality is currently defined in Scotland. Following on from this I describe the method by which the Scottish Government currently identify areas of Scotland experiencing the highest concentrations of poverty, illustrating that such a method is not suited to identifying poverty that is spatially dispersed, as it often is in rural areas. I then review the evidence of poverty and deprivation in rural Scotland, in particular focussing on the issues of rural life that have either been regarded in the literature to be associated with poverty in rural areas of Scotland or exhibit different rates of occurrence across the urban-rural domain. I have also reviewed the limited literature that identifies issues associated with rural poverty in other developed countries and show that such issues appear to be common across the rural areas of most of the developed world. I conclude the chapter with a short section identifying how secondary datasets have previously been used in poverty analysis, with the aim of identifying the methods and methodological issues discussed in chapter three.

In the previous chapter I noted that the attention that poverty in rural Scotland has received is very much a recent if rather sporadic phenomenon. This was illustrated at the outset of this study by the paucity of previously published material on the rural dimension of poverty in Scotland. In widening my review of literature on rural poverty to other developed countries I have also found a similar paucity of published material. Such material, at the Scotland level and further afield, appears to be virtually non-existent prior to 1990. As a result I have limited the review of factors associated with rural poverty to research carried out since that time.

Background: Poverty in Rural Scotland from late 17th to late 20th Century

> *Poverty and hardship have been a part of Scottish history from the earliest times. Although the last two centuries have generally been a story of increasing wealth and higher living standards for the majority of the population, there has never ceased to be*

an army of the poor and deprived for whom the success of the majority was a mockery (Smout & Wood 1991; p200).

As highlighted in the quote above hardship of one kind or another have been features of life for a proportion of the population in Scotland for centuries. This section aims to illustrate how hardship for those in a rural setting has changed over the three hundred or so years up to the end of the twentieth century.

During the three hundred plus years under review here, Scotland's population changed dramatically, both in terms of numbers and geographic location. The late seventeenth century Scotland was an economy where between eighty and ninety per cent of the population of approximately one million lived and worked in a rural setting and were distributed evenly across the country (Smout 1969). At this time only five per cent of the population lived in towns of 10,000 or more (Devine 1999). The overwhelming majority of society were involved in food production in a broadly subsistence system.

By 1750 still only one Scot in eight lived in a town of 4000 or more and there were only five towns with a population greater than 10,000 inhabitants (Houston 1988), yet by 1850 more than a third of Scotland's inhabitants lived in large towns (Devine 2006). This re-distribution of the population was matched by an unprecedented rise in the number of inhabitants. In 1755 the population of Scotland, according to Webster's estimate (Smout 1969 cites A.J. Youngson, 1961-62) had risen to just over one and a quarter million inhabitants. By the time of the first census of 1801 the population was more accurately measured as slightly more than 1.6 million; at the 1811 census just over 1.8 million; and at the 1821 census nearly 2.1 million people. Later census figures show a rapidly rising population up to 1951 with a relatively constant total thereafter: nearly 2.9 million in 1851; almost 4.5 million in 1901; and 5.1 million in 1951, a total that has changed little over the last 60 years. Today, the total population is just over 5.2 million of which just short of one million people, or around 18% of the population, live in rural Scotland (Scottish Government 2012b).

From medieval times through to the 1740s the Scottish countryside of open fields and huddled settlements changed very little in overall structure (Devine 2006). The tenant classes were the backbone of this agricultural community, particularly so during the late seventeenth century Scotland. Owner occupiers were rare. The tenants were the principal figures in the ferme touns or small settlements of cottages and farm buildings where the cottagers, servants and tradesmen (who comprised the rest of the rural economy) lived and worked (Devine 1999).

The cottagers, or cottars, formed the agricultural labour force and were provided with rudimentary accommodation and a small parcel of land (usually less than 5 acres) while they worked for the tenant or sub-tenant (usually a husbandman). Tradesmen, also regarded as cottars, were for example weavers, blacksmiths and carpenters. These cottars made up the majority of the rural population, particularly in lowland Scotland and when added to the tenant population it is evident that there were few in the landless class. Principal among this landless class were the servants, mainly young men and women in their teens or early twenties. Many were born into cottar households and on marriage usually reverted back to a cottar existence. As Devine (2006) points out, cottars and the servants, once married, were bound together by the common experiences of holding some land, no matter how small.

Prior to 1700 these multiple tenancy rents were generally paid in kind. Tenants and sub-tenants delivered to their landlord products they grew on their small parcel of land and as agreed in their rental agreements. This meant that the tenants had no access to markets and remained locked into a broadly subsistence system (Devine 1999). There was a gradual move to single tenancy farms from the late 17th century onwards, and around the same time, a similar move to farm enlargement through amalgamation.

This move to single tenancies and farm enlargement gathered pace with the gradual increase in market pressures on the agrarian system. The trend to larger holdings under one farmer resulted in the contraction and ultimate removal by the 1820s of the cottar system. The new agricultural social order became one of a small number of rent paying farmers, holding a lease for a given number of years, employing landless servants and labourers who were now dependant entirely on selling their labour power (Devine 2006). To Devine (1999) the removal of cottars was of such speed and effect that it was more reminiscent of the pattern of the famed highland clearances (that peaked during the later famines of the 1840s and 1850s) than any other aspect of Scottish lowland social change.

The move to a property-less proletariat was also observed by historians looking at the situation in England. Davies (1795), cited in Hasbach (1908) observed:

> *Formerly many of the lower sort of people occupied tenements of their own with parcels of land about them on which they realised a considerable part of their subsistence, without being obliged to buy all they want at shops. But since these small parcels of land have been swallowed up in the contiguous farms and enclosures, and as cottages themselves have been pulled down, and the families that used to occupy them are crowded together in decaying farmhouses with hardly enough room about them for a*

cabbage garden, and being thus reduced to hirelings, they are very likely to come to want (Davies (1795) cited in Hasbach (1908; p56).

It is this move to a hireling status, the introduction of a waged labour force that marks the beginning of capitalism and, to some, the origins of poverty. To Novak (1988) 'Poverty is a product of capitalism', an interpretation of a Karl Marx (1974: p826) view that 'poverty begins with the tiller's freedom':

When…..landowners dismissed their retainers who had with them consumed the surplus product of the land; when further their tenants chased off the smaller cottagers then….a mass of living labour power was thrown onto the labour market, a mass that was free in a double sense, free from the old relationship of bondage and servitude, and secondly free of all belongings and possessions, and of every objective material form of being, free of all property; dependant on the sale of its labour capacity or on begging, vagabondage and robbery as its only form of income (Marx 1974; p826).

The above mentioned proletariatisation of agricultural labour, along with the rise in non-agricultural occupations, led to increased mobility among inhabitants (Houston 1988). Scottish industrialisation to 1815 was still primarily a rural phenomenon and this was reflected in the spread of industrial settlements, e.g. textile production, mining and iron-making villages. In addition, the cottars and craftsmen who lost land in the process of farm amalgamation and improvement, also moved into these settlements.

Handloom weaving for example was still a predominantly rural activity until the 1850s, almost every country family in Scotland and the north of England wove in the time spared from the land (Gauldie 1974), but the technology of power looms serves as an illustration that the trades that moved to the rural settlements came under increasing competition from their urban counterparts during the second half of the 19th century. According to evidence provided to the Commission to Inquire into the Conditions of the Handloom Weaver in 1834 the agricultural population, accustomed to supplementing a meagre living by spinning or weaving, fell back even further into the miserable conditions they had previously known before the brief spell of prosperity (HM Government 1841).

The traditional markets for tailors, shoemakers and other such traders came under threat from cheaper goods moved into the rural areas on the developing railway network. The railways also gave the rural population a taste of urban values and to many their existing life

must have appeared intolerable when compared with the working conditions and social attractions of the town and city.

The even distribution of the population across the country up to the 1740s resulted in relatively few people in each parish which meant that the community leaders were likely to be aware of those individuals and families that were enduring hardship. Every parish had responsibility for its poor laid down by statutes of 1535 and became embodied in Poor Law legislation after the Reformation (Smout 1969).

By the mid-eighteenth century the Scottish Poor Law had, in lowland Scotland at least, become capable of marshalling enough in resources to prevent a bad harvest leading to a famine – a parish had the powers to impose assessment on landowners, demand a rate that could be passed down to their tenantry (Mitchison 1994). This was designed to make up the difference between voluntary funds and the level of need. However, Mitchison points out that records suggest it was often easier to keep the source of extra assistance voluntary. Some landowners took a paternalistic attitude to tenants, particularly during food shortages, although as Hunter (2000) points out a lot of early historical work on poverty was written from the landowner perspective and did not take account of the position of the poor themselves so this view may not be entirely accurate. It is possible that this paternalistic attitude was in part down to the low population, with the landowner realising that he would get no rents if tenants were evicted and he could not get new tenants. Records suggest that at times of shortages the landowners would buy foods and sell them to tenants at a price below cost. However, when crop failure occurred in successive years, such as 1623 & 1624, 1650 & 1651 and 1673 & 1674, many peasants were forced to leave their holdings and go begging with his family. Emigration to Ireland and Scandinavia was highest at these times (Smout 1969). The famines of the 1690s led to some of the rural area populations temporarily dropping by up to a half, either through death or emigration.

The combination of bad harvests, overcrowded housing and the trade depressions of the early 1840s were catalysts for the reform of the Scottish Poor Law in 1845. Under this new Act, which stayed in force until 1948, parishes were compelled to raise money to relieve the poor, and could choose to provide compulsory rates. As with the old act the able bodied poor had no right to any relief but were on occasions provided a charity hand-out. The able bodied were thought at the time to have brought their poverty onto themselves. The control of relief payments was also no longer in the hands of the church, with Boards of Supervision set up to oversee the work of the parishes.

One result of the new Act was the creation of poorhouses. The Act did not force the creation of these houses but it allowed the poor to appeal the failure to provide suitable accommodation which could have been regarded as breaking the law. Providing poorhouses was costly and in many rural areas parishes combined resources to build one small poorhouse sufficient for their combined needs. However, in very rural areas a poorhouse could be very inaccessible to scattered parishes and were often only used for very burdensome paupers, especially the insane. Those parishes without a poorhouse could pay to board their paupers in a neighbouring poorhouse or in hired accommodation. The use of poorhouses in Scotland was much lower than in England. In 1850 there were just 21 poorhouses in Scotland, by 1900 there were 65 (Crowther 2000) and at this latter date 14% of paupers in Scotland were housed in this way compared to more than 31% in England. Instead, paupers in rural areas of Scotland were put into hired accommodation with many orphans boarded out with local farmers (Knox 2012).

This reform of the Poor Law appears to have had little effect in the highlands. The relief of poverty and starvation in the highlands was carried out by three organisations during the years around 1847, the Free Church of Scotland, and the Edinburgh and Glasgow Relief Committees (later amalgamated to the Central Board of Management for Highland Relief). There was very little cash available from which contributions to a poor fund could be made. As a result famine was a real risk and one against which the local social organisation had no defence. The Scottish poor law, at best, simply kept those it aided alive; it did nothing to stop those families who had previously been able to earn adequate support from sinking to a level of extreme poverty. Aid to the destitute and hungry highlanders occurred after the first outbreak of potato blight that afflicted many areas of north-west Scotland, including many island communities in 1846. Deaths among the old and very young rose significantly in late 1846 and early 1847. The scale of the potato blight problem in the highlands nowhere matched the 3 million affected by it in Ireland during the previous year. Only around 200,000 were at serious risk of starvation in the highlands and the problem proved relatively short-lived as by the following year 1848 only around 70,000 were thought at risk (Devine 2006). In part this reduction was down to the more resilient nature of the economies of some areas of the highlands. In pockets, there was strong commercial fishing and linen interests, plus less reliance on potatoes, with grain and fish as alternative primary food sources. However, it was the Free Church of Scotland that was the only relief provider during the critical period of the first potato blight at the end of 1846 and the first few months of 1847.

The potato famine precipitated emigration on a hitherto unknown scale. A sizeable proportion of those leaving to countries such as Australia and Canada were doing so with landlord assistance, particularly the very poor. In addition, a buoyant lowland economy resulted in high demand for labour and led to considerable migration away from the highlands. Black cattle prices dropped significantly during this time while the price of sheep remained buoyant. Small tenants traditionally kept black cattle and with dropping prices and the need to sell stock to buy food, were falling into arrears. The higher rentals from sheep rearing was a decisive factor in landlords removing small tenants and cottars, which along with assisted emigration became an integrated programme of action on many highland estates. The scale of population reduction in the highlands is illustrated by figures derived by Collier (1953) who noted that in 1881 the population of crofter parishes was roughly 180,000; by 1931 it was down to 120,000.

During the 1870s and 1880s the highland population became less dependent on the land for their survival. The people entered more fully into the cash economy. In the highlands, this engagement into the cash economy generally occurred decades later than had happened further south. Fishing and temporary migration to seasonal and infrastructure work provided earnings with which to buy the necessities of life rather than produce them themselves. Such engagement however did not have a great impact on the level of poverty and uncertainty suffered by the majority of the population in the highlands. There were many bad harvests during the latter decades of the 19th century and many people received relief during these years, in the form of food and seed. However, the 1880s agricultural depression saw the poor law collapse in Skye with the only source of crofter support coming from highland societies in London (Knox 2012).

Urbanisation led to overcrowding in poor housing stock in all of the major Scottish cities during the second half of the 19th century. This was perhaps exemplified most in Glasgow where even those in regular employment were more overcrowded and poorly housed than in any other British city and this continued well into the 20th century (Crowther 2000). As a result, any poverty mitigation measures of successive governments during most of the twentieth century were primarily focused on the reduction of urban rather than rural problems.

During the early years of the twentieth century there were many areas of Scotland that were designated poor and poverty stricken but few had more than 5% of their population on poor relief (Levitt 1988). However, some of the highest percentages could be found in rural areas, particularly the highlands. Housing conditions in rural Scotland continued to be poor.

The 1917 Royal Commission on Housing in Scotland shows the persistence of miserably inadequate housing in the countryside (Royal Commission on Housing in Scotland 1917).

Poor law relief in the early twentieth century was being administered by hundreds of parish councils around Scotland and each of these applied varying rates of relief, in part due to there being very few inspectors thus allowing local authorities to do as they wished. Such failings led to the liberal government of the period 1906-1912 to attempt to create a more comprehensive and uniform system of dealing with poverty and during this time provision was made for needy children and a non-contributory pensions for those over 70, plus the introduction of national insurance. The latter meant that unemployed workers could claim up to 13 weeks of benefit after which they could apply to the poor law authorities for further relief (Knox 2012).

The inter-war years of 1920-1939 was a period of mass unemployment, particularly so during the latter years and an array of Acts were introduced to deal with the problem. In Scotland a sizeable proportion of this unemployment was in the ship building and mining industries. These industries were in areas with few other local employment opportunities and unemployment would have had a devastating effect on household incomes. Acts such as the 1921 Unemployment Insurance Act and the later Unemployment Assistance Act of 1935 ensured that applying for and obtaining financial assistance was no longer an act of last resort (Vincent 1991). However, by 1931 the rising cost of unemployment led to the then Labour government resigning over plans to reduce unemployment benefit. This government had introduced a 'means test' qualification for benefit and this led to mass demonstrations in the form of hunger marches. During the early 1930s unemployment was significantly higher in Scotland than in England (Smout 1986) and the rate of poverty in Scotland was estimated to be double that suffered by the people of England (Levitt 1988). This was also a period of high emigration, so much so that during the years 1920 to 1930 the numbers leaving Scotland actually exceeded the entire natural increase (Knox 2012).

Immediately after the Second World War the Labour government introduced the 'cradle to grave' Welfare State as outlined in the Beveridge Report of 1942. A full history of the creation and development of the welfare state is beyond the scope of this review but some of the ideas enacted in the Beveridge Report had considerable impact on the poverty issue. A key mantra throughout the report was 'Abolition of want', and provided a summary of principles necessary to banish poverty and 'want' from Britain. Unemployment benefit rates were set as suggested by Beveridge at a subsistence rate:

In considering the minimum income needed by persons of working age for subsistence during interruptions of earnings, it is sufficient to take into account food, clothing, fuel, light and household sundries, and rent, though some margin must be allowed for inefficiency in spending (Beveridge 1942).

The post-war years up to the late 1960s saw Britain's economy grow steadily and for most of the population their standard of living rose. However, there was a large elderly population, whose numbers had been growing rapidly between the wars, and benefit payments to this group of people was to take up a sizeable proportion of the total. The rules surrounding benefit provision made the outlook particularly bleak for those elderly who had no surviving children, and women. Then, as now, they were more vulnerable to the shortcomings of the local medical and social services, particularly in rural areas.

The 1950s were regarded by some as the period of the 'affluent society'[6], a period when poverty had finally been eradicated (Coates & Silburn 1973) and 'most of our people have never had it so good' [7](Middleton 1997; p422). To some this had proved to be a myth (Townsend 1954; Wedderburn 1962). Townsend took issue with the earlier work of Rowntree and Lavers (Rowntree & Lavers 1951) particularly over their list of necessary expenditures used to derive their conclusions. To Townsend this list should have been based on actual spending patterns rather than on the prejudices of the researcher, and that 'due regard must be paid to the conventions sanctioning membership of the community, to the influence of economic and social measures adopted by society as a whole…..'(Townsend 1954; p132). A subsistence level assumes the monies are spent efficiently, in the way that the experts thought it should be spent thus disregarding preferences or what people themselves regard as 'necessary'. A further issue is that claimants may not be able to buy the goods as cheaply, a particular issue in rural Scotland.

Wedderburn (1962) used a variety of official sources to demonstrate that around 12 per cent of the British population were living at or close to the subsistence levels maintained by the National Assistance Board (NAB) in the late 1950s. Given that the 'affluent society' had been most noticeable in the midlands and south east of England it appears quite likely that in

[6] The term 'Affluent Society' was used ironically by JK Galbraith in his book The Affluent Society (1958) to describe the United States after World War II, and became part of the Conservative Party's motif during their 1959 election campaign.

[7] Macmillan's comment has often been taken out of context. He went on to say that "is it too good to last".

Scotland the percentage would have been higher but even this percentage equates to around 600,000 Scotland's people. The collapse of traditional industries in Scotland from the late 1960s through to the 1980s supports the view that Scotland was in a worse relative position compared to England when it came to considering household income and poverty levels (Dickson & Treble 1992).

Later work by Norris, in Brown (1983) makes an estimate of the number of people in poverty in Scotland in the late 1970s and early 1980s by using the qualifying income figure for claimants on supplementary benefit. On this basis there were 450,000 qualifying claimants in 1979 but in just three years of the Margaret Thatcher Conservative Government this figure had risen to 770,000 by 1982. To this latter figure Norris has added eligible non-claimants and the working poor to suggest that just over a million Scots were experiencing poverty in 1982. By adding the people who were regarded as on the margins of poverty Norris suggests that 1,664,000 Scots were living in or on the borders of poverty, approximately a third of the population of Scotland. The author makes no estimate for those people living in rural areas that endured or were on the margins of poverty.

Theories on Poverty

The earliest theory of poverty developed in Victorian Britain and was derived from a common view that poverty was rooted in the individual failings of the poor. This individualistic approach, as highlighted in Smout (1986), suggested it was the morality of the individual that caused their poverty and as such should not be given any assistance whatsoever and forms part of what has been termed the classical theory of poverty (Davis & Sanchez-Martinez 2015). The basic assumption within this classical theory, rooted as it was then in its original agricultural form, is that the outcomes of the exchanges taking place in the employee/employer marketplace are efficient, and therefore wages reflect individual productivity. Poverty is consequently seen as the product of poor individual choices. Within this classical theory is the view that the poor are in their situation due their culture, their beliefs, values and attitudes. The idea is that there exists a different culture, almost a sub-culture, whereby people hold an attitude of helplessness or fatality that stops them attempting to better their position (Lewis 1962). As a result they do not see education or employment as a way out of their predicament and do not see the point of holding any savings. State intervention is generally viewed adversely as a source of economic inefficiency, with welfare programmes thought of as a potential cause off or reinforcement of poverty (Davis & Sanchez-Martinez 2015). A more

detailed analysis of the sociological perspectives on poverty can be viewed in Shildrick & Rucell (2015).

This notion of culture impacting on poverty has re-surfaced over recent years but couched in a slightly different form. The rhetoric now, particularly at the UK Government level, is around a 'culture' of welfare dependency and worklessness. Allied to this is the notion of intergenerational dependency whereby a set of behavioural traits and dispositions among specific families are 'transmitted' from one generation to the next. This idea is reflected in Ian Duncan Smith's foreword (DWP 2011) where he wants to 'break the cycle of deprivation too often passed from one generation to another', echoing the speech made by Keith Joseph in the early 1970s about the 'cycle of deprivation'. Recent evidence suggests that such rhetoric is baseless with very little evidence existing of inter-generational poverty (Nelson et al. 2013) or inter-generational worklessness (Rosso et al. 2015).

In chapter 4 I look for evidence of some of these behaviour traits in rural Scotland. To test for inter-generational poverty or worklessness requires data covering a long time period. Such longitudinal survey data is not available with sufficient number of respondents or over a long enough time period in rural Scotland to derive statistically robust conclusions on inter-generational poverty but what data there is does help identify individuals or households who are in poverty or without work for more than one or two time periods or who meet the definition of persistent poverty (defined later in this chapter).

The neo-classical theory of poverty is an extension of classical poverty; in terms of a person's talents, skills and capital determining productivity, with poverty deemed to be a result of market failure. The main difference between the classical and neo-classical theories lies in the concept of utility, the perceived value or satisfaction of goods and services received by the consumer. The assumption is that the consumer is rational and will attempt to maximise their utility. Allied to this is the notion of marginal utility, the additional satisfaction a consumer gains from consuming one more unit of a good or service. Early neo-classical economists believed that there was diminishing marginal utility across income, meaning that an extra unit of income was more valuable to a person who is poor than to someone who is rich, so income re-distribution raises overall utility. Among many later neo-classicists, poverty alleviation is not regarded as an overriding economic objective and there is an aversion to policies of redistribution (Davis and Sanchez-Martinez 2015). Poverty reduction is regarded as desirable only if it increased efficiency in the allocation of resources among the population.

It is within the neo-classical school of economic thought where income is first regarded as the primary consideration in the alleviation of poverty as it enables people in poverty to gain purchasing power and access to resources otherwise unavailable to them (Bhalla 2002). Under this monetary approach poverty is then defined as a shortfall in income below some specific poverty line. Also fitting within the monetarist neo-classical view of poverty is the minimum standards approach that proposes a certain level of income as the level of resources everybody should be entitle to. Joseph Rowntree was the first to undertake such an approach (Rowntree 1901). In the next section of this chapter I discuss Rowntree's and other similar methodologies in more detail.

The creation of the Welfare State in the UK stemmed from a slightly more liberal view than the classical definition of poverty and in the support for those in its grip, although to some extent the believers of classical and neo-classical poverty have never gone away. The liberal theory on poverty revolves around the idea that not only market distortions but also broad underdevelopment, in its multiple facets, cause poverty (Davis & Sanchez-Martinez 2015). Underdeveloped facets include poor levels of: human capital (health, skills, education); business capital (machinery and buildings); infrastructure (transport, power, sanitation); natural capital (viable land); public institutional capital (rule of law and security); and knowledge capital (know-how needed to raise productivity). Many of these structural issues are particularly applicable to developing countries, but in many respects differences within them may be visible for those suffering poverty in urban and rural areas of Scotland. An example may be geographical isolation, which may impede the import of goods and services with a resulting price differential.

J.M. Keynes, the pioneer of liberal economics, believed that market forces can promote economic development, which in turn was perceived to be the single most important tool against poverty. It follows that under this liberal theory, poverty can be seen as a reflection of market failure. Poverty can also be regarded as a reflection of market failure under the classical and neo-classical theories but the difference is that a large allocation of powers are given to the state to resolve the problem in a liberal/Keynesian economic system. One such power, was investment in public education, promoting human capital accumulation. Another is the encouragement of aggregate investment, with its positive effect on employment. Within this is the public investment of government revenues raised by taxes or bond issues. Such investment was identified as a key element in generating the type of growth that permits poverty relief. Growth however, is not the panacea to poverty reduction. The growth in wages that usually

follow a growth in Gross Domestic Product (GDP) can cause surges in relative poverty if wage dispersion also rises. Poverty rates can actually persist and even grow despite economic growth if the deprived are not also seeing their wages rise (Dickens & Ellwood 2001).

The liberal/Keynesian economic theories take a more macro approach compared to the micro orientation of the earlier classical and neo-classical models. Other macroeconomic considerations, beyond the promotion of human capital and public investment described above are inflation, high sovereign debt and asset market bubbles. Inflation can depress real income and generate poverty, particularly when the wages of the poor stagnate or grow at a lower rate than prices. High sovereign debt can lead to austerity programmes, as experienced in the UK over recent years. Such programmes can impact on the allocation of public resources to poverty alleviation and the sovereign debt can worsen poverty by impeding economic growth. An example of an asset market bubble is a large increase in housing prices and related rises in rents that deny vulnerable groups access to the housing market and increase the likelihood of homelessness.

A more radical or Marxist theory on poverty suggests that class and group discrimination is central to poverty. It is considered a moral as well as a technical issue and economic growth alone may be insufficient to reduce it. The state is considered to have a central role in market interventions (such as anti-discrimination laws and setting a minimum wage). The Marxist theory suggests that capitalist states keep the cost of labour unnaturally lower than its value, with the added threat of unemployment, and therefore poverty in a capitalist economy can only be alleviated by strict regulation of the market, in the form of a minimum wage. The justifications for a minimum wage include: low wages prevent individuals from saving which in turn increases the likelihood of entering poverty upon a negative socio-economic shock; and low earners are more likely to suffer poor health, which can lead to reduced human capital and reduce chances of exiting poverty (Pemberton et al. 2013). To some degree the levels of in-work poverty may explain the extent of low pay (or low hours in work), and as highlighted elsewhere in this thesis, the level of in-work poverty has increased over recent years. As part of my study, I have compared the level of in-work poverty across Scotland's urban-rural divide.

As described elsewhere in this thesis, many of the recent definitions of relative poverty include an element describing a lack of participation in the economic or social norms of a person's society. The term social exclusion has been added to the poverty debate and the resulting social exclusion/social capital theory of poverty. Within this theory it is thought social as well as economic considerations explain poverty. The result of poverty is a lack of contact

with positive role models and a disconnection from social networks is a cause of persistent poverty (Davis and Sanchez-Martinez 2015). Poverty is viewed as non-participation in consumption, production, political engagement and social interaction (Morazes & Pintak 2007).

Reimer proposed that processes of social inclusion/exclusion may be seen to operate through four social systems: market relations, or private systems; bureaucratic relations, or state administration systems; associate relations, i.e. collective action processes based on shared interests; and communal relations, based on shared identity, among family and friends networks (Reimer 2004). The author viewed these four systems not only as the underlying dimensions of social exclusion but also as dimensions of individuals' and communities' capacity to act. Such a definition provides a framework for looking at the processes by which social exclusion might occur but does not establish a benchmark for the level of exclusion. A criticism of social exclusion is that it suffers from an undue emphasis on boundary formation and the implicit notion that all but a few are included in a cohesive society undifferentiated by class or social division (Shucksmith 2012).

Social exclusion is evidently difficult to define and thereafter measure. One way to define it is relative to a society's normal activities. There is then the problematic issue of aggregating the different dimensions of exclusion. One such measure that captures social exclusion, plus a number of other additional issues, is the Human Development Index (UN 2015). The adoption of social exclusion as an element in poverty related policies allows discussion to move beyond child poverty, pensioner poverty, and working-age poverty to include health and neighbourhood inequalities in addition to income inequality (Morazes & Pintak 2007). One aim within my study is to test if any such sub-population inequalities exists across the urban-rural divide in Scotland.

The other component of this theory, social capital, consists of connections among individuals, including the social networks, as well as norms of reciprocity and trustworthiness that arise from them (Putnam 2000). Pierre Bourdieu defined the concept of social capital is 'the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance or recognition' (Bourdieu 1986; p248). At its most basic, social capital has been described as the consequences of social position in facilitating the acquisition of standard human capital characteristics and thus economic status (Loury 1977). This definition can help explain the occurrence of poverty, by highlighting different economic outcomes between different groups of people, ethnic minorities and non-minorities for example.

Putnam breaks down his theory into two components; bridging social capital and bonding social capital. In relation to poverty, a lack of bridging social capital can exacerbate the social isolation in already poor neighbourhoods, resulting in a lack of contact with positive role models or the ability to find employment, and thereby obstructing exit routes out of poverty. A lack of bonding social capital can have a negative impact on the incidence of poverty through problems relating to the communities social organisation and a general lack of trust, reciprocity and social support (Davis and Sanchez-Martinez 2015).

Of particular interest to my study of poverty across rural and non-rural Scotland and the inclusion of any social capital measures in my analyses, is the notion that while low levels of social capital can cause poverty, the opposite may not necessarily hold true. It is possible that those in poverty may belong to groups characterised by high social capital, but they do not have the resources or skills to make use of that social capital. Such situations perhaps make the inclusion of a social capital measure problematic in my analyses.

Defining Poverty and how it is Measured

The aim in this section is to describe those definitions of poverty that have been identified from the literature. The words of (Zaidi et al. 2005) illustrate that 'while poverty…….. is an important research domain in its own right, findings and their interpretation are strongly influenced by the conceptualisation and measurement of poverty' (p544).

A meaningful and robust definition of poverty is therefore vital. There has been much debate on the meaning of poverty and for a term that is regarded as a universal concept its definition is often contested[8]. The most basic poverty, absolute poverty is defined as:

> *a condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. ……..its requirements stay the same even if the society is becoming more prosperous*. (UN 1995)

An absolute definition of poverty such as this is rarely used (or measured) in developed countries. As Townsend points out 'people's needs, even for food, are conditioned by the society in which they live and to which they belong, and just as needs differ in different societies so they differ in different periods of the evolution of single societies. Any concept of poverty as 'absolute' is therefore inappropriate and misleading.' (Townsend 1979: p38).

[8] (Decancq et al. 2013) provides a useful summary of various definitions suitable in a European context and how they are contested.

A definition more appropriate for developed countries such as Scotland is that of relative poverty. Perhaps the earliest definition of relative poverty came from the father of modern economics, Adam Smith who defined poverty as the inability to purchase necessities required by nature or custom (Smith 1776). There exists a plethora of definitions of relative poverty but most (Townsend 1979; Oppenheim 1990; Brown et al. 2002) reflect the definition of relative poverty as 'individuals or families whose resources are so small as to exclude them from the minimum acceptable way of life of the Member State in which they live' (EC Council Decision 1975, cited by Gordon 2006). A slightly longer version of this EC definition became the official definition of poverty across all European Commission Member States in 1985. What relative poverty means will vary from country to country, depending on the standard of living enjoyed by the majority. Poverty is relative to the place and time that you live in (Mack 2013). While not as extreme as absolute poverty, relative poverty is still very serious and harmful (EAPN 2013).

The Beveridge report of 1942, with one of its key aims the 'Abolition of wants' led to the subsistence idea based on the minimum standards required to maintain physical efficiency of the populace. Subsistence rates were devised based on a minimum basket of goods and were designed as a payment to keep the recipient out of poverty, but only for the short-term. These rates became the standard for several decades.

The Beveridge approach might be termed a minimum budget standard as the aim is to determine the budget necessary for households to maintain a minimum standard of living. Any households whose income falls below this minimum are deemed to be in poverty. Such an approach was not new. A similar exercise was first undertaken by Joseph Rowntree in York in 1899[9]. A key issue with this methodology is how to decide which goods and services should be included in the basket on which the minimum budget is based. In both instances discussed here it would appear to have been expert rather than public opinion that was used to do this. As will be shown later, researchers such as Townsend (1954) regard the use of expert rather than public opinion, plus the ignoring of actual spending patterns, as major flaws in the methodology used by Rowntree and Beveridge.

A more consensual approach that addresses some of the concerns expressed by Townsend was developed from the early 1980s. The first in Britain was a survey carried out in 1983 by Mack and Lansley and published in Poor Britain (Mack & Lansley 1985). Nearly 1200 households

[9] Other early studies on poverty can be seen in Glennerster et al. (2004).

were surveyed with the aim of defining poverty from the viewpoint of the general public's perception of minimum need.

A follow up 'Breadline Britain in the 1990s' (Gordon & Pantazis 1997) took a similar approach asking respondents about a list of 44 items designed to cover the possessions and activities deemed important. Items were regarded as necessities if more than 50% of respondents agreed and if the respondent did not have this 'necessity' their index of deprivation increased by one. Thirty-two of the 44 items were regarded as necessities after the sample had been weighted to represent the general population. As Pantazis et al. (2006) point out, the 1983 and 1990 Breadline Britain surveys were able to provide direct evidence of poverty and its trends during the years of the Thatcher led Conservative Government by measuring the number of people who were poor in terms of being unable to afford items that the majority of the general public considered to be basic necessities of life.

A similar approach was taken with the PSE1999 survey[10]. As with the two Breadline Britain surveys discussed above, the aim was to use comparable methods to identify the items that a majority of the population deem as necessary. In addition, this survey also considered a new concept in social policy and poverty rhetoric, social exclusion. The PSE 1999 survey generated its results via several means: the 1998/99 General Household Survey (GHS) to gather data on the socio-economic circumstances of the respondents; the June 1999 ONS Omnibus Survey which included questions asking the public what they considered to be necessities; and a follow-up survey in September and October 1999 where a sub-sample of the above GHS survey were interviewed to identify how many respondents lacked necessities and to collect other data on poverty and social exclusion.

A similar survey was carried out again in 2012 but at the time of writing little published material was available. Some early results in the summary document 'The Impoverishment of the UK' (Gordon et al. 2013) paint a bleak picture suggesting that over 30 million people in the UK are suffering some degree of financial hardship and almost 18 million cannot afford adequate housing. In addition, almost 12 million people are too poor to engage in common social activities considered necessary by the majority of the population. An interesting addition to this PSE2012 survey is an online 'Necessities of Life Survey' which members of the public can complete. With regard to any analyses for this thesis, an issue with the PSE surveys is the depth of data available at the rural Scotland level. Numbers are insufficient to draw any statistically

[10] Other examples of the consensual approach can be seen in Niemietz (2011).

meaningful conclusions. A planned boost of 220 households, mostly in rural areas, would go some way to alleviating this problem[11].

A study with a slightly different emphasis is the present day research on the Minimum Income Standard (MIS) project funded by the Joseph Rowntree Foundation. This is an on-going programme of research to define what level of income is needed to allow a minimum acceptable standard of living in the UK today. It brings together two approaches to setting budget standards: the 'consensual' negotiation of budgets by panels of ordinary people, and budgets based on research evidence and expert judgements. This initially looked at costed baskets of goods and services deemed necessary as a household minimum standard of living for urban households (Bradshaw et al. 2008) and later revised and updated by (Hirsch 2013) and (Davis et al. 2014). Later work produced an MIS for rural England for which different baskets of goods and services were created for rural towns, villages and hamlets (Smith et al. 2010) that allowed householders the same minimum standard of living as their urban counterparts while accounting for their differing needs and expenditures. Most recently, (Hirsch et al. 2013) extended this process further by doing the same in three areas of remote rural Scotland: the Highlands, the Islands and remote Southern Scotland. Some of the results of this study are discussed in more detail later in this chapter.

It is important to recognise that MIS[12], while relevant to the discussion on poverty, does not claim to be a poverty threshold. The participants in the surveys were not specifically asked to talk about what defines poverty. Almost all households officially defined as being in income poverty (below 60% of median income) are also below MIS. Thus households classified as in relative poverty are generally unable to reach an acceptable standard of living as defined by members of the public (Hirsch et al, 2013).

Many definitions of poverty have been signed up to by the UK government as part of international treaties or agreements over the last four decades or more. However, as Gordon et al. (2000) explain, there exists a problem of extricating the concept of poverty from political ideology whilst simultaneously widening scientific perspectives from narrow concerns with the physical and nutritional needs of human beings to include their complex social needs.

[11] An initial analysis of the PSE2012 survey data, including analysis of poverty in rural Scotland, was published very near the completion of this thesis (Bailey et al. 2016). Some details from this are discussed in my conclusion chapter.

[12] The MIS project website (minimumincomestandard.org) has set up a minimum income calculator in which the user can input their family type, make adjustments for their own situation and compare their income with the minimum. On this comparison page there is a link to information that may help those whose income is lower than the suggested minimum for their situation. Accessed 27/05/2016.

One example of the political ideology Gordon and colleagues discussed here was a speech given on 11th May 1989 by John Moore the UK minister for Social Security. He claimed that poverty as most people understood it had been abolished in the UK and that critics of the conservative government's policies were 'Not concerned with the actual living standards of real people but with pursuing the political goal of equality….' (Gordon & Townsend 1990).

Even with the existence of a plethora of poverty definitions, the primary definition used for official statistics by the UK & Scottish Governments and many others worldwide is one based on relative income. Households with income below 60% of the median income are regarded as in poverty, a measure decided on in 1998 by the Statistical Programme Committee of the European Union (Eurostat Task Force 1998). This proxy measure is essentially arbitrary as it has no validation from direct measures of people's living standards. However, it does allow comparison with other countries, can be tracked over time and shows how the poorest members of society are doing in relation to others. In the UK this measure of poverty levels is recorded annually in the Households Below Average Income (HBAI) statistics, available online through the UK Government website[13].

Many have criticised the 60% threshold figure and argued for alternative poverty standards, e.g. Marx & Bosch (2007) or Bradshaw & Mayhew (2010) who each suggest budget standards as preferable with the latter also suggesting the use of a deprivation index. Up to date figures from the Scottish Government (that are not summarised by rurality), suggest that there were 730 thousand individuals in relative poverty (before housing costs) in Scotland in 2013/14 (Poverty Truth Commission 2015). This is a drop of 90,000 on the previous year. Part of this drop could be explained by what many regard as a flaw in the use of 60% of household income threshold methodology in calculating relative poverty. Even the UK Government's own consultative document (albeit at a UK rather than Scotland level) on measuring child poverty (DWP 2012a) acknowledges the percentage of median threshold produces some arguably absurd anomalies, particularly when there is a fall in the median income that pushes the relative poverty line down:

> *These [latest] figures showed that 300,000 fewer children were in relative income poverty between 2009-10 and 2010-11. This was largely due to a fall in the median income nationally, which pushed the relative poverty line down…….poverty remained unchanged. For the 300,000 additional children no longer in poverty [by this statistic], life remained the same… (DWP 2012a: p10)*

[13] HBAI statistics are available here (Accessed 27/05/2016):
https://www.gov.uk/government/collections/households-below-average-income-hbai--2.

The House of Commons Scottish Affairs Committee second report of 2007 (House of Commons Scottish Affairs Committee 2007) actually went so far as to recommend that the Government should review its preferred measure (the 60% threshold), suggesting that the poverty line should instead represent a minimum adequate income. Such an approach has been carried out by Bradshaw et al. (2008), Smith et al. (2010), Hirsch (2013), Davis et al. (2014) and Padley et al. (2015) in their work on Minimum Income Standards (MIS) discussed earlier in this chapter. Instead, I have examined, within the relative income definition of poverty, just how sensitive poverty levels are to the level of income threshold applied. Of particular interest in this thesis is a comparison of the sensitivity in poverty levels in urban and rural Scotland: will a 5% rise in the income threshold, for example, result in a larger or smaller change in poverty levels in rural compared to urban Scotland.

A further issue with the relative income threshold definition relates to housing costs. There is considerable debate among poverty analysts on whether it is more accurate to measure poverty using an after housing cost (AHC) rather than before housing cost (BHC) measure, as the former will better reflect the actual disposable income of households. In particular, the measure used can have a bearing on the poverty rates among sub-populations. This has been illustrated by comparing children and pensioner poverty rates (McKendrick 2011). Children show a higher poverty rate with the after housing cost measure than they do with before housing costs. In contrast, pensioners have a higher poverty rate with a before housing cost measure. Most official government poverty statistics are reported before housing costs, primarily for the purposes of tracking progress, and for comparison purposes this measure has been used throughout this thesis. The after housing measure has not been dropped entirely. It may be revealing to test the sensitivity of poverty levels to both the before and after housing costs. These before and after housing cost poverty levels are compared in some of the analysis in chapter four.

Defining Poverty among Population Sub-groups

The review so far has only considered poverty at the overall national level. The literature also highlights some population groups that may have their own poverty definition. These groups include gender, children, the low paid (or in-work poverty), the elderly, ethnic minorities[14] (Bell 2013) and those in fuel or persistent poverty. To date it would appear that

[14] The population of ethnic minorities is low in rural Scotland and numbers are so low as to not provide any statistically robust conclusions so any further discussion will not include this group. Matthews et al.

very little research has been carried out that considers any variation in poverty levels across the urban-rural classification in Scotland for population sub-groups. National figures are available, for example, in-work, pensioner and child poverty (all three in Scottish Government 2013a), and lone parent poverty (Davis 2012; Bell 2013).

Gender Poverty

Gender is an element of social relations based on perceived and actual differences between the sexes and expressed in symbols, norms, institutions and politics, and subjective identities (Scott 2008 cited in Bennett & Daly 2014). Razavi argues that gender analysis of poverty is not so much about whether women suffer more poverty than men, but rather about how gender differentiates the social processes leading to poverty, and the escape route out of destitution (Razavi 1998: p2). Of interest in this thesis is the extent to which the factors I identify from the literature show differing associations with being in poverty or transitioning into and out of poverty across the genders.

Typically poverty is measured at the household level so in a household with an adult couple, either both partners are in poverty or neither is in poverty. Accordingly most differences in poverty rates by gender rest upon the differences between single adult households that are headed by men and by women.

There are three primary reasons why single women households could be poorer than single men households: more single women live with children; women's earnings are lower than men's; and gender inequality in government transfers (Christopher et al. 2002). Most single parent households have a woman as the head of household, since women usually gain custody of the children on marital breakups or non-marital births. How people qualify for government transfers, in the form of benefit payments, has a gender implication. Historically, men were more likely to qualify for higher status individual benefits, with women tending to get derived benefits via their partner, or lower status means-tested benefits (Bennett & Daly 2014). Poverty data from the Scottish Government shows poverty rates (after housing costs) among single working age adults without children that are similar by gender at around 25% in 2014/2015. In the same period female lone parent households had a poverty rate of 37% (Scottish Government 2016).

(2012), for example, illustrate the vulnerability of ethnic minorities to poverty in urban Scotland, as does (Platt 2007) in the UK.

Child Poverty

A rights based approach forms the basis for protection from poverty of vulnerable population groups, particularly children. The rights of children are covered by The United Nations Convention on the Rights of the Child[15]. This was ratified by the UK Government in 1991 and although not incorporated into domestic law, its recommendations would always be considered. A paper by the Office of the Children's Commissioner suggests that the recent 'austerity reforms' are impacting negatively on children in the UK and that the Government is failing to meet several articles of intent under the treaty (Office of the Children's Commissioner 2013).

A combined measure is used by the UK and Scottish Governments as one of the indicators of child poverty. Under the 2010 Child Poverty Act the UK Government targets a child poverty level below 10% by 2020. The Government is also required to report on four indicators of child poverty: relative poverty; absolute poverty; persistent poverty; and a combined material deprivation and low income measure. The measure of the latter is The Scottish Government National Indicator 36 'reduce children's deprivation' under its National Performance Framework.

A similar combined income and material deprivation measure has been suggested in the methodology put forward by Magadi & Middleton (2007) and used by Save the Children (Phillips et al. 2011). Here an income figure of 50% below median is used and combined with a material deprivation measure, in this case where both adults and children lack at least one basic necessity, and either adults or children or both groups lack at least two basic necessities. Under this methodology Phillips et al. (2011) suggest that 9% of Scottish children are living in extreme poverty.

In Scotland, the Child Poverty Strategy for Scotland (Scottish Government 2011b) forms the central plank of its poverty alleviating policies and sets out plans for reaching each of the targets in the 2010 Child Poverty Act. These targets are unlikely to be reached. Alan Milburn, the chairman of the UKs Commission on Social Mobility and Child poverty has stated that "I don't think there is a cat in hell's chance that the 2020 [child poverty] target will be hit" (The Independent[16], 21st Apr 2013). In July 2015 the UK Government Work and Pension secretary

[15] Available from http://www.ohchr.org/EN/ProfessionalInterest/Pages/CRC.aspx Accessed 15/02/2016.
[16] Alan Milburn's comment was accessed on 31/07/2013 from http://www.independent.co.uk/news/uk/politics/alan-milburn-and-gillian-shephard-the-government-must-be-judged-by-its-actions-not-words-our-job-is-to-judge-the-actions-8582000.html.

Iain Duncan Smith announced that the child poverty target is to be scrapped and replaced with a new duty to report levels of educational attainment, worklessness and addiction, rather than relative material disadvantage. The indicators will continue to be published but will no longer be seen as part of a target[17].

At a UK level, households with three or more children are regarded as a driver of child poverty (DWP 2014; Lopez Vilaplana 2013). According to the most recent HBAI statistics around 25% of households with three or more children were in poverty (BHC) in the UK during 2011-12 compared to 15% in smaller households with two or less children (Department of Work and Pensions 2005). Such a difference warrants inclusion of this as a factor in my later analyses. Of particular interest for this thesis is how child poverty varies across the urban-rural classification and in chapter 4 I consider any such differences among households with three or more children using the relative income measure of poverty.

Poverty among the Low Paid (In-work Poverty)

In-work poverty consists of individuals and families who maintain regular employment but their income levels are low and dependent expenses so high that they remain in relative poverty. The official Employability Scotland definition of in-work poverty is individuals living in households where the household income is below the poverty threshold despite one member of the household working either full- or part-time[18]. Research carried out for JRF (Aldridge et al. 2012) suggests that in-work poverty has been rising steadily for the last decade, while Bell (2013) suggests that currently 48% of all poor individuals in the UK have someone in work in the household. In Scotland this figure was 52% in 2014 (Scottish Government 2015d). When in-work poverty is viewed in terms of the decent living income level suggested by the Minimum Income Standard team the UK figure rises to 62% in 2013/2014 (Padley & Hirsch 2016).

To Pennycook & Whittaker (2012) the rise in in-work poverty has closely mirrored the patterns of earnings inequality in the lower half of the income distribution over the last three decades. The authors suggest Britain has one of the highest incidences of low paid work in the Organisation of Economic Cooperation and Development (OECD) countries. The authors also provide some official 2011 figures that suggest that the proportion of the population in Scotland on low pay (below two-thirds of median hourly pay) is actually lower than in many

[17] http://www.theguardian.com/society/2015/jul/01/government-scrap-legal-requirements-child-poverty Accessed 5th October 2015.

[18] Definition downloaded last on 8th June 2016 from http://www.employabilityinscotland.com/barriers/poverty/what-you-should-know-about-tackling-poverty/poverty-and-employment/in-work-poverty/.

other regions of Great Britain, with the exception of London and the South East. The data is not broken down by rurality.

At a UK wide level (Spannagel 2011) the primary explanatory factor for in-work poverty is poor educational levels as it markedly increases the risk of earning low wages. The author also suggests household related factors associated with in-work poverty: financial resources of all household members; any household benefits; and the household composition. Within the latter, households with many dependent children or lone parents are at the greatest risk of in-work poverty.

Poverty among the Elderly

Across the UK poverty levels among the elderly have halved since the 1990s (Aldridge et al, 2012). Research suggests that pension provision for those living in rural areas of the UK is lower than in the rest of the country, primarily due to lower paid work (Chapman et al. 1998; Kotecha et al. 2013). Conversely, affluent in-migrant retirees in some pockets of rural Scotland may be resulting in the opposite effect, that pension provision is higher in some rural areas. It is possible therefore that the reduction in poverty among this sub-group of the population has not been realised equally across the urban-rural divide.

In addition to the usual relative and absolute poverty measures (both before and after housing costs) the Scottish Government also use a Pensioner Material Deprivation Index. Within this, pensioners are asked to give a reason why they do not have an item or access to a service and their response is used to judge whether or not they are materially deprived (Scottish Government 2012a). This is a stand-alone indicator not combined with household income information, as for the child deprivation indicator described elsewhere in this chapter. The index is not without its detractors, particularly in relation to the range of items and services pensioners are asked if they have access to (McKay 2008). Part of the issue here is that older groups have proven to be less likely to say they do not have particular items because they cannot afford them. Instead, the items absence is down to not wanting them, which raise the question of whether they can afford them if they do not want them. Given these concerns, and this index not being included in my chosen dataset, I have restricted my analysis to the use of the relative income measure.

Fuel Poverty

A household is deemed to be in fuel poverty if they are required to spend more than 10 per cent of their household income on household fuel and in severe fuel poverty if more than 20% is required (Scottish Government 2013b). An alternative definition (Hills 2012) may provide a better reflection of the increased costs of household fuels faced by rural households. Under this alternative definition, households are considered in fuel poverty if: they have required fuel costs that are above the contemporary median level, and were they to spend that amount, they would be left with a residual income below the official poverty line. This alternative definition offers scope for further work and is discussed in more detail in the concluding chapter. I have applied the official Scottish definition in my analyses.

In 1996 the number of households in Scotland in fuel poverty was around 36% and this dropped to a low of around 13% by 2002 (Wilson et al. 2012). Since then the percentage of households across Scotland in fuel poverty gradually increased to reach 34% in 2009. More recently the rate has fluctuated around the mid to high third decile, at 39.1% in 2013 (Mueller et al. 2013). Interestingly for this thesis, the 2013 fuel poverty rate in the Mueller paper, when analysed by rurality, show 55% of rural households to be in fuel poverty, compared to 36% in urban Scotland. The primary cause of the increase in fuel poverty rates has been put down to increases in fuel prices which have only partially been offset by rising incomes and energy efficiency gains.

Fuel poverty is particularly high in rural areas due to a combination of demographic considerations: the high number of older households; infrastructure, with properties off the gas grid and limited fuel choice; plus matters relating to the housing stock with more detached and hard to insulate homes (Scottish Government 2008b)[19]. According to this same source, there are three principal issues that determine the number of households that are fuel poor: fuel prices, household incomes and the energy efficiency of housing. Almost a quarter million of all of Scotland's 2.4 million households are off the mains gas grid. Most of these are in rural Scotland and make up more than a half of the rural housing stock (Mueller et al. 2013). Grid gas is the cheapest of the major commercial fuels so households off the grid are therefore likely to be paying premium prices for alternatives such as oil and LPG. Added to this will be the extra fuel expenditure resulting from houses having poor energy efficiency. Around 19% of homes in

[19] At a local authority level the highest proportions of fuel poverty are in the Orkney Islands and the Western Isles (Wilson et al. 2012).

remote rural Scotland have poor energy efficiency compared to 7% in accessible rural areas and less than 1% in the rest of Scotland (Scottish Government 2012b).

Persistent Poverty

Over recent years the UK Government has attempted to look at the durational aspect of poverty. A type of poverty regarded by the UK coalition Government as one of its 'key indicators' in its social justice strategy is persistent poverty (DWP 2012b). This is defined as having an equivalised disposable income below the 60% of median threshold in the current year and in at least two of the preceding three years by Ozdemir & Ward (2010), a definition used across the European Commission.

Other definitions of persistent poverty have been suggested in the literature. Foster (2009) sets his measure as the proportion of periods that an individual has been in poverty over a time period, irrespective of the timing of those episodes of poverty. In another definition, to account for the bunching effect of poverty, i.e. where poverty states occur together, they may have a bigger impact than if the poverty states are interrupted by periods of affluence, a count is made of the number of consecutive periods of being in poverty (Bossert et al. 2008). A similar definition counts the number of periods of uninterrupted affluence over previous time periods, with longer spells of affluence thought to impact less on an individual's subsequent poverty spell than short periods of affluence (Dutta et al. 2013).

Closely allied to persistent poverty is repeated spells of poverty. To Nolan et al. (2006) recurrent poverty refers to households falling below the income threshold more than once but not for more than two years in any one spell. The same authors also describe another group of the poor, those in transient poverty who are below the poverty threshold for only one spell of no more than two years. These two definitions along with persistent poor (as defined by Ozdemir & Ward above) and persistent non-poor (never below the income poverty threshold) have been used by the authors to examine child poverty in Northern Ireland (Nolan et al. 2006). I have made use of the European Commission definition throughout my analyses, i.e. falling below the income threshold in the current year and in two of the previous three years.

Figures published by the Scottish Government suggests that for the period 1999 to 2008 persistent poverty has been higher in Scotland than in England. In 1999 Scotland's persistent poverty sat at around 13% compared to 10% for England and Wales. By 2008 these figures were 9% and 8% respectively (Scottish Government 2011a). Unfortunately, the follow-up

Statistical Publication (Scottish Government 2012a) does not include estimates of the number of individuals in persistent poverty for later years.

Defining Rural Scotland

Scotland has an urban-rural classification that is unique in the UK. The Scottish Government use an 8-fold Urban Rural Classification, introduced in 2000, to classify different areas of Scotland. This urban rural classification is divided on population sizes but also takes account of drive times to larger settlements to divide Scotland into the 8-fold version shown below in table 2.1. A reduced form 6-fold version of the classification combines categories 4 and 5 (in table 2.1) into one remote small town category and categories 7 and 8 into one remote rural category with all other categories unaltered.

The Scottish Government currently defines rural Scotland as areas with a population of less than 3,000 inhabitants, i.e. categories 6, 7, and 8 in table 2.1. In England and Wales the definition is different from that used in Scotland. Output areas are treated as urban if the majority of the population of an output area lives within settlements with a population of 10,000 or more, with the remaining output areas regarded as rural (ISER 2008). A further difference to the definition used in Scotland is that England and Wales rural output areas are divided into areas that are predominantly town and fringe, predominantly village or predominantly dispersed (the latter includes hamlets and isolated dwellings). In Northern Ireland a settlement size of less than 4,500 people determines rural areas. Across the countries of the United Kingdom we see three different population cut-offs to define rural areas. I have failed to find any literature that determines the basis on which each of these cut-offs were derived. There does not appear to be any theoretical reasoning underpinning any of them and the Scotland definition is the only one to include any recognition of accessibility to larger settlements. Given what appears to be the arbitrarily derived cut-offs defining rural areas it may be revealing to try alternative divisions of the eight Scottish urban-rural categories and view the poverty levels therein.

The OECD applies a different regional typology, based on population density (OECD 2008). Under this scheme there are three classification: predominantly rural regions; intermediate regions; and predominantly urban regions, according to the share of population that live in areas of less than 150 inhabitants (more than 50%, 50% to 15%, and less that 15% respectively). Interestingly, there is a proposal to extend the OECD system to take the accessibility issue of

rurality into account, which would make the new typology a closer match to that used in Scotland (Bertolini et al. 2008).

Table 2.1: Scottish Government 8-fold Urban-Rural Classification

1. *Large urban area:* settlement of over 125,000 people
2. *Other urban area:* settlement of 10,000 to 125,000 people
3. *Accessible small town:* settlement of 3,000 to 10,000 people, within 30 minute drive of a settlement of 10,000 or more
4. *Remote small town:* settlement of 3,000 to 10,000 people, with a drive time of 30 to 60 minutes to a settlement of 10,000 or more
5. *Very remote small town:* settlement of 3,000 to 10,000 people, with a drive time of over 60 minutes to a settlement of 10,000 or more
6. *Accessible rural:* areas of less than 3,000 people, within 30 minute drive of a settlement of 10,000 or more
7. *Remote rural:* areas of less than 3,000 people, with a drive time of 30 to 60 minutes to a settlement of 10,000 or more
8. *Very remote rural:* areas of less than 3,000 people, with a drive time of over 60 minutes to a settlement of 10,000 or more

Source: http://www.scotland.gov.uk/Topics/Statistics/About/Methodology/UrbanRuralClassification Accessed 9th Sept 2016

The Scottish Government urban-rural classification has been carried out using data zones. These data zones are the core geography used for the dissemination of small area statistics in Scotland[20]. Each data zone has been assigned to an urban-rural category based upon the location of its population weighted centroid. Data zones were not designed to nest within the urban-rural classification and as a result some data zones do straddle the classification boundaries. Therefore, it may be possible to have postcodes and output areas that belong to one urban-rural category when classified based on the location of their centroid, but belong to another category when the data zone in which they are located is used to classify them (Office of the Chief Statistician 2014: p13). Such miss-classification appears to be a relatively minor issue. More than 99% of census output areas are assigned to the same category under their centroid classification and their classification based upon the data zone in which they are located, across the urban and small town classifications. In the accessible and remote rural classifications the degree of straddling is slightly higher and assignment to the same category drops to 92.4% in accessible areas and 94.9% in remote rural Scotland.

The rural Scotland population has fluctuated during the twentieth century and showed a steady decline during the latter years of the century. Recent data suggests that this trend of de-population of rural Scotland has reversed over recent years, particularly since 2000. Scotland's

[20] See http://www.scotland.gov.uk/Publications/2004/02/18917/33243 for more information on the Data Zone geography. Last viewed 27/05/2016.

rural population has actually increased, particularly in accessible rural areas and now sits at just below one million. Table 2.2 shows that there has been a 12% increase in the accessible rural population and a 6% increase in the remote (remote plus very remote) rural population between 2001 and 2010.

Table 2.2: Population by Geographic Area 2001, 2009 & 2010

	2001	*2009*	*2010*	*% change 2001-2010*	*% change 2009-2010*
Remote Rural	317,813	335,812	337,470	6.2%	0.5%
Accessible Rural	558,907	620,223	626,519	12.1%	1.0%
Rest of Scotland	4,187,480	4,237,965	4,258,111	1.7%	0.5%
Total	**5,064,200**	**5,194,000**	**5,222,100**	**3.1%**	**0.5%**

Source: Scottish Government, 2012. All figures are based on the Scottish Government six fold Urban Rural Classification 2009-2010.

Towns and settlements that have their population cross the various settlement size thresholds will impact on their urban-rural classification. A comparison of the map of the 8-fold version of the 2009-10 classification with the equivalent map for the year 2003-04 shows some very minor area changes. An example is the town of Stonehaven, 15 miles to the south and a 25 minute commute from Aberdeen. Between the years 2003 and 2010 the population there has crossed the 10,000 threshold and as a result the town has been re-classified from an 'accessible small town' to 'other urban area' and a considerable area of previously classified remote rural land has been re-classified as accessible rural. For ease of analysis, households that have had their urban-rural classification re-classified in this way have been dropped from my analyses. Details on the number of cases affected by this re-classification are described later in this thesis in the section outlining the sample selection criteria.

In terms of land area on which the rural population live, under the Scottish Government urban-rural classification, 94% of Scotland's land mass is classified as rural, split 69% remote rural (i.e. category 7 plus category 8 in the 8-fold classification) and 25% accessible rural (category 6) (Scottish Government 2012b).

Identifying Areas of Poverty and Deprivation in Scotland

The Scottish Government's primary tool for identifying those places in Scotland suffering deprivation and poverty is the Scottish Index of Multiple Deprivation (SIMD). The index is

designed to identify small area concentrations of multiple deprivation across Scotland using a set of indicators chosen to measure deprivation regardless of where a person lives[21]. The seven indicators or domains in the last SIMD of 2012 were: employment; income; health; education, skills & training; geographic access to services; crime; and housing.

SIMD divides Scotland into 6,505 small areas called data zones each containing around 350 households and ranks these data zones from 1 (most deprived) to 6,505 (least deprived). These are the same data zones that are used for Scotland's urban-rural classification described in the previous section of this chapter. Very few of these data zones in rural areas are among the most deprived 15%. In the 2012 SIMD only 2% of the 15% most deprived data zones are in rural Scotland (Scottish Government 2012c).

On face value such a result suggests that poverty and deprivation are much less of an issue in rural Scotland. However, the nature of poverty and deprivation in rural Scotland is more spatially dispersed than in urban areas and impacts on some of the indicators that make up SIMD and thus the data zone position within the index. It is this spatial dispersion, with rural data zones covering larger areas than their urban counterparts that make the use of SIMD questionable for the identification of small areas of multiple deprivation in rural Scotland. The Scottish Affairs Committee of the UK parliament, in conclusion 24 of its second Poverty in Scotland report stated:

> *We conclude that rural poverty presents its own challenges, which will not be solved by an approach tailored to the small pockets of deprivation characteristic of urban poverty. It is vital that the Government's anti-poverty policies are subject to 'rural proofing'……*
>
> (House of Commons Scottish Affairs Committee 2007)

Previous studies of concentrated poverty, which focused largely on inner-city neighbourhoods, may be missing an important spatial dimension of growing poverty during the 2000s (Lichter et al. 2012). The Scottish Government are aware of the limitations of using SIMD for rural Scotland and have considered how SIMD could be used to help identify some of the particular issues experienced in rural Scotland (Office of the Chief Statistician 2011a; Office of the Chief Statistician 2014). Until such changes can be made the Scottish Government will carry on using SIMD as it is to identify areas for poverty alleviation activities, with the result that some rural areas that warrant much needed assistance could be overlooked.

[21] http://www.gov.scot/Topics/Statistics/SIMD/FAQRuralIssues last viewed 27/06/2016.

Factors Associated with Poverty in Rural Scotland

In this section I have reviewed the literature to identify factors of rural life thought to impact on poverty levels there. In so doing, I have attempted to identify issues relating to the various facets of poverty theory. From the classical and neo-classical theories I have looked for factors relating to worklessness and persistent poverty. From the liberal theory of poverty I have looked for structural issues relating to human capital and infrastructure. Under these two broad headings are health, education, housing and transport. Also under consideration within the liberal/Keynesian theory are issues surrounding employment opportunities. Marxist theory suggests that class and group discrimination, plus stratified labour markets are central to poverty. Consequently, the issues of poverty by gender and minority groups, plus the extent of low wage jobs have been considered. Also under review in this section are poverty related issues that come under the social exclusion/social capital theory of poverty. To this end social as well as economic factors are examined. The aim has been to identify factors thought to be associated not simply with a household being in poverty, but also with households entering poverty or exiting poverty. The factors identified have formed the basis on which my hypotheses have been formulated and tested.

A key issue in this review is how rural Scotland has been defined in the research that I have examined. In some cases it is not clear that the Scottish Government definition of settlements with a population of fewer than 3,000 people has been the definition that was applied, in others it is obvious that a wider definition has been used. The current Scottish urban rural classification system was first used in the year 2000 so it is possible that research prior to that year applied an alternative definition. Such inconsistency can have an impact on the analysis in this thesis. Given that alternative definitions of rural Scotland have been applied in the identification of some factors it is quite likely that any statistical analysis will not show the association with rural poverty expected when the official definition of rural Scotland is applied.

Gibb et al. (1998) suggest that rural areas require a separate poverty analysis, taking account of uniquely rural forms of deprivation. Since then two reports by the Select Committee on Scottish Affairs on Poverty in Scotland (House of Commons Scottish Affairs Committee 2000 and 2007) highlighted some of the key issues that they suggest makes rural poverty distinct from that in urban areas.

The work by Gibbs and co-authors, plus the two House of Commons Scottish Affairs Committee reports provide a range of issues thought to be associated with poverty in rural

Scotland. These issues have been divided under the following broad headings: fragile jobs market; lower benefit uptake; higher cost of living; health in the household, household demographics; and other aspects. What follows is an examination of the literature that may or may not support the range of factors identified in the reports discussed above. In addition, a search for other influences has been carried out examining rural poverty beyond Scotland, in other similarly developed countries. Any additional considerations found have been included under the appropriate broad heading described above. All of the relevant factors identified in the literature, and their sources, are summarised in table 2.3.

Fragile jobs market: A fragile jobs market is cited in the first Select Committee report as a particular feature of rural life. In the same year as the first Select Committee report, Pion Economics (2000) produced an independent overview of research and developments in understanding and evidence of rural deprivation in Scotland. The report takes a broad view of poverty, including the wider notions of social and community disadvantage, and highlights several dimensions of poverty and deprivation that are different across the rural and urban domains. In addition, the report also lists the increased prevalence of seasonal employment, both agricultural or tourist based, together with lower average pay and limited job opportunities as features of rural life. Low pay and limited job opportunities in rural Scotland have also been identified in other research (McKendrick et al. 2003; Shucksmith & Philip 2000).

> *Research shows that the rural workforce is more likely to be faced with a limited range of employment opportunities, low pay, job insecurity, little scope for career progression, a paucity of training and careers advice, a high degree of non-unionisation and a need to travel some distance to the workplace.*
>
> (Shucksmith & Philip 2000)

Earlier qualitative research conducted in the rural councils of Harris, Wester Ross, Angus and North Ayrshire revealed people's experiences of the poverty and disadvantage in rural Scotland in the early 1990s (Shucksmith et al. 1994). These four council areas were selected to represent the four main types of rural area found in Scotland. A questionnaire survey of 500 households was followed by in-depth interviews with 120 respondents and included follow-up feedback meetings with the general public. This study found widespread poverty and poor employment opportunities, particularly among youths, plus other issues discussed later in this section. A particular finding from the survey was that a majority of respondents felt advantaged by their rural lifestyle rather than disadvantaged by it. Many households experiencing poverty and disadvantage rejected the objective assessment of their position (Shucksmith & Philip, 2000).

The combination of lack of employment opportunity, poverty and the resultant pressures had led to de-population of rural areas up to 2000 (House of Commons Scottish Affairs Committee 2000). This de-population of rural areas actually reversed in later years and was discussed in more detail in an earlier section of this chapter. Also highlighted in the House of Commons report are structural changes in farming that are thought to have impacted negatively on rural poverty in some areas with farms going out of business in locations already suffering high unemployment. The agriculture sector steadily contracted in the two decades to 2006 and in 2004 accounted for just 11% of rural employment (OECD 2008)[22].

The prevalence of second jobs, particularly in remote rural (8%) and accessible remote (6%) areas appears to differ markedly to the rest of Scotland (3%) (Scottish Government 2012b). Home working is also cited in this Scottish Government report as being much higher in remoter areas of Scotland. Early poverty analysis, at a wider scale than Scotland, suggests a key component associated with entry into and out of poverty is thought to be the change in the level of household labour market involvement (Bane & Ellwood 1986; Smith & Middleton 2007). McKendrick et al. (2011) have identified rural life problems that can impact on poverty and that apply to a greater extent than for urban households. These include reduced employment opportunities and the gender pay gap.

A literature review (McSorley 2009) suggests that there are five domains each with characteristics that are particular to rural areas thus making rural poverty different to urban poverty. These are very similar to those already identified in the Pion Economics report above: employment; income; housing; health; and access. The relevant key findings from this research was that rural employment levels are high but the work is often low paid, seasonal & part-time, resulting in the problem of working poor or in-work poverty.

In-work poverty has increased over recent years to the point where more than half of all households experiencing poverty have at least one member in work (MacInnes et al. 2013) and one reason put forward is that a UK Government policy focus on work first simply 'converted a significant minority of poor workless households into poor working households reliant on low

[22] An analysis of structural changes in any industry and how such changes directly impact on poverty levels is beyond the scope of this thesis. Such data is not available within my chosen dataset. However, the knock-on effect of such changes will be felt at the household level, particularly in terms of overall household income and this has been captured in the dataset. It would perhaps be revealing to examine any agriculture structural changes, and in particularly their impact on rural poverty in Scotland. This is an area worthy of further research and is discussed further in chapter 7.

pay' (Pennycook & Whittaker 2012; p7). Household labour market involvement is very much tied to household size, e.g. separation/divorce or widowhood impacting on the number of people in the household who are in paid employment. I discuss household type and its association with poverty later in this chapter but as may be expected, job loss and a drop in household income are most commonly associated with entry into poverty (Jenkins 2000; Jarvis & Jenkins 1997). A drop in household income could be due to changes in labour earnings, pension & private income, or benefit income.

Lower benefit uptake: A lower uptake of benefits among rural households was a key finding of the first House of Commons Scottish Affairs Committee, suggesting that benefit uptake may be lower in rural areas due to lack of anonymity and stigma coupled with pride and the ethos of self-help[23]. Research by Shucksmith et al. (1994), Pion Economics (2000) and McSorley (2009) each make the same observation. However, research also suggests that once other characteristics are accounted for then urban-rural differences in uptake are less marked (Bramley et al. 2000).

Higher cost of living/different consumption patterns: Several papers have highlighted the generally higher cost of living in rural areas (Shucksmith et al. 1994; House of Commons Scottish Affairs Committee 2000; Pion Economics 2000; McSorley 2009; EKOS 2009; McKendrick et al. 2011; McHardy 2012)[24]. The Rural and Environmental Analytical Services within the Scottish Government produced a review of information sources on the cost of living in rural areas and a key finding was the higher expenditure by rural households on fuel for transport and heating. However, in their concluding remarks they acknowledge that these sources would only provide a broad brush picture on the difference in living costs compared to urban areas and the data is in need of updating (REAS 2009).

Work by Hirsch et al. (2013) provides more up to date detailed information on the increased cost of living for Scotland's rural households. In developing a Minimum Income Standard for rural Scotland they estimate that the budget of a household in remote rural

[23] Reasons for the low uptake of benefits in rural areas of Scotland are also highlighted in a Scottish Executive report (Scottish Executive Poverty Inclusion Working Group 2001).

[24] The research by EKOS, based on a literature review, national consultation and rural workshops, was used to inform the development of the Scottish Government's Achieving Our Potential: A Framework to tackle poverty and income inequality in Scotland (Scottish Government 2008a). One of the national indicators in this National Performance Framework measurement set is the reduction in the proportion of individuals living in poverty.

Scotland had to be as much as 40% higher than in urban Scotland to reach a minimum acceptable living standard.

Another recent study, published by Consumer Advice Scotland (Sutherland 2015), compared prices for the cost of a basket of food and essential household items across Dumfries and Galloway and found in a remote rural area of the region that prices were more than double those paid in an accessible small town. There is also some evidence of increased consumption of fruit and vegetables (typically more expensive in rural areas) and some other foodstuffs by households in rural Scotland compared to their urban counterparts (Wrieden et al. 2006).

The Consumer Advice Scotland study also identified a number of issues described as detrimental to consumers in accessible rural, remote rural and remote small towns. In particular, high fuel prices: the study found that rural motorists were paying around 7 or 8 pence per litre more for their fuel than their city dwelling counterparts (Sutherland 2015). High rural transport costs, including air travel to and from the islands is also highlighted in the first House of Commons Scottish Affairs Committee report (2000).

The second report from the House of Commons Scottish Affairs Committee (2007) focused on fuel and rural poverty in Scotland, suggesting fuel poverty is higher and that car ownership is an essential rather than a luxury in rural Scotland. Increased fuel prices and poor household energy efficiency in rural areas will result in different consumption and expenditure patterns (Shucksmith et al. 1996). The same authors identify urban-rural disparities in access to public transport and services, as do McKendrick et al. (2011). Similar disparities are noted at a UK wide level (Ward & Ozdemir 2012) and across Europe (Bertolini et al. 2008).

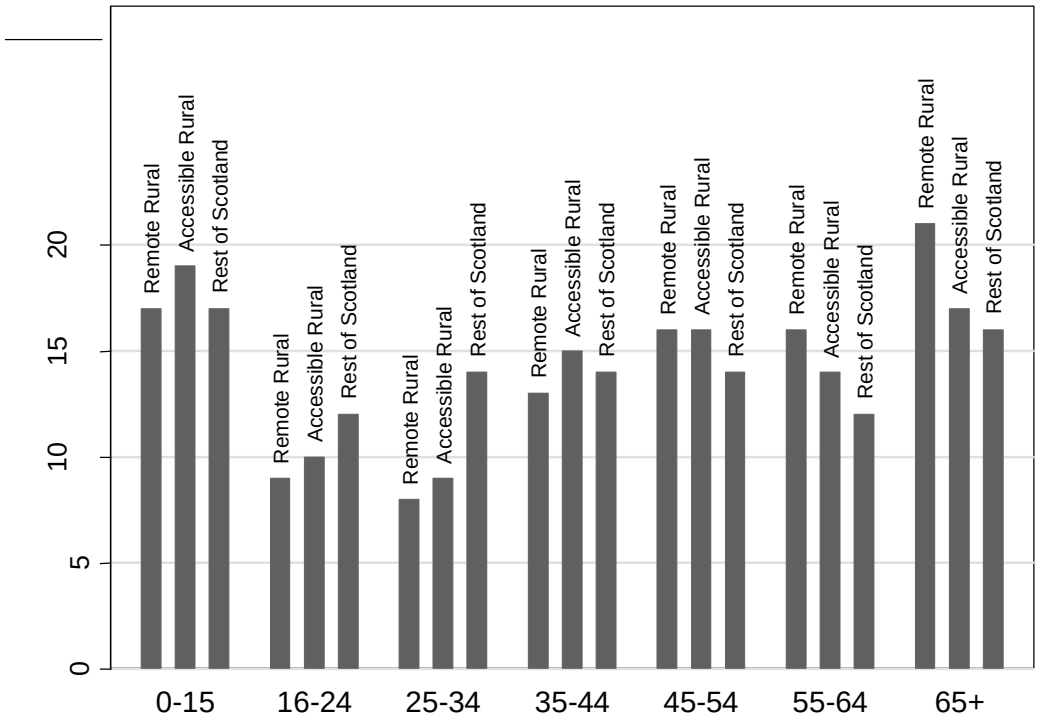
Health in the household: Over recent years there has been increasing interest in the UK and around the world in using wider measures to monitor well-being alongside the traditional economic measures. An important component of national well-being is the subjective well-being of individuals. This, together with objective well-being across several domains such as income and health, then provides a national well-being measure (ONS 2012). Venkatapuram (2013) suggests that subjective well-being could be a primer for poverty analysis. One such measure of subjective well-being is the General Health Questionnaire (GHQ). A person's subjective well-being and mental health has been shown to have a strong association with living in households with equivalised income in the lowest quintile (Wilson et al. 2015). Using two validated mental health measures, the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) and GHQ, the authors have shown that equivalised household income is a

significant influence in their multivariate logistic regression models for below average mental well-being and signs of a possible psychiatric disorder among the Scottish population.

At a UK level the latest annual HBAI report highlights households with someone who is disabled having increased likelihood of being in poverty. In 2013-14, 22% of households with a disabled person were below the 60% median income figure; among households without any disabled persons this figure is 15% (DWP 2015). Of interest in this thesis is any difference in poverty rates across the urban-rural domain among households with any disabled persons.

Household demographics: Age is a consideration thought to be associated with poverty (DWP 2014; The Poverty Site 2010; Devicienti 2011; Maes 2013; Rigg & Sefton 2006) as is the gender of the head of household (Ruspini 1998). The age distribution of the population by remote rural, accessible rural and the rest of Scotland vary considerably (Scottish Government 2012b) as it does across Europe (Bertolini et al. 2008). In Scotland the age bands 16-24 and 25-35 both show a markedly lower proportion in rural areas (figure 2.1). Only 8% of the remote rural population are in the age band 25-34 compared to 14% for urban Scotland. Conversely, the over 45s make up a larger proportion of the rural population compared to their urban counterparts. Reasons for this difference, cited by the authors, could be differing education and employment opportunities, housing and public transport availability.

Figure 2.1: Age Distribution of Population by Geographic Area, 2010



Source: Derived from Skerratt et al. (2012). 2010 mid-year estimates based on data zones using the Scottish Government Urban Rural Classification 2009-2010. Remote rural = settlements < 3000 people, more than 30 minute drive time from settlement of 10,000 or more. Accessible rural = settlements < 3000, less than 30 minute drive from settlement of 10,000 or more.
The traditional working age definition (16-59 for females and 16-64 for males) has been replaced by the population aged 16-64 to reflect changes to the state retirement age for women.

At a national level, the number of people in the household has been shown to be associated with poverty (Jarvis & Jenkins 1997; Betti et al. 2003). An element of this household membership will be the number of children. In the earlier section on child poverty I highlighted literature suggesting that, at a UK level, households with three or more children are regarded as a driver of child poverty (DWP 2014; Lopez Vilaplana 2013). It appears appropriate to test this as a factor associated with poverty in rural Scotland.

Also affecting household size (and type) is widowhood and separation or divorce, and becoming a lone parent shows strong association with entry into poverty (New Policy Institute 2014). Family type, for example lone parent or elderly couples, is strongly associated with poverty at a national level (Cappellari & Jenkins 2004). Of particular interest for my dynamic poverty models in chapters five and six is the work by Smith & Middleton (2007) suggesting

that the two most important demographic change triggers for entry into poverty are an increase in the number of children in the household and the change from a two to one parent household. After separation almost a fifth of children and their mothers have been identified as falling into relative poverty (Brewer & Nandi 2014). The only data on lone parent households that has any urban-rural poverty analysis distinction is in a report on the 1999-2000 Scottish Household Survey. Analysis here shows a higher proportion of lone parent households in remote (rather than rural) areas facing financial difficulties or being in deep financial trouble (SEERD 2003), more than 5% above the national average. This report also suggests no difference in poverty levels across the urban-rural domain among pensioner households or child poverty.

Qualitative work in rural Fife (McHardy 2012) suggests that poor access to employment and training opportunities, in part down to lack of childcare provision, are features of rural life that are associated with increased levels of poverty among lone parents. Other qualitative research commissioned by the Scottish Government was published by McKendrick et al. (2003). The authors carried out focus group research exploring life experiences of adults, children and young people living in low income households in Scotland with at least one child under the age of 18, and although they only reported the issues at a national level, they did also include some rural area fieldwork. A key finding from this research was that rural labour markets imply different demands being placed on childcare services as a result of longer working days and the distances that must often be covered to access work and education. Of significance to this thesis, some of the areas regarded as rural in this research do not match the Scottish Government urban-rural classification of rural. An implication from this is that a factor regarded as showing an association with rural poverty in this research may not show such association when the official definition of rural Scotland is applied.

Since 2002 the Joseph Rowntree Foundation has been producing reports monitoring poverty and social exclusion across the UK and more recently has also provided separate reports for Scotland. Their seventh and latest Scottish report (Kenway et al. 2015) provides statistics on 42 indicators, ranging from income related measures through to measures of ill health & mortality, education inequalities, in-work poverty, and housing & homelessness. These indicators are national in nature, not separating out poverty in rural Scotland. One influence identified in this report that perhaps warrants scrutiny by rurality is educational attainment. Among the low paid, the relative size of the various highest educational attainment groups has changed considerably over recent years (Kenway et al. 2015). In 2003, 23% of those

who were low paid had no qualifications, by 2013 just 9% of the low paid had no qualifications. By contrast, those with a degree made up 5% of the low paid in 2003. The relative proportion of those with a degree who were low paid increased to 13% by 2013. Clearly, the highest level of educational attainment among the low paid has changed with time. Of interest to this thesis is if and how this change is reflected among households in poverty across the urban-rural divide.

The generally lower paid jobs that are available in rural areas will have impacted on the pension provision for the elderly (Shucksmith et al. 1996) through a lower private or occupation pension (if one had been paying into such a scheme). Pension age poverty has fallen considerably over recent years, from an average of 29% in the years 1996-97 to 1998-99 to an average of 14% by 2008-09[25] across Scotland, with similar proportions of single pensioners and pensioner couples in low income. Figures on pension age poverty by rurality have not been found but given the likely lower private pensions in rural areas discussed above warrants the inclusion of this sub-population in my analysis.

Other factors: Lack of affordable housing. A further feature highlighted in both the Pion Economics (2000) and McSorley (2009) reports discussed earlier in this section is the dearth of low cost housing in rural areas, a problem exacerbated by house prices inflated by second home ownership and affluent in-migrants. In 2010 the median open market house sales price was £180,000 in accessible rural Scotland, £146,000 in remote rural and just £129,835 in the rest of Scotland (Scottish Government 2012b).

In some rural areas the number of households lying empty or a second home amounts to nearly 50% of the housing stock (Skerratt et al. 2012) with the result that family members move away from the area when leaving the family home as local housing is unaffordable (Shucksmith et al. 1996). Low income groups face difficulties in accessing affordable housing in rural areas (Satsangi et al. 2001; Wilson & Edwards 2008) and one of the reasons for the lack of provision may be down to specific aspects of land ownership (Wightman 1996). Vast tracts of rural Scotland are in the ownership of very few people and there is an 'overarching objective of all landowners…….to preserve the integrity of their estate', retaining ownership and control of any housing development (Shucksmith et al. 1993: p250).

[25] http://www.poverty.org.uk/s64/index.shtml - Accessed 17th November 2015.

Table 2.3: Source of factors identified in the literature showing association with life and/or poverty in rural Scotland and rural areas of other developed countries

Factor	*Source*
Fragile jobs market	
Lack of employment opportunities	HOCSAC (2000); McSorley (2009); Shucksmith & Philip (2000); Scottish Government (2012a); Bane & Ellwood, 1986); Smith & Middleton (2007); Pion Economics (2000); Gibb et al. (1998); McKendrick et al. (2003; 2011)
Number in HH in employment	
Lower pay (in-work poverty)	
Gender pay gap	
In seasonal/temporary work	
More than 1 job in last year	
Having a second job	
Working from home	
Lower benefit uptake	
Total household benefit (£/wk)	HOCSAC (2000); Pion Economics (2000); Shucksmith at al. (1994); McSorley (2009)
Proportion of households receiving benefit	
Higher cost of living/different consumption	
Expenditure on grocery (food poverty)	HOCSAC (2000); Pion Economics (2000); Gibb et al. (1998); McKendrick et al. (2011); McHardy (2012); REAS (2009); Shucksmith et al. (1996); Sutherland (2015)
Expenditure on household fuel (fuel poverty)	
Higher transport costs	
Car ownership essential	
Health in the household	
Care of disabled family member	DWP (2015); Wilson et al. (2015); Venkatapuram (2013)
Subjective well-being/psych. morbidity	
Other factors	Shucksmith et al. (1996); Pion Economics (2000); Skerratt et al. (2012); Satsangi et al. (2001); Wilson & Edwards (2008); McSorley (2009); Sutherland (2015); Lambert & Gayle (2009); Vandecasteele (2012); Townsend (1979)
Lack of affordable housing	
Social stratification	
Household demographics	
Proportion of single parent households	SEERD (2003); DWP (2014); Lopez Vilaplana (2013); McHardy (2012); McKendrick et al. (2003); Scottish Government (2012a); Shucksmith et al. (1996); Kenway et al. (2015)
Three or more children in household	
Lack of available childcare	
Age of head of household	
Educational attainment	
Pensionable age in HH	
Pension provision	

Social stratification. Social stratification, where persons are grouped according to their social position in terms of social class or status, has long been linked to poverty, albeit at the national rather than rural level discussed in this thesis (Townsend 1979; Lambert & Gayle 2009; Vandecasteele 2011; Dewilde 2003). Virtually all stratification measures take occupational groups as their basic units. Employment is the major mechanism by which material rewards are distributed in developed societies and occupation is commonly regarded as the most significant indicator of someone's position in the overall structure of advantage and disadvantage, as well as a major source of identity (Lambert & Prandy 2012). One such measure is the Cambridge

Social Interaction and Stratification (CAMSIS) scale and this has been included in my initial analyses.

Some of the key factors which determine the extent and level of poverty in Scotland are political in nature. The welfare system and taxation are arguably the two levers with the largest impact or control on poverty levels and both of these are retained powers of the UK Government. Current UK wide welfare and housing reforms are impacting on poverty levels across Scotland (McHardy 2012). In this chapter we have already seen literature suggesting benefit uptake is lower in rural Scotland. An analysis of any welfare benefit changes and their impact on rural Scotland poverty levels is beyond the scope of this thesis. However, in my concluding chapter I suggest that the welfare system and taxation could be included in any future work on poverty analysis in rural Scotland.

In summary, in this section I have identified from the literature a range of factors thought to be particularly associated with households being in, entering or exiting poverty, primarily across rural Scotland but in some instances at a wider scale. These factors form the basis for the testing of hypotheses described in chapter one.

Previous Use of Secondary Data in Poverty Analysis

This thesis is an empirical analysis of poverty in Scotland that makes use of secondary data, and in this section I have reviewed previous poverty related research that has made use of such datasets. The review was not restricted to Scotland; if it was there would have been very little to include here. The aim was to identify datasets and methodologies suitable for poverty research in a rural Scotland context. This review also acted as a check on the work of the previous section, both illustrating how the factors found there have been used in secondary data analysis, and identifying any other factors not identified in my earlier work that are perhaps worthy of inclusion in my analyses in later chapters. Hard statistics with which to measure poverty in Scotland, be that at a national or regional scale, have been until fairly recently very difficult to obtain. This is reflected in the short time span over which most of the available datasets[26] have been running.

Some of the earliest published poverty related research derived from the use of secondary data was by researchers such as Norris (1977) and Fiegehen et al. (1977) who each used the Family Expenditure Survey (FES) to analyse incomes and living standards in Scotland and the UK

[26] A brief summary of the available datasets is provided in Appendix A.

respectively. The FES, along with census data and the General Household Survey, was also used to validate the use of census data in deriving deprivation indicators (Davies et al. 1997). After several name changes this dataset was incorporated into the Integrated Household Survey (IHS). The FES is cross-sectional in nature and as such is not suitable for the poverty dynamics analysis required in this thesis.

Much of the early use of secondary data for analysis of poverty dynamics follows the methodologies employed in USA studies outlined in Bane & Ellwood (1986). These studies used the Panel Studies of Income Dynamics (PSID) datasets and one conclusion drawn from this work is that when poverty dynamics are considered it is the changes in individual and household circumstances that are the driving force. There is a danger that 'all deviations from permanent income are treated as random and behaviourally equivalent'. This seminal paper includes a review of a considerable volume of early work on income dynamics. Included is consideration of the duration of spells of poverty, exit probabilities and spell length distributions, plus spell beginning and ending events, and poverty persistence. Changes in earnings are identified as important beginning and ending events, but so are several life cycle events. These include wife becoming head of household (through divorce or widowhood) or the birth of a child. Jenkins (2011a) has used data from waves 1-16 of the BHPS to show that income stability, be that men's employment earnings or household income, has changed little between the start of the 1990s and mid-2000s. This may be an area for future rural poverty related work with all years of the BHPS dataset. It may be revealing to test that income stability is similar across the urban and rural Scotland domains.

The impact of life cycle events are also explored at a Great Britain level (Rigg & Sefton 2006) in an analysis of income trajectories following these events, using data from BHPS. The BHPS has been used in a considerable number of poverty related studies. Some of these are relevant to this thesis (Devicienti 2011; Cappellari & Jenkins 2002; Cappellari & Jenkins 2004; Jarvis & Jenkins 1997; Jenkins 2000; Stewart & Swaffield 1999; Burgess et al. 2001; Ruspini 1998; Ballas 2004; Jenkins et al. 2001; Hill & Jenkins 2001). However, none have included any analysis of poverty in rural areas, their relevance is primarily in providing methodological ideas and identifying pitfalls associated with longitudinal data.

The rate of low income turnover is a feature identified in several papers: in the UK (Jarvis & Jenkins 1997; Jenkins 2000; Stewart & Swaffield 1999; Cappellari & Jenkins 2002; Cappellari & Jenkins 2004); in Sweden (Obucina 2014); and in the USA (Stevens 1999). Such work illustrates an advantage of longitudinal over cross-sectional data, namely that income turnover can only

be derived in the former. This advantage is discussed in more detail in the next chapter. In Jarvis & Jenkins (1997), almost a third of the sample had experienced low income at least once during the four year period of the study and to the authors it is striking the relatively large number who transition into and out of low income each year. In their analysis two definitions of low income cut-offs have been used; half of wave one mean income (a threshold fixed in real income terms); and the poorest quintile in each wave (a threshold that varies in real income terms). The levels of persistent low income, i.e. those that had low income across all four waves as derived by each cut-off, varies considerably and highlights just how sensitive the choice of low income threshold can be. Also of note is their observation of re-entry into low income among those who have previously raised their income and that low income spell repetition is an important phenomenon in the UK. Of interest to this thesis is how, if at all, these observations vary by rurality.

A possible research strategy for this thesis was to examine small area data in my attempt to gain a better understanding of rural poverty. Such analysis has been ongoing during the lifetime of this thesis. Examples are an examination of small area local incomes and poverty (Bramley & Watkins 2013), the use of the Scottish Household Survey (SHS) dataset to compare rates of multiple deprivation across different areas of Scotland (Barnes & Lord 2012) and an attempt to better understand the scale and nature of disadvantage affecting families in Scotland again using the SHS (Bazalgette et al. 2012). Another recent paper looking at small area measures of poverty (Fenton 2013) makes use of Understanding Society datasets. Spatial inequality in relation to child poverty in the United States is a feature identified through the use of Census data (Curtis et al. 2012), and while not longitudinal in nature, does suggest that local area processes are at play, contributing to varying child poverty levels across counties within the US. It seems likely that similar processes occur across Scotland and impact on child poverty levels here too. Small area analyses such as these can provide more detailed information, put more meat on the bone, and it would have been interesting to include such an analysis in my thesis. However, I elected not to include small scale research, in part due a shortage of such data that is longitudinal in nature. A further consideration was the requirement to compare and contrast factors associated with poverty in rural and non-rural Scotland. This would add considerably to the number of small scale areas that would need researching.

It would be remiss of me to not include in this section work on the PSE and MIS surveys, highlighted in an earlier section of this chapter. During the time of this thesis both have been extended to include data, analysis and results specific to rural Scotland. Hirsch et al. (2013)

created an MIS that was derived from a basket of goods and services that allowed householders in three parts of remote rural Scotland: the Highlands, the Islands and remote southern Scotland, the same minimum standard of living as in the rest of the country but accounting for their different needs and expenditures[27]. Most recently, Bailey et al. (2016) published their initial analysis of the PSE2012 dataset, providing details of levels of poverty and social exclusion in rural and urban areas of Scotland. Some of the early findings from this initial analysis are compared with the results of my analyses in my conclusion chapter.

Conclusion

To provide some background I have in this chapter provided an historical perspective on poverty in rural Scotland cover the 17th to 20th century. It is clear that how we define both poverty and rurality will impact on the numbers of individuals and households deemed to be suffering rural poverty in Scotland. I have gathered together the various definitions of poverty, from the global absolute definition preferred in the developing world to the relative definition widespread in developed countries such as Scotland. I have shown, primarily through the ground-breaking work of Peter Townsend, that the use of an absolute measure of poverty is not appropriate in a developed country such as Scotland. I have also shown that the definitions of poverty described above can effectively be classed into 5 theories of poverty: classical; neoclassical; Keynesian/Liberal; Marxist/Radical; and social exclusion/social capital.

The research that follows draws heavily on the Liberal/Keynesian theory of poverty, certainly in the way that poverty is measured. The primary reason for this approach is that it allows comparison with official published poverty related statistics. The use of other approaches to poverty analysis has been considered. The use of a minimum budget standard approach has much appeal but, as recognised in this chapter, does not claim to be a poverty threshold. The Poverty and Social Exclusion approach also has its appeal for this project but I am aware that work at the Scotland rural level has been ongoing during the later years of my study.

This review has shown that at the outset of this study very little research existed on rural poverty specific to Scotland or among the Scotland dwelling sub-populations described in this chapter. Poverty among each of these sub-populations has been defined in several ways, but to remain consistent with official figures the relative income measure has been used across all of these groups in the analyses that follow. Across developed nations the relative income

[27] It is worth repeating that MIS is not a measure of poverty.

threshold of 60% of the median household income has become the basis on which cross-country comparisons of poverty levels are made. As outlined above this threshold measure has its detractors but nonetheless has been used in my analyses comparing and contrasting poverty among the population and sub-populations in rural Scotland with their urban counterparts.

I have shown in this review that rural Scotland is currently defined as settlements with a population of less than 3,000 people, which contrasts with a 10,000 settlement population threshold in England & Wales and 4,500 in Northern Ireland. Since 2000, this has been the official definition on which Scottish Government rural statistics are reported. The Scottish Index of Multiple Deprivation (SIMD), the Scottish Government methodology for the identification of small area concentrations of poverty and deprivation, has been shown in this review to be lacking in some aspects for rural areas. SIMD was designed principally for the identification of small areas of multiple deprivation. Such deprivation is more dispersed in urban areas.

In an effort to understand what makes rural poverty different to poverty in the rest of the country this review has identified literature highlighting factors thought to be particularly associated with being in, entering or exiting poverty in rural Scotland. This review has also attempted to identify factors associated with poverty in rural areas of other developed countries. A problem in some of this literature is that the definition of rural Scotland has been shown to be inconsistently applied. In some instances the definition of rural Scotland that has been used does not match the official definition described above. Certainly, research carried out prior to 2000 is likely to have employed an alternative definition of rural Scotland. It is vital then that these factors are tested for their association with rural Scotland as it is defined now. Otherwise it is possible that policies developed to address these factors and put in place in an effort to alleviate poverty in rural Scotland may not achieve their objective or may even exacerbate the problem.

Finally in this chapter I have provided a short review of research that has made use of secondary data in poverty research. Again, this review was not restricted to rural Scotland, primarily due to the lack of such material.

In the next chapter I have described the analytical methods used in testing my hypotheses, the datasets used in achieving this, and outlined the methodological issues that needed addressing in using my selected datasets.

Chapter 3: Methodology and Methods

Introduction

This empirical research makes use of secondary data to test the research hypotheses set out in chapter 1. At the outset of this study the intention was to carry out research that was both qualitative and quantitative in nature, in my effort to better understand the extent of poverty in rural Scotland. While acknowledging that to some researchers quantitative approaches are best suited to answering questions related to poverty measurement (Mwabu 2005) my originally planned approach was on the basis that the sole reliance on either only a quantitative approach or only a qualitative approach in measuring and analysing poverty is often likely to be less desirable than combining the two approaches (Carvalho & White 1997). The aim under such a strategy is to confirm, refute, enrich and explain the findings by one approach with those of the other. Fortunately for my research, a considerable amount of qualitative research has already been carried out on poverty, and its causes and impact, in rural Scotland and has been discussed in some detail in the previous chapter (House of Commons Scottish Affairs Committee 2000; House of Commons Scottish Affairs Committee 2007; McHardy 2012; McKendrick et al. 2003; McKendrick et al. 2011; Sutherland 2015). Some of this data has been used to inform Scottish Government poverty reduction policies, exemplifying how 'strategies to reduce poverty need to be more grounded in poor people's realities' (Petesch 2001, p31). Several key qualitative research techniques have been used in this literature, including key informant interviews, questionnaires, in-depth interviews with members of the public, focus group discussion, and case study analysis. Such qualitative data has been important in that it has informed the quantitative analysis that follows, particularly in providing factors of life in rural Scotland thought associated with poverty.

The data I have used is longitudinal in nature, and provides some advantages (over cross-sectional data that is more typically available) as set out in the first section below. My next section in this chapter outlines the reasons for selecting the British Household Panel Survey and its associated datasets on which to base my analyses and the testing of the hypotheses of chapter 1. I then go on to describe my chosen datasets in more detail, and in the following section outline the data management steps carried out to get the required data into a format suitable for analysis. Following that I outline the analytical methods I have employed and go on

to describe the various methodological issues that can present themselves in any analysis of large datasets and explain how these issues have been addressed.

Advantages of Using Longitudinal Data in Poverty Analysis

Longitudinal data have a number of advantages over repeated cross-sectional data (although the latter are often treated as longitudinal) and are essential for the analysis of micro-level individual or household level social changes. Most importantly, such data allows for the measurement of within-sample change over time, enabling the measurement of duration of events, and recording the timing of various events. In this section I highlight some of these advantages.

In the previous chapter I described the official UK and Scotland Government publication for poverty statistics, the HBAI. This measure only provides a snapshot of the poverty levels at each time period. It does not track what happens to particular sets of individuals. It does not identify those 'movers' whose income rises or falls to such an extent that they breach the poverty threshold. This is where longitudinal data have an advantage over repeated cross-sectional data such as the HBAI.

Longitudinal data provide opportunities to capture the underlying dynamics of change (Rafferty et al. 2015). For example, whereas one might use repeated cross-sectional data to track change in overall levels of income in the general population, longitudinal data can be used to analyse change in individual income over time, for example, to consider what factors influence the likelihood of entering or exiting poverty. Longitudinal data allow a dynamic analysis to consider how past events or states influence current outcomes. In poverty analysis allows us to examine whether a poverty experience is an exceptional circumstance or the usual state of affairs. As Ellwood (1998; p49) points out, 'such dynamic analysis brings to bear a great deal more richness and texture……[it] gets us closer to treating causes, where static analysis often leads us towards treating symptoms'.

An example that highlights the advantage of longitudinal data over repeated cross-sectional data is an early examination of poverty dynamics using datasets from the British Household Panel Survey (Webb 1995). A key finding that emerged from this work is the level of fluidity in personal finance that can be seen in longitudinal data is generally not visible in repeated cross-sectional data (such as successive years of the Family Resources Survey or the HBAI). In particular, the changes in average individual income for those in the bottom income decile, or who move into or out of the bottom decile, in waves 1 and 2 are highlighted. This is

illustrated in table 3.1 below. When treating wave one and wave two as if they were entirely separate cross-sectional surveys we see the median income of the bottom decile drops from £88 per week to £86 (in January 1991 prices). However, when taking advantage of the longitudinal nature of the data and comparing the median income in waves one and waves two for those in the bottom decile in wave one, irrespective of their position in wave two, the median has increased from £88 to £110 per week. Around a half of the individuals in wave one had moved out of the bottom decile by wave two, with the median income among this group rising to £134 per week.

Individuals who were not in the bottom decile in wave one but were in wave two saw their median income drop from £161 per week to £84 per week. It is this group that brought the median for the bottom decile in wave two down to less than the median in wave one.

Table 3.1: Median income (£/wk) in wave one and wave two of individuals in bottom decile group in either or both waves (1991 & 1992) illustrating incomes when data is regarded as cross-sectional or longitudinal

	In bottom decile group in wave 2	*Not in bottom decile group in wave 2*	*All*
In bottom decile group in wave 1	88 -> 86	92 -> 134	88 -> 110
Not in bottom decile group in wave 1	161 -> 84	229 -> 237	225 -> 229
All	114 -> 86	220 -> 231	210 -> 217

Source: Webb (1995) using data from the British Household Panel Survey

A further study (Gunasekara et al. 2011) also illustrates the differences in results that can be obtained between cross-sectional and longitudinal data. The authors suggest that much of the evidence supporting the generally held view that income is strongly associated with health comes from analysis of cross-sectional data. In their review of panel and longitudinal data the authors have found the majority show only a small statistically significant net association which was much reduced once unmeasured confounders had been controlled for. In addition, residual bias, particularly from measurement error, probably reduces this association to nil. However, it is possible that this lack of association applies across the whole population, and stronger association may exist in either of the rurality classifications I am testing. I have already included a subjective heath measure as an influence in my models and on this latter basis will retain it.

Highlighted in this section are some pieces of research that have illustrated some of the benefits of using longitudinal data in poverty analysis. The primary advantage is in providing insight into poverty dynamics, an important element in this thesis in gaining a better

understanding of the extent of poverty in rural Scotland. I have carried out some poverty dynamic analysis is chapters 5 and 6, considering how any change in factors associate with households moving into poverty and moving out of poverty respectively.

Selection of Appropriate Dataset for Poverty Analysis

There are a number of datasets with survey data either specific to Scotland or with a wider geographical remit that includes Scottish respondents. These are described in Appendix A. A key requirement of the chosen dataset was that it was longitudinal, of sufficient duration to allow consideration of levels of poverty dynamics & persistence, and that it included data for all members of households, i.e. was not restricted to a particular demographic such as the labour force or children. Only one such dataset exists with the required level of information at the Scottish household level and in a format suitable for quantitative analysis, the British Household Panel Survey (BHPS).

The British Household Panel Survey (BHPS)

BHPS was launched in 1991 and was considered at that time to contain a representative sample of private households[28] in Great Britain (Jarvis & Jenkins 1998). All members of these wave one households (and their natural children born after the start of the study) are classed as original sample members (OSMs) and were re-interviewed each year. Two other classes of study membership exist in BHPS: temporary sample member (TSM) and permanent sample member (PSM). TSMs consist of individuals who form households with OSMs after the start of the study and are eligible for interview for as long as they are resident with an OSM. Such members can become PSMs, if they are deemed to have a sufficiently strong bond with an OSM to justify following them, even if they cease to live with that person. Typically in this situation the TSM is the natural parent of an OSM's child born since the start of the study (Taylor et al. 2010).

Boost samples of new households were added at waves 7, 9 and eleven. The wave seven boost was not representative of the national population as it contained an over-representation of low income households. The wave nine boost increased the number of survey contacts from Scotland and Wales, and wave eleven did the same for Northern Ireland[29]. These boosts ensure

[28] The representativeness of the Scottish element of the early years of the BHPS dataset is debatable given the lack of any households from the area north of the Great Glen.

[29] The Northern Ireland 'boosted' sample is representative of the overall NI population and has neither clustering nor stratification. Stata cannot compute correct standard errors if a part of the sample have a different design. As a result, data from Northern Ireland have been excluded from all analyses.

sufficient cases in each country for more detailed analysis both within and across the UK countries, and these additional study respondents are treated in BHPS as OSMs. Prior to the wave nine boost there were insufficient numbers of households in rural Scotland for meaningful and statistically robust analysis. As a consequence, the analysis described here is restricted to Scottish households in the boosted waves 9 to 18 of the BHPS.

Eighteen waves of data were collected, the last wave in 2008, and BHPS was then incorporated into the UK Household Longitudinal Study (UKHLS). The UKHLS builds on the BHPS data, collecting additional health related information from some of its participants and containing a boost sample of adults from ethnic minorities. It should be noted that data from UKHLS was not used in this thesis. When I started work on this project in 2012 only one year of UKHLS data was available for downloading from UK Data Service. In addition, there was a gap of one year at the end of BHPS and the start of UKHLS in which no data was made available. This meant a discontinuity in the data that I could use. With supervisor advice, analysis was restricted to BHPS data as it was deemed that little benefit would be gained by the use of this one year of UKHLS data, plus its inclusion posed considerable data management issues. I discuss this issue further when considering the limitations and outstanding research questions in my concluding chapter.

Data Management

The analyses of the following chapters have been carried out using the statistics and data analysis package Stata, version 14 (StataCorp 2015). All waves of the relevant BHPS and associated data files were downloaded in Stata format from the UK Data Archive during 2013. To allow analysis of the BHPS dataset by rurality it has been necessary to also download the accompanying urban-rural classifications files for each household on each wave of the BHPS (University of Essex 2010). Also downloaded from the UK Data Archive is a supplement to the official BHPS releases. This supplementary dataset includes a set of derived household income related variables (University of Essex 2012), discussed in more detail later in this chapter. Other downloads from the UK data Archive were the special licence Scottish data zone files and the spreadsheet connecting these data zones to the various components of the Scottish Index of Multiple Deprivation (SIMD).

The BHPS is complex (Taylor et al. 2010) in that it consists of a number of data structures (datasets) with differing focuses, be that at household or individual level, or events experienced by the respondent. Adding to the complexity is the differing sampling and selection strategies

across the datasets. The use therefore of these datasets requires a considerable amount of data management, primarily in the linking of files. With a few minor exceptions each of these datasets are consistent in their content and format throughout all years or waves of the survey. This meant it was a relatively straightforward exercise to merge all years for each dataset, including the supplementary derived household income dataset. During this process I also merged to the appropriate files the urban-rural classifications[30]. A final step was to add the SIMD component variables to each household according to their data zone identification.

Table 3.2: Income sources and deductions included in net household income estimates provided in supplementary BHPS household income dataset

Income sources

Gross earnings from employment
Earnings from subsidiary employment
Profit or loss from self-employment
Social security benefits and tax credits
Private and occupational pensions
Income from investments and savings
Private transfers and other incomes

Deductions

Income tax (employees and self-employed)
National Insurance contributions (employees and self-employed)
Contributions to occupational pension schemes
Local taxes

Total net household income (BHC) = income sources – deductions

Source: Jenkins (2010)

The supplementary BHPS household income dataset includes variables that are estimates of current (i.e. in month prior to interview) household net income and annual household net income, along with some of their components, plus other variables that classify respondents according to family type and economic status. These household net incomes have been constructed in a way that closely matches the definitions used in Britain's official income statistic Households Below Average Income (HBAI), published by the Department of Works and Pensions and include income sources and deductions as described in table 3.2. A full description of the steps involved in the derivation of each of the components listed in Table 3.2 can be found in Jenkins (2010). A limitation with the social security benefits and tax credits

[30] The dataset references are SN5151, SN6032, SN3909, SN6136 and SN6871 for the full BHPS dataset, the urban-rural classifications, derived household income data, Scottish data zones, and SIMD information respectively.

incomes sources is that these have been summed under the one component and the various benefits have not been provided separately.

To account for household size and composition the net household income figure is adjusted using an equivalence scale (the modified OECD scale[31]), and further adjustments are made to convert these values to constant price terms using the same before housing costs price index as used in official income statistics[32], to express incomes in January 2010 prices. As part of some sensitivity analysis I have also carried out analyses using after housing cost household income figures. After housing cost income figures are not provided in the supplementary BHPS derived household income dataset and have been derived by myself. Housing costs by month are provided in the main BHPS dataset. To be in line with the supplementary household income dataset these have been converted to weekly figures and deducted from the net household income figures. The resulting figures are then adjusted in the same manner as the before housing cost estimates but using indices appropriate to after housing costs prices to express income in January 2010 prices.

According to Jenkins the resultant estimates of the percentages of individuals with a net equivalised household income before housing costs (BHC) of less than 60% of the median by year are remarkably similar across the two methodologies (Jenkins 2010). Given such close similarities in methodology and resultant poverty levels it seems appropriate to use the supplementary BHPS household income data rather than the income estimates provided in the official BHPS datasets[33]. It is noted however that the HBAI estimates are derived from data in the Family Resources Survey (FRS), which covers a sample of around 20,000 private households in the UK (DWP 2015). Certain individuals, for example students in halls of residence and individuals in nursing or retirement homes will not be included.

A further data preparation issue was to create a two category rural/non-rural variable. In Scotland the urban-rural classification is made up of the eight categories described in chapter two, with a ninth pseudo code for the rest of the UK. These are shown in the first column of table 3.3. As already described in Chapter 2, the Scottish Government core definition of rurality classifies settlements and areas of less than 3,000 people to be rural, and this has been used as

[31] The modified OECD is now adopted by the UK for its headline statistics rather than the previously used McClements scale (Department of Work and Pensions 2005).
[32] The all items Retail Price Index excluding Council Tax has been used as the price index.
[33] A further consideration is that the BHPS income estimates are gross pre-tax figures and would require considerable manipulation to derive net household income, effectively repeating the efforts of the supplementary BHPS household income team.

the basis for the analyses described throughout this thesis. For brevity, all future use of the term settlement should be read as settlements and areas. To follow the Scottish Government 2-fold definition of rurality requires the 8-fold classification to be divided as follows, with categories one to five defined as non-rural and categories six, seven and eight as rural. For analytical purposes a dummy variable has been created with the three rural categories set to 1 and the other categories set to zero. These category assignments are highlighted in the column headed 'Rural dummy' in table 3.3. In chapter 4 I have carried some analysis to test the sensitivity of poverty rates to differing urban-rural thresholds. I have used the England and Wales definition of rurality, creating a binary variable identifying household in settlements above or below the 10,000 settlement population. For the purposes of this sensitivity analysis only categories 1 and 2 in table 3.3 are consider non-rural and categories 3 to 8 as rural Scotland.

Table 3.3: Urban-rural classifications in Scotland and the derived official rural/non-rural categories

	Rural dummy
1. Large urban area: settlement of over 125,000 people	0
2. Other urban area: settlement of 10,000 to 125,000 people	0
3. Accessible small town: settlement of 3,000 to 10,000 people, within 30 minute drive of a settlement of 10,000 or more	0
4. Remote small town: settlement of 3,000 to 10,000 people, with a drive time of 30 to 60 minutes to a settlement of 10,000 or more	0
5. Very remote small town: settlement of 3,000 to 10,000 people, with a drive time of over 60 minutes to a settlement of 10,000 or more	0
6. Accessible rural: areas of less than 3,000 people, within 30 minute drive of a settlement of 10,000 or more	1
7. Remote rural: areas of less than 3,000 people, with a drive time of 30 to 60 minutes to a settlement of 10,000 or more	1
8. Very remote rural: areas of less than 3,000 people, with a drive time of over 60 minutes to a settlement of 10,000 or more	1
9. Postcodes in rest of the UK	-

Source: http://www.scotland.gov.uk/Topics/Statistics/About/Methodology/UrbanRuralClassification

Sample Selection Criteria

The derived household net income data (the supplementary BHPS household income files described above) excludes households where one or more of the adult members refused to be interviewed or income information was gained from a proxy respondent. The latter were excluded due to the likelihood of inaccurate income information. Exclusions have also been made in this analysis as a result of missing data in the urban-rural classification datasets. Further, it is noted that the urban-rural classification for any settlement need not be static

throughout the time periods studied here. Settlement populations can cross the 125,000, the 10,000 and the 3,000 population thresholds, or road improvements can reduce commuter journey times, and such changes could alter a settlement's urban-rural classification. Survey members could also be moving house from one urban-rural category to another.

In reality very few settlements have had their urban-rural classification change during the period of this study. Similarly, only a small number of survey members have moved house into or out of settlements with a population of 3,000 or less. Between 1999 and 2008 a total of 229 individuals (approximately 1.1% of the non-rural population) 'moved' from a settlement of 3,000 or more to one with a population of less than 3,000, either through a house move or settlement re-classification. A similar number of individuals (236, equating to 4.6% of the rural population) made the opposite move, moving from a rural to an urban settlement. What these figures do not capture however are the people who have moved to a home in a different category within the same rural/non-rural classification, for example, from a home in a rural remote location to one that is in an accessible rural area.

Table 3.4: The number of individuals and households by wave in the Scotland BHPS sample

Year	Individuals (including under 16s)	Households
1999	3.498	1,624
2000	3,689	1,669
2001	3,484	1,576
2002	3,040	1,371
2003	2.903	1,306
2004	2,641	1,201
2005	2,613	1,164
2006	2,463	1,128
2007	2,339	1,051
2008	2,235	1,017
Total	28,905	13,107

Source: BHPS waves 9-18
Excludes movers between rural and non-rural Scotland

The 'movers' across the rural/non-rural classification have been dropped from the analyses. As a result of all of the above mentioned restrictions the number of individuals and households (unweighted) in Scotland that make up this study are as shown in table 3.4. The number of individuals in 1999 was 3,498 and by 2008 this number was down to 2235. Given the relatively small number of 'movers' that have been dropped from the study it is clear that a considerable number of other households have dropped out of the survey between 1999 and 2008. The impact this attrition has on my analysis is discussed in more detail later in this chapter. Analysis of households moving into and out of poverty (in chapters 5 and 6) will not include all of the

individuals or households shown in table 3.4. Instead, in the case of my analysis of entry into poverty, I will base individual or household entry rates on the number each year who were not in poverty in the previous year. Similarly, for those exiting poverty I base results on the number who were in poverty in the previous year.

Identification of BHPS variables equating to poverty factors

In chapter two I identified from the literature factors associated with poverty primarily in rural Scotland but also taking in those thought to also impact on a wider scale. The next step was to find variables in BHPS that could put numbers to these factors. In this section I describe the variables identified in BHPS that 'fit' with these factors. As in the earlier section in chapter 2 identifying these factors, I have used the same broad categorisation to summarise them and their associated BHPS variable.

Fragile jobs market: BHPS does not include any variables accounting for the level of local employment opportunities. What it does include are questions on the number in the household who are working (in employment or self-employed), an individual's current employment status, the number of jobs held in the previous 12 months, whether the respondent has a second job and if their current job is seasonal or temporary. From the first of these variables it is possible to identify workless households, which may to some extent reflect the level of employment opportunities. Also included in BHPS are estimates of primary employment income and whether the family member is working from home. Elements of the household income sources in the supplementary BHPS household income data are divided into the primary and subsidiary (second job) employment earnings for both the employed and self-employed. To assess a lower paid job market in rural areas, only the primary employment income figures in the supplementary BHPS household income data have been considered. Any self-employment income has not been included in this element of the analysis. While the levels of self-employment (and income) could be used as a proxy to reflect the lack of available local jobs they do not necessarily show that the local job market is of lower paid jobs.

Within BHPS individuals are asked if their current job is permanent or temporary[34], and this appears to be a useful proxy variable to use to measure levels of seasonal work. An alternative is to use the variable of the number of different employment spells the respondent has worked

[34] If their current employment is temporary respondents are asked if their job is seasonal, fixed term contract, agency temping or casual. It seems reasonable to assume that seasonal agricultural, tourist based or any other work could be considered to fit any of these categories.

in the previous year. If this is greater than one this suggests some degree of temporary work (and/or previous loss of employment by a variety of means).

A respondent having a second job is a variable directly available in BHPS. Using this variable, I have created a dummy variable identifying if anyone in the household meets this criterion. BHPS also includes a question on work location and one of the options is 'at home'. The number of respondents selecting this option each year is very low, too low to derive any statistically robust analysis so I have not included a working at home variable in my regression models.

The logistic regression models discussed in later chapters use household level data so the job related variables applied therein all relate to the head of the household.

Lower benefit uptake: there are two benefit related variables available in BHPS that are relevant to this thesis: the actual amount of benefit the household receives; and a straightforward yes/no question asking if the household receives any benefits at all. Both of these variables have been used in the analyses that follow.

Higher cost of living/different consumption patterns: Overall food expenditure, but not identifying the items bought, and household fuel expenditure are included in the BHPS dataset. It is therefore possible to create fuel and food poverty lines, and so identify those household that spend more than a set percentage of their total household income on each. If rural households do face fuel and food budgets that are higher than their urban counterparts then it seems probable that this would be reflected in the proportion spending more of their household income in each.

The methodology for calculating fuel poverty is described in more detail in chapter 4 but briefly is defined as households that spend more than 10% of their net household income on household fuel are regarded as being in fuel poverty. There is no official definition of the term food poverty. For the purposes of this thesis I have used the same methodology used to identify households in fuel poverty, and households spending more than 50% of their net household income on food items are regarded as being in food poverty. An alternative would be to use a methodology similar to that used in generating the income poverty line. King et al. (2015) suggest a food poverty line based on expenditure on food items per person of less than 60% of the national median expenditure. This then becomes a measure of inadequate food expenditure. Instead, I prefer to use a measure similar to that used in fuel poverty analysis and as described above.

Car ownership is recorded in BHPS but transport expenditure is not. For the former I have created a binary variable identifying household access to a car or van, be it privately owned or connected to employment in the form of a company vehicle. The gathering of transport related expenditure is one area that appears to have been neglected in the BHPS dataset. Data for example on expenditure on public transport or motor fuel does not appear to be collected. As a proxy for an element of transport costs, i.e. only measuring increased rural fuel usage rather than the price paid, I have used the variable measuring time spent travelling to work for those who use a car or van to do so (including as a passenger).

An alternative travel time measure considered in this thesis is the geographic access to services indicator within the SIMD measure described in chapter 2. This access domain, while not specific to travel to work, is intended to capture the issues of financial cost, time and inconvenience of having to travel to access basic services. It is a derived score based on population weighted average travel times in minutes from each data zone to various services such as GP, shopping centre, school & post office, and consists of two sub-domains, one looking at public transport times and the other looking at drive times (Scottish Government 2012c). The SIMD and its component indicators are not available directly within BHPS. Two further datasets have been accessed from the UK Data Services, one that allowed data zones to be linked to household identifiers in the BHPS data and a second that provided the SIMD geographic access domain information for each data zone (University of Essex 2014; Office of the Chief Statistician 2011b).

Health in the household: Unfortunately, BHPS does not appear to have within its list of variables one for disability that runs for the full length of the time period under analysis. The question, asked only of a proxy, if respondent is registered disabled was dropped in 2004 and a similar question asking if respondent regards themselves as disabled was only added in 2002. There is a question on caring for handicapped/other in household (variable name aidhh). This question is only asked in households with more than one person (so excludes single person disabled households) but appears to be the closest fit to disability in household available in BHPS that is also available for all years under analysis. A binary variable has been created at the household level such that anyone in the household caring for a handicapped/other in the household is scored 1.

The General Health Questionnaire (GHQ), a subjective well-being measure, is asked of BHPS members. It is actually a scale designed to detect possible psychiatric morbidity in the general population, which has been validated in the UK and worldwide (Goldberg et al. 1997). The

questionnaire contains 12 questions about the informant's general level of happiness, depression, anxiety, and sleep disturbance over the past four weeks, arranged so that no reverse scoring is required. The scoring takes the form of a four point Likert scale with response options 'less than usual' (score 0), 'no more than usual' (1), rather more than usual' (2) or 'much more than usual' (3) (or in the opposite order to avoid the need for reverse scoring). The summed GHQ score then ranges from 0-36.

To identify psychiatric morbidity these scores are converted into binary scores, with 0 or 1 set to zero and 2 or 3 set to 1. The scores for the summed morbidity variable then range from zero to 12, with higher scores indicating greater likelihood of possible psychiatric morbidity (Taylor et al. 2010). With this new variable, a cut-off score can be selected to signify the possible presence of psychiatric morbidity. Although there is considerable variety in literature on the choice of the most appropriate score to use as the cut-off, a figure of four has been used here, in line with previous Scottish Government reports, e.g. the last Scottish Health Survey Topic Report on Mental Health and Well-being (Wilson et al. 2015), and examples from literature (Hoeymans et al. 2004; Guthrie et al. 1998; Moffat et al. 2004; Shaw et al. 2000). I have tested the association with rural poverty of two mental health variables, the straightforward 0 to 36 scale (called GHQ36 and representing a subjective well-being scale) and the 0-12 scale with a cut-off of 4 (called GHQ12, identifying households with members who are exhibiting the possible presence of psychiatric morbidity). Given that analysis is at the household level, the scores for the household member with the poorest health will be applied for each mental health variable.

A lack of affordable housing: BHPS does not include a variable on the availability of affordable housing but does ask respondents for the value that they would put on their house were it to be sold today. One of the many possible reasons for a higher average price estimate in rural areas could be a paucity of lower priced housing. Perhaps more likely are house valuations reflecting the householder's view on the buoyancy of their local economy. This is highly subjective; relying as it does on respondent knowledge of the housing market and the value of homes in their area, but may be informative. Given that this variable is so subjective it has not been included in the regression models but is included in the comparative analysis.

Social stratification: As outlined in the previous chapter, virtually all social stratification measures take occupational groups as their basic units. The BHPS records the occupations individuals hold currently and have held through time. These occupations are coded into occupational unit groups and such groups are then converted into other categorisations,

including the CAMSIS scale derived in BHPS for males and females. For the analyses described in this thesis I have taken the CAMSIS score of an individual's current job, using the score for males regardless of the gender of the working respondent. CAMSIS provides a score, from 1 to 99, to each occupational group, comprising their relative social advantage (Prandy 1990). Higher numbers suggest more advantaged occupations.

Household demographics: the household type is an important variable in BHPS and within this are categories identifying single parent households with dependent children. From this it was a straightforward task to create a binary variable identifying lone parent households with dependent children. The number of dependent children in the household is also available in the BHPS dataset and again a binary variable was created to identify households with three or more dependent children (a possible trigger for child poverty (DWP 2014; Lopez Vilaplana 2013) highlighted in chapter 2). Among the reasons for lone parent households being at greater risk of poverty in rural Scotland is thought to be a lack of affordable child-care provision impacting on their take up of jobs or training (McHardy 2012). The BHPS dataset includes child care uptake and cost variables although the numbers responding to this question are low and as can be seen in chapter 4 no meaningful results could be derived from such a low response.

The age of the survey member is another key variable in BHPS. In the comparison analysis I compare the age of the head of household by rurality. All regression analyses are at the household level but here the age of the head of household has been converted to a binary variable reflecting working age.

There are several variables in BHPS that record a respondent's highest education attainment. The variable '*qfachi*' is a derived variable that holds the highest academic qualification, from higher degree to CSE, plus a code for none of the categories. Two other derived variables '*isced*' and '*casmin*', added after the fifteenth BHPS release, are very similar with slight variations in the categories used in each. The ISCED scale is the UNESCO International Standard Classification of Education (UNESCO 2012), and CASMIN is described as the Comparative Analysis of Social Mobility in Industrial Nations classification of education (Brauns et al. 2003). I have used the ISCED scale throughout my analyses.

The final household demographic consideration is pension income. The BHPS records the number of people in households who are of pensionable age. From this I have created a binary variable indicating if any pensionable age people live in the household. The supplementary BHPS household dataset income includes a variable measuring a household's pension income.

This has been used along with the private occupational pension income and contribution variables held in the BHPS dataset.

Analytical Methods

Analysis has been divided into three chapters. The first considers the results of analyses for hypotheses relating to individuals and households being in poverty. The next two chapters consider poverty dynamics, examining hypotheses relating to households transitioning into and out of poverty respectively.

As previously described, all of the data management and analyses of secondary data have been carried out using Stata version 14. Rather than typing commands at the keyboard I have created text files containing commands that can be executed as required. These do-files offer many advantages over simply typing commands at the keyboard or using the drop-down menus, including the ability to reproduce work at a later date and to make any de-bugging an easier process (Long 2009). A feature of these do-files is that they can be nested, i.e. one do-file can activate another do-file, which in turn can activate another do-file. Such a feature has been used in merging the various BHPS, rural classification and household income files into one file containing the variables required for the analyses in each of the three following chapters.

Identification of Poverty Status

An obvious requirement is to identify a household's poverty status. To borrow the terminology of Jarvis & Jenkins (1995) the phrase 'being in poverty' is taken to mean having a real income level below a pre-specified low income cut-off. For most of my analyses the cut-off was 60% of median equivalised household income (BHC)[35]. An important consideration then is how a household is defined. In current UK Government low income figures (HBAI) a household is a single person or group of people living at the same address as their main or only residence, who either share one meal a day together or share the living accommodation. The British Household Panel Survey applies the same definition (Taylor et al. 2010).

As previously described, some of the datasets are at household level and some at the individual level. By merging the relevant household level datasets it has been possible to derive GB-wide poverty lines for each year using the equivalised household level income data from the supplementary BHPS household income dataset as its basis. Using these results it was then

[35] To test the sensitivity of poverty rates to different operationalisations I have also calculated a poverty rate based on 70% of median household incomes and also derived an after housing cost poverty threshold (at 60% of median household income).

a straightforward task to identify a household's poverty status. This household status is then applied to all members of the household, as is various other household level information, so that analyses at the individual level can be carried out. When analysing at the household level, analysis was restricted to one individual from the household, the head of household (HoH). It was then possible to identify household poverty rates. The BHPS is not designed for following households, recognising that households change in their composition from one year to the next, for example in the numbers of individuals, perhaps through divorce or marriage, or children leaving home. This means that the calculation of poverty persistence has been carried out at the individual rather than household level.

Identification of Transitioning Individuals

For the same reason the analysis of movement into and out of poverty, poverty dynamics, is also carried out at the individual rather than household level. An individual is identified as entering poverty (at wave *t*) if, at wave *t-1* their equivalised household income is at or above our poverty line and at wave *t* it has fallen below the line. The reverse of this process is used to identify individuals exiting poverty. In his analysis of poverty exit rates and re-entry rates, Jenkins (2000) attempts to account for measurement error. Jenkins suggests that it is 'implausible to treat small income changes, for example one pound below the poverty line to one pound above the line, or vice versa, as genuine transitions out of or into poverty, when it is likely due to transitory variation or measurement error' (Jenkins, 2000; p543). To overcome these effects the author requires the income of an in-poverty household to rise to 10% above the poverty line for it to be regarded as transitioning out of poverty. Similarly, a household above the poverty line needs its income to drop below 90% of the poverty line for it to be regarded as transitioning in to poverty. This attempt at accounting for measurement error appears to have been applied in no other similar analyses so I have preferred not to do this and take the income measure at face value when calculating if households and the individuals within it have moved into or out of poverty.

Deriving Transition Variables

For the poverty dynamics models of chapters five and six I require the change in each time varying factor from one year to the next. Of interest is how changes in these factors associate with a household's entry into and exit from poverty. According to Smith and Middleton (2007) the factors most likely to be associated with a household's entry or exit from poverty revolve around '….changes in individuals' or households' labour market participation and demographic characteristics which precipitate poverty transitions' (Smith & Middleton, 2007, p37). The

authors' review suggests that income and labour market change are more likely to trigger entry into and exit from poverty than any demographic change. However, their review leads them to conclude that demographic change is more important for entry into poverty than it is for exit out of poverty.

That is not to say all other elements should be dropped from further analysis. If rural poverty really does deserve separate analysis given the unique forms of rural deprivation, then the level of association among all of the factors identified from the literature as particular to rural poverty should be reflected in the results of the logistic regression models that follow.

The dynamic analysis of poverty requires the calculation of changes in variables at the individual rather than household level. The characteristics of the household can still be applied to the individual within the household and as described above it is the changes in these characteristics which precipitate poverty transitions. One method of defining the year on year change in each factor variable is to simply record its change in value from one year to the next. This will result in positive and negative values, reflecting the variable value rising or dropping each year. Such transition variables could be used as they are when testing association with both the entry into and exit from poverty models. In the first instance though I have applied a slightly different methodology, similar to that used by Jenkins (2000), creating binary variables that measure a variable change that is commensurate with the poverty change. Doing this narrows the focus: taking as an example the working household variable, rather than simply calculating its change year on year, which would result in values -1, 0 and 1, I have created a binary variable identifying if theindividuals in the household moved from a working to a non-working household. In this way I can model the effect of a one way change in the factor, in this example to test the impact of moving to a workless household on entry into poverty. For the exit from poverty model I have done the reverse, creating a binary variable that identifies individuals in households that have moved from a non-working to a working household. This process has been repeated for all of the time varying variables to create the transition variables.

The creation of binary transition variables has been repeated for most of the other factors that were included in the in-poverty models, with some remaining as non-transitioning due to low numbers. For the entry into poverty models binary transition variables have been created that identify households with drops in the number in employment, in the head of household employment income, a change from an in-work to non-work household, in the amount of benefit received and in household pension income. Transition variables have also been created

that identify if households have entered fuel or food poverty, if the expenditure on household fuel has increased, if a car is no longer available to household members and if the care burden in the household has increased. Also created are binary variables that identify a worsening head of household subjective well-being score and any household members exhibiting possible psychiatric morbidity, plus households reaching the threshold of three or more dependent children.

It is worth noting that trigger events associated with a household entering poverty are *a contrario* also associated with a household exiting poverty, although the strength of that association may vary somewhat. Given this, the factors considered in my analyses remain the same across both the entering poverty & exiting poverty models. In creating binary transition variables for the exiting poverty models, the direction of change is reversed, for example, identifying households with an *increase* in the number in employment.

Not all of the factors in my in-poverty model can sensibly be reflected in their equivalent transition variable. With respect to the three employment related factors of someone in the household being employed in seasonal work, having a second job or being employed in more than one job in the previous year, any change to or from these states could be for a multitude of reasons that could each relate to a household either entering or exiting poverty. For example, the change from one year to the next of someone in the household working in seasonal employment to not doing so could perhaps be down to moving to a full-time post or conversely be due to the job ending and now being unemployed. Given such ambiguity I have not included these variables in my transition models.

Analytical Processes

The analytical process within each of the three analysis chapters has been very similar. For the in-poverty analysis of chapter four, after calculating year by year poverty lines in the manner described above, I have then calculated poverty levels for the general population and sub-populations, comparing in each case the levels in rural and non-rural Scotland and testing the relevant hypotheses. Following that I then compared the rates of occurrence of each of the poverty related factors, again by rural and non-rural Scotland. The final steps were to carry out logistic regression analysis to test the association of factors with a household being in poverty in rural and non-rural Scotland and, by the addition of rural interaction variables, identify those elements that show significant difference in association with poverty in rural Scotland

compared to the rest of the country. In this way the in-poverty related hypotheses of chapter 2 were tested.

The poverty dynamics analysis has followed a very similar process, with separate analyses for the entry into poverty and exit from poverty transitions, in chapters five and six respectively. The slight exception is that the low number of cases in rural Scotland in the sub-population comparison analyses means that any differences in poverty transition rates for these groups have not been tested formally by hypotheses, although the results are included for completeness. In all three chapters the comparative analysis of means across the rurality domain has taken account of the panel nature of the data. The use of a test such as a t-test is not appropriate for panel data.

I have elected to use probit regression models. The alternative approach using logit models is very similar and the choice between the two is often disciplinary. Logit models are most often the choice among epidemiologists for example, while probit models are generally preferred in econometrics. Both approaches are similar and generally lead to nearly identical substantive conclusions. There are some occasions when differences in results occur between logit and probit models, an example is when there are an extremely large number of observations heavily concentrated in the tails of the distribution (Liao 1994). Hahn & Soyer (2005) suggest that probit models are better in random effects models and should be the preferred option except in the case of extreme independent variables. These are variables where one particularly large or small value overrides the effect of other variables and determines whether the dependent variable takes a value of 0 or 1.

The poverty status binary variable has been set as the dependent variable, in all of my poverty models. For the purpose of testing hypotheses, in each case separate models have been run for rural and non-rural Scotland. An important impact of producing separate models like this is that they should better illustrate what Gibb et al. (1998) describe as uniquely rural forms of poverty.

Within each of the three poverty status chapters I am also testing hypotheses examining significant differences in the extent of association that each factor has in rural and non-rural Scotland. The differences in the association of these factors for each poverty status across rural and the rest of Scotland can be tested more formally by introducing ‘interaction terms’. In my models I am introducing interaction variables made up of each factor multiplied by the rurality binary variable. An interaction refers to how the effect on the dependent variable of one

explanatory or independent variable depends on the level of one or more other independent variable(s). This effect on the dependent variable can be significantly different for different values of the independent variable. An example for my in poverty model may be that the effect on the probability of the household being in poverty of having 3 or more children in the household is significantly greater among rural households than among households in the rest of Scotland; there is then said to be a significant interaction effect between our factor and rurality.

To test whether the magnitude of association of factors with poverty status in rural and the rest of Scotland is significantly different, a model has been run with all of the interaction terms included. Interaction effects are complicated to compute and interpret in non-linear models (Norton et al. 2004). A problem is that unlike in linear models the statistical significance of an interaction effect should not be determined solely by the z-statistic reported in regression output. In a linear regression model a statistically significant coefficient on the interaction term suggests there is a difference in the impact on the output variable between the two interaction variables. The same cannot be said for non-linear models and care needs to be taken in interpreting the coefficient of the interaction term in such models. Stata has some commands that can help better visualise and interpret the results of interaction effects in models. The use of the *margins* and associated *marginsplot* commands (Williams 2012) allows a visual interpretation of how the probability of being in poverty varies across rural and the rest of Scotland for each of the factors. These commands have been applied to each of the derived probit regression outputs from the in poverty, entering poverty and exiting poverty models.

I have reported model results both with and without all of the non-significant independent variables. Doing the former in linear models is typically 'preferable because it provides the best point estimate based on a set of variables that the analyst has an *a priori* basis for suspecting affect the outcome' (Treiman 2009; p107). Here of course I am using non-linear models and the consideration of the effect of each independent variable is more complex compared to that in linear models. I illustrate the impact that the removal of the non-significant variables has on the goodness of fit of my models and go on to examine with my parsimonious models how each variable associates with being in poverty, entering poverty or exiting poverty in non-rural and rural Scotland, and the interaction effect of rurality on each of the factors, again for the in-poverty, entering poverty and exiting poverty scenarios.

Throughout this analytical process I have been conscious that there are several methodological issues, particularly relating to panel datasets that needed addressing. These are discussed in more detail in the next section.

Addressing Methodological Issues

Some important methodological issues need addressing when analysing panel data. In this section I discuss these issues, explaining what they are and how they have been addressed in my analyses. In no particular order these issues are: applying weights; attrition; initial conditions, state dependence & heterogeneity; collinearity; and heteroskedasticity.

Weights

The use of weights is somewhat controversial (Treiman 2009; p214). One argument is to never use weights but to include in your analysis all the variables used to devise the weights. Solon et al. (2013) among many others suggest weighting for descriptive statistics only. These authors also provide examples illustrating when applying weights is not a good idea, particularly when estimating causal effects: to achieve more precise estimates by correcting for heteroskedasticity (discussed later in this chapter); to achieve consistent estimates by correcting for endogenous sampling; and to identify average partial effects in the presence of un-modelled heterogeneity effects.

The analysis in this thesis makes use of longitudinal data. An obvious strategy therefore is to use the longitudinal weights provided in BHPS. However, the BHPS longitudinal weights are non-zero only for original and permanent sample members with complete response at every wave up to and including the current one. Those with intermittent responses are excluded and this is undesirable for longitudinal analysis (Jenkins 2010).

An important feature of my research is the use of the supplementary BHPS household income dataset which provided the derived net household income. This was constructed from data about various income sources for each person within each household and as such requires complete information for income recipients and income sources. Analysis was restricted to households in each wave in which all eligible members provided complete interviews (Jarvis & Jenkins 1995). In view of this, I have followed the author's suggestion and in my regression analyses have not used the cross-sectional or longitudinal weights provided in the BHPS data, since they are designed to be applied to samples of all respondent households. I have however applied household weights to derive the UK wide poverty line (60% of net current household

income), following the procedure set out in an ISER Stata workshop attended at Edinburgh University in 2013. For comparison purposes I also calculated the UK wide poverty line without weights and the resulting pounds per week poverty line calculated by the two methods were very similar. Analysis based on unweighted data can be subject to attrition biases, an issue discussed in the next section.

Attrition

Attrition is the process that leads to absence of data in the panel record as a result of survey non-response or other data unavailability (Uhrig 2008) and results in the panel sample decreasing in size over time with a resultant loss of precision of estimates derived from it. Through work with early years of BHPS (Cappellari & Jenkins 2002) it was found that attrition was highest among the low paid, although a footnote in Stewart & Swaffield (1999) suggests that low pay transitions show no correlation with future attrition. In later poverty and income related applications the magnitude of the impact of attrition has been found to be small but not ignorable (Cappellari & Jenkins 2004; Cappellari & Jenkins 2008). BHPS longitudinal weights are designed to help adjust for the problem (Jenkins et al. 2001) but these are only available for persons who are present in all waves of the survey up to the current one. Such weights could still be applied in my analyses to test for attrition, albeit with the above caveat. The examination of poverty rates by rurality across Scotland and among various sub-populations (chapter 4) have been calculated with and without weights. In these sections of chapter 4 I have tested hypotheses that the rates of poverty across the rurality domain are the same within each of the population groups. Where the application of weighting produces a result different to that obtained without the application of weights I have commented on this in the relevant section of chapter 4. The same process has been applied for the comparative statistics of factors associated with a household being in poverty. Only where weighting affects the comparison results has a comment been made in the relevant section.

Initial Condition, State Dependence & Heterogeneity

The initial condition problem arises when processes by which data is generated have been in place prior to the start of the observation period of models. The initial response at the start of the observation period can be affected by pre-observation responses. A study accounting for such a problem and relevant to this PhD is the experience of low income in one year impacting on the risk of having low income the following year (Cappellari & Jenkins 2002). Generally, ignoring the problem of initial conditions will result in biased and inconsistent parameter estimates (Fotouhi 2005; Wooldridge 2005; Stewart 2006). An exception is when the initial

conditions or the relevant pre-sample history are pre-determined or exogenous. This applies if the unobservables generating the process are serially independent, or if a genuine new process is observed at the beginning of the sample period, and the relevant pre-sample history is unrelated to unobservable characteristics that generate the process in the sample period (Heckman 1981).

It is also possible that a household with income below the poverty line in one year may be there because of an earlier history of poverty (state dependence) or due to some observed and perhaps unobserved characteristic affecting their household income. A person's unobserved trait or characteristic, such as ability, taste and effort, can correlate with their likelihood of being in poverty. It is not possible to say whether the poverty status when first observed is the result of state dependence or such heterogeneity. The problem is that it is difficult to distinguish between the two (Arulampalam et al. 1998). That is not to say that some have not tried (Cappellari et al. 2010; Skrondal & Rabe-Hesketh 2014).

With regard to heterogeneity, controlling for differences in observed and unobserved characteristics between individuals has been shown to be important. An example relevant to this thesis shows that the mis-specification of the heterogeneity process can give rise to an erroneous estimate of the true impact of past low pay on current low pay probabilities (Stewart & Swaffield 1999). Observed & unobserved heterogeneity and the initial condition are explicitly controlled for in later work on poverty dynamics and persistence among targeted population groups. In an example using data from years 1991 to 2006 of BHPS, poverty exit and entry rates are estimated that depend on unobserved heterogeneity terms, and the single and multiple spell distribution of time spent in poverty are also calculated (Devicienti 2011). The author also introduces initial condition equations to his models, based on pre-sample information (Heckman 1981) and was able to make a tentative speculation that there was no initial condition problem.

Testing for initial condition, state dependence and heterogeneity effects

Through simulation studies the impact of initial conditions has been shown to wane to virtually nothing by the fourth observation period (Fotouhi 2005). If this is the case and there exists an initial condition problem then the coefficient estimates for models including the first three observation periods are likely to be significantly different to those obtained from models excluding these observation periods. If, on the other hand, these coefficients show no significant difference then either the initial conditions are not affecting the model or their impact actually lasts longer than the three years suggested by Fotouhi. The latter can be tested

by dropping another observation period (in this case the fourth time period) and again comparing coefficient estimates across the models.

I have applied this methodology to test for initial condition problems in the being in poverty model of chapter four, pooling the data to compare coefficients from the full 10 year model with those from the model with the first three years dropped. The results for the being in poverty model of chapter 4, in appendix B (table App0.1) suggest some degree of initial condition problem with three variables showing statistically significant difference in their coefficients[36]. However, there is no difference within each model in the variables that show statistically significant association with being in poverty. Similarly, the initial conditions test for the entry into poverty model shows no difference in the variables that are significant in each of the full ten year and reduced seven pooled models (data not shown).

A method attempting to account for initial conditions and state dependence is suggested by Skrondal and Rabe-Hesketh (2014) who note that responses in longitudinal or panel data are invariably dependent over time, even after conditioning for observed covariates. One of their approaches to handling such longitudinal dependence is to use models where the binary responses are regressed on previous or lagged responses. Such an approach allows one to test for the presence of state dependence (Arulampalam 2004). In my poverty models the probability of a household being in poverty in any year could depend on whether or not the household experienced poverty at the previous time period. Similarly, the probability of a household being in poverty in any year could also depend on how often the household has previously been in poverty. Is there a circumstance of life prior to the start of my observation time periods that influences this likelihood? I am effectively looking for pre-sample variables that impact on a household's likelihood of entering poverty. Heckman (1981) for example, used variables summarising the respondents parental socio-economic status measured when the respondent was aged 14. Cappellari & Jenkins (2004) have also included a variable identifying if the respondent was a BHPS original sample member (OSM). This is on the assumption that OSMs are more stable survey members compared to the other group, the joiners, who joined the survey later by moving into an OSM's household. Parental socio-economic status when the respondent was aged 14, plus age at completion of full-time education, work experience, training in previous 12 months plus size of workplace and union recognition are some of the variables included by Stewart and Swaffield (1999).

[36] The difference in coefficients between the 10 year and 7 year models was tested by running the Stata command *parmtest*.

In summary, this approach adds to the right hand side of our model equation the dependent variable at time *t-1*, plus a set of initial condition variables made up of pre-sample information. The inclusion of pre-sample variables and the lagged dependent variable has been tested by Stewart (2006), who has produced a Stata program *redprob* with which to do this. I have applied this program to test for initial condition/state dependence effects on an early version of the being in poverty model of chapter four. I have followed Cappellari and Jenkins (2004) in using a binary variable identifying if the head of household is an original sample member as a pre-sample variable. The aim for such pre-sample variables is that they are statistically significant for time t=1 but not so thereafter. Unfortunately, the OSM variable does not fit this requirement[37] but age of the head of household[38] does (Appendix B: table App0.2). Interestingly, the estimated effect of some of the remaining variables are bigger in absolute values with the *redprob* estimator, differences that would be increased further if the *redprob* model estimates are scaled up as a result of each model using different normalisation methods. Of further interest is none of the factors, except age of head of household, show any difference in statistical significance across each model.

Individual heterogeneity, variables that cannot be observed or measured such as cultural circumstances, or variables that change over time but not across entities, can be accounted for in longitudinal or panel models, unlike in pooled data where it is assumed away. There are basically two types of longitudinal models that each differ in how heterogeneity is captured, the fixed effects and random effect models. The assumptions used within each type are different. The regression equations are rewritten to include, in a fixed effect model, a time invariant heterogeneity component that captures the time-invariant variables not otherwise captured by the time varying characteristics included in the model. In such a model the heterogeneity is associated with the explanatory variables on the right hand side. In a random effects model no such association is assumed. This allows an estimation of the effect of time-invariant variables which cancel out in a fixed effect model. The choice of which model type to use relies on which of the assumptions are satisfied. The Hausman test analyses whether the results of a random effects model are systematically different from the results of the fixed effect model. If they are, it means that the random effects model is inconsistent and the fixed effect model should be preferred (Longhi & Nandi 2015). I have carried out a Hausman test and

[37] Miss-specifying the initial conditions will result in biased estimates of the parameters of interest. In the example considered here the magnitude of the state dependence as captured by the coefficient of the lagged (poverty) term will not provide a true reflection of its effect.

[38] The age of head of household variable takes a dummy variable form in later models to reflect working age.

a null hypothesis result of less than 0.05 suggests there exist systematic differences in my fixed effect and random effects models (this was comparing logit rather than probit models as a fixed effects model of the latter is not available in Stata). A problem however with fixed effect models is that the effect of time-invariant characteristics such as gender cannot be estimated. My models included gender, an important consideration in poverty research so I retained the random effects models[39].

Collinearity

Collinearity is a situation when multiple explanatory variables are sufficiently strongly related that satisfactory identification cannot be assured. Should there be a perfect linear relationship between two variables then Stata will automatically drop one of them when calculating the model. One method of detecting explanatory variable collinearity is through the calculation of Variance Inflation Factors (VIF) as outlined in (Neter et al. 1999). The standard diagnostic tool in Stata is the *estat VIF* command, and commonly a variable with a VIF of greater than five or ten is removed from the model. If the mean VIF score across all variables in the model is greater than 5 then collinearity is still regarded as a problem. For the models described in this thesis none of the variables exhibit a VIF of greater than 10 but in some instances variables have been removed when they have a VIF of more than 5. Any such removal has been highlighted in the text. It should be noted however that VIF is not a strong indicator of collinearity as it ignores correlations between the independent or explanatory variables and the dependent variable (Wheeler 2007). A further check for collinearity is to examine to what extent coefficient estimates change when a new variable is added to a model. Large changes in coefficient estimates can indicate the presence of collinearity. Nested tables of results have been included throughout the analysis chapters, and these show the development of my models as new variables were added. Any significantly large variations in coefficient estimates are highlighted and resulting actions discussed in the relevant sections of this thesis.

Heteroskedasticity

Heteroskedasticity occurs when the assumption of homoskedasticity is violated. The homoskedasticity assumption requires that the variance of linear regression equation errors be

[39] One way of estimating a consistent random effects model when the Hausman test suggests inconsistency is to include the mean of the time-varying covariates among the explanatory variables (Mundlak 1978). Adding the means should capture the correlation between the unobserved heterogeneity and the explanatory variables that render the random effects model inconsistent.

the same for all values of the independent variables. Kaufmann (2013) gives a full discussion on this (with Stata example files) and suggests:

A final reason to care about heteroskedasticity is that the potential for it to exist is more common than is usually recognised by researchers. (Kaufmann 2013: p6).

The usual consequence of Heteroskedasticity is inefficient standard errors (smaller than they should be). Often you can transform the dependent variable to remove Heteroskedasticity (Kohler & Kreuter 2009: p298). Examples for binary dependent variables are to perform a logit or probit transformation. If such a transformation does not remove heteroskedasticity in the regression model then the standard errors of the estimated coefficients should not be used for a significance test. The model could also be subject to other types of heteroskedasticity so it is a good idea to calculate robust standard errors (in Stata by the use of the *vce(robust)* option in the regression command). Under this option the standard errors are computed so that homoskedasticity of the error term need not be assumed. As Kaufmann (2013) goes on to point out, just using robust standard errors is suboptimal (Type II error). All of the regression models in this thesis have applied the probit transformation and include the robust standard errors option in the regression command.

Solon et al. (2013) suggest applying tests for heteroskedasticity using for example the Breusch-Pagan test and reporting robust standard errors. They also suggest reporting both unweighted and weighted results. The contrast between results can be used as a diagnostic for model misspecification or endogenous sampling. The failure to model heterogeneous effects is one sort of misspecification that can generate a contrast. I have taken the decision that running my models with a probit transformation and calculating robust standard errors, plus providing some weighted and un-weighted results will provide some degree of comfort that heteroskedasticity is not of sufficient issue to invalidate any conclusions drawn from my analyses.

Quadrature Approximation

The results of random effects models, the log likelihood and its derivatives, are calculated by quadrature approximation. Stata uses two types, adaptive or non-adaptive Gauss-Hermite quadrature. Generally the former is the default method in Stata. The accuracy of the quadrature approximation depends on three considerations: how many quadrature points are used; where they fall; and the smoothness of the function being approximated. Stata has a tool that helps identify a good quadrature approximation.

The Stata function *quadchk* compares coefficients of models derived with varying numbers of quadrature points, usually comparing the default 12 points with 8 and 16. If the relative difference in these coefficients is greater than 1% then quadrature is not reliably approximating the log likelihood[40]. There are three alternatives if that is the case. The user can switch quadrature method, increase the number of quadrature points, or as a final resort consider an alternative model, such as fixed effects, pooled or population-average model. All models described in this thesis have had quadrature approximation checks carried out in this manner and none have proven unreliable under the generally used 1% relative coefficient difference.

Conclusion

In this chapter I have explained some of the advantages of using longitudinal data over cross-sectional data in poverty analysis, and how the choice of the appropriate dataset was an easy one given the lack of alternatives that included all members of households and of sufficient duration. I have gone on to explain the data management that was required to get the various datasets and required variables into the form required for my analyses. A description of the analytical methods used then follows. This includes explanations on how a household's poverty status was identified, plus how transition variables were created that measured the appropriate change in factors. The use of longitudinal data brings with it a baggage of methodological issues that need addressing to improve confidence in ones results and conclusions. These issues have been described, and the way in which they have been addressed were included in the final section of this chapter.

In my next three chapters I have tested my hypotheses against data in the BHPS. In chapter four I have tested factors, identified in the literature, for their association with a household being in poverty in rural and non-rural Scotland. In chapters five and six I have tested hypotheses relating to households moving into and out of poverty respectively. In each chapter testing that the factors identified in the literature show association with a household being in poverty, moving into poverty or exiting poverty in rural Scotland, when using the official Scottish Government definition of rural Scotland. Each of these three chapters followed the same format, presenting findings and initial interpretations of results followed by more discursive interpretation.

[40] http://www.stata.com/manuals13/xtquadchk.pdf accessed 20th May 2016.

Chapter 4: Analysis I - Being In Poverty

Introduction

In chapter two I described how poverty is defined and how it is measured both generally and among population sub-groups. In this chapter I have calculated poverty lines for each year of the study period and shown the levels of poverty among these population groups in rural and non-rural Scotland. Also in the previous chapters I described the Scottish Government definition of rural Scotland and reviewed the findings from the limited previous research on poverty that was specific to rural Scotland. In this review I identified factors thought to be particularly associated with poverty in rural Scotland and in some cases at a wider scale as well. These definitions and previous findings have formed the basis on which several hypotheses have been tested in this chapter. One objective in testing these hypotheses is to see if all of the factors identified in the literature actually show association with rural Scotland when considered with BHPS data and where rural Scotland is as defined and currently used by the Scottish Government. I have shown that the term rural means different things to different people and it is possible that factors identified as associated with poverty in rural areas do not show such association when the Scottish Government definition of rural is applied.

Prior to testing these hypotheses I provide some comparative statistics, comparing the mean values, by rurality, for each of the factors. To some extent these results offer an explanation as to why these factors were regarded in the literature as showing association with poverty in rural Scotland. To test these associations more thoroughly, I then go on to test the hypotheses using probit regression techniques. The hypotheses tested in this chapter are:

Hypothesis 1: Poverty rates in rural Scotland are the same as they are in non-rural Scotland;

Hypothesis 1a: poverty rates among male single person households are the same as they are among female single person households; and

Hypothesis 1b: poverty rates among single person households in rural Scotland are the same as they are in non-rural Scotland.

Hypothesis 1c: child poverty rates in rural Scotland are the same as they are in non-rural Scotland;

Hypothesis 1d: the proportion of individuals living in a household where someone in the household is in work and the household is in poverty, is the same in rural Scotland as it is in non-rural Scotland;

Hypothesis 1e: poverty rates among the elderly in rural Scotland are the same as they are in non-rural Scotland;

Hypothesis 1f: household fuel poverty rates in rural Scotland are the same as they are in non-rural Scotland;

Hypothesis 1g: persistent poverty rates in rural Scotland are the same as they are in non-rural Scotland;

Hypothesis 2a: poverty factors significantly associated with a rural Scotland household being in poverty are also associated with a non-rural Scotland household being in poverty; and

Hypothesis 2b: the extent of association of each factor with a household being in poverty is the same in rural Scotland as it is in the rest of Scotland.

Derived Poverty line and Scotland-wide Poverty Rates

As described in an earlier section, equivalised current household level income data, adjusted for differences in household size and composition is provided in the supplementary BHPS household income dataset. All incomes have been converted to January 2010 prices. A GB wide poverty line for each wave has been calculated as defined in chapter 2, based on 60% of median current household income, equivalised to account for household size. Within BHPS and the supplementary BHPS household income datasets, current household income is measured in the month prior to the interview and is expressed in pounds per week. The poverty line derived from these income figures are shown in table 4.1.

Table 4.1: Derived poverty line (before housing costs) of 60% of net current household income, by wave (equivalised household weighted Pounds per week – Jan 2010 prices)

Year	Poverty line (£s per week)
1999	140.47
2000	146.02
2001	152.43
2002	160.35
2003	160.26
2004	163.16
2005	161.46
2006	165.48
2007	164.77
2008	161.59

Source: BHPS waves 9-18.

It is noticeable in three out of the last four years that the poverty line drops. Of interest in this thesis is how such change is reflected in the poverty around those years. For analytical purposes a simple binary variable has been created to identify households in poverty, with values of zero for households with equivalised income above the poverty line and a value of one if below it.

Table 4.2: Percentage of households with net income less than 60% of the GB median (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
1999	25.1	1.2	1340	21.5	2.4	284	24.5	1.1	1624
2000	22.9	1.1	1379	21.4	2.4	290	22.6	1.0	1669
2001	22.4	1.2	1295	21.7	2.5	281	22.3	1.0	1576
2002	22.0	1.2	1116	22.0	2.6	255	22.0	1.1	1371
2003	22.2	1.3	1063	16.5	2.4	243	21.1	1.1	1306
2004	21.2	1.3	975	17.7	2.5	226	20.6	1.2	1201
2005	18.9	1.3	956	13.9	2.4	208	18.0	1.1	1164
2006	19.2	1.3	932	14.3	2.5	196	18.4	1.2	1128
2007	17.3	1.3	866	16.2	2.7	185	17.1	1.2	1051
2008	18.8	1.4	834	17.5	2.8	183	18.6	1.2	1017
All years	21.4	0.4	10756	18.7	0.8	2351	20.9	0.4	13107

Notes: Rural Scotland defined as settlements with a population of less than 3,000.
Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

When applying the poverty line over the whole period from wave 9 to wave 18 the average cross-sectional household poverty rate across Scotland is 20.9% (table 4.2). The rate across all of Scotland is highest in 1999 (24.5%) and takes a downward trend year on year to a low of 17.1% in 2007 before rising to 18.6% in 2008. It is noticeable that the drop in the poverty lines (table 4.1) for the later years of the study period has not being matched by drops in the rates of

poverty for those years. These all Scotland poverty rates are similar to those found in official published documents (Scottish Government 2015a) and in other research using BHPS data (Devicienti 2011).

A similar pattern emerges when the poverty rates across the rural/non-rural classifications are observed. It is noticeable that the average rates of poverty are lower in rural compared to non-rural areas. Across all waves the rural areas show poverty rates that are averaging 2.7% lower than non-rural areas of Scotland. A random-effects probit regression with the rural dummy as the sole independent variable shows strong statistically significant association with decreased likelihood of being in poverty in rural compared to non-rural areas of Scotland ($p=0.020$). These results show that hypothesis 1: Poverty rates in rural Scotland are the same as they are in the rest of Scotland, is not the case under the official definitions of poverty and rural Scotland, described in chapter 2, and can be rejected. The data suggest poverty rates are lower in rural Scotland than in the rest of the country.

An issue when examining population data in the manner described here is that a change in household size, for example through marriage/co-habiting or household breakups, could introduce an artefactual bias in the population being studied. This could potentially be a problem if there were a considerable number of household size changes. Within the time period under consideration within this thesis just over 6% of households have seen a change in their household size, a percentage that has remained constant in each year of the study. An examination of the poverty rates when such households are removed, i.e. only among those households that did not have any change in their household size, reveals poverty rates very similar to those shown in table 4.2, with very small changes in rates by year and by rurality of around 0.2 percent, and figures that have no impact on the conclusion on hypothesis 1. In terms of rates of poverty in rural and non-rural Scotland the issue of changing household size does not look to impact significantly on the results of table 4.2.

Poverty Rates among Sub-populations

Gender Poverty

In chapter two I noted that poverty is typically measured at the household level, so that in a household with an adult couple, either both partners are in poverty or neither is in poverty. Accordingly, most differences in poverty rates by gender rest upon the differences between single adult households that are headed by men and by women. There are two poverty counts that can be made here: the rates of poverty among all single person households; and the rates among single parent households. I also noted in chapter two that most single parent households have a woman as the head of household, since women usually gain custody of the children on marital breakups or non-marital births. This is reflected in the number of single parent households headed by males found in the BHPS dataset. Between the years covered by my research there are only 73 instances of male head of household single parents, just 7% of the single parent total. Poverty rates are very similar, 37.0% among male single parents and 36.1% among female single parents. These figures have not been broken down by rurality given there are several years when there are no male single parents in rural Scotland.

The results of the alternative measure, of poverty rates among all single person households, are shown in tables 4.3 and 4.4 separately for male and female headed households.

Table 4.3: Percentage of male single person households with net income less than 60% of the GB median (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
1999	29.3	3.2	205	26.5	7.7	34	28.9	2.9	239
2000	21.9	2.9	210	25.6	7.1	39	22.5	2.7	249
2001	22.9	3.0	192	22.2	7.0	36	22.8	2.8	228
2002	28.0	3.5	164	24.2	7.6	33	27.4	3.2	197
2003	25.5	3.4	165	16.1	6.7	31	24.0	3.1	196
2004	26.2	3.7	145	19.4	7.2	31	25.0	3.3	176
2005	26.3	3.8	133	17.9	7.4	28	24.8	3.4	161
2006	23.0	3.6	139	17.9	7.4	28	22.2	3.2	167
2007	22.8	3.7	127	30.4	9.8	23	24.0	3.5	150
2008	23.4	3.8	124	22.7	9.1	22	23.3	3.5	146
All years	25.0	1.1	1604	22.3	2.4	305	24.6	0.10	1909

Notes: Rural Scotland defined as settlements with a population of less than 3,000.
Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

The poverty rates among female single person households are statistically significantly higher than among male single person households, in non-rural, rural and across all Scotland households (when comparing percentages in tables 4.3 with similar in table 4.4). The difference is most marked in non-rural Scotland where poverty among female single person households is more than 12 percentage points higher than among males. Given the significant difference hypothesis 1a can be rejected, poverty rates among single male households are not the same as poverty rates among female single person households.

When comparing poverty rates across the rurality domain, non-rural Scotland sees higher rates than rural Scotland for both male (25.0% non-rural compared with 22.3% rural) and female single person households (37.1% non-rural compared with 31.5% rural) but in each case the difference by rurality is not significant. Hypothesis 1b cannot therefore be rejected.

Table 4.4: Percentage of female single person households with net income less than 60% of the GB median (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
1999	40.1	2.9	287	36.7	6.3	60	39.5	2.6	347
2000	37.8	2.8	294	33.3	6.7	51	37.1	2.6	345
2001	36.8	2.8	288	38.8	7.0	49	37.1	2.6	337
2002	40.6	3.3	229	34.7	6.9	49	39.6	2.9	278
2003	40.7	3.4	216	28.3	6.7	46	38.5	3.0	262
2004	39.3	3.4	211	31.8	7.1	44	38.0	3.0	255
2005	33.8	3.3	201	24.4	6.5	45	32.1	3.0	246
2006	34.5	3.3	203	24.4	6.8	41	32.8	3.0	244
2007	29.9	3.4	184	23.8	6.7	42	28.8	3.0	226
2008	33.9	3.5	186	35.0	7.6	40	34.1	3.2	226
All years	37.1	0.1	2299	31.5	2.2	467	36.1	0.9	2766

Notes: Rural Scotland defined as settlements with a population of less than 3,000.
Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

Child Poverty

Hypothesis 1c posits that child poverty rates in rural Scotland are no different than they are in the rest of Scotland. Data in BHPS suggests that the rate of households with children in poverty (table 4.3) in rural Scotland look to be slightly lower than in urban Scotland but the difference is not statistically significant at a 95% confidence limit and hypothesis 1c therefore cannot be rejected.

Table 4.5: Percentage of households with children and net income less than 60% of the GB median (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
1999	24.7	2.2	385	22.4	5.1	67	24.3	2.0	452
2000	20.4	2.0	407	15.7	4.0	83	19.6	1.8	490
2001	21.7	2.1	374	16.0	4.1	81	20.7	1.9	455
2002	19.6	2.2	327	19.4	4.9	67	19.5	2.0	394
2003	18.7	2.2	305	14.8	4.6	61	18.0	2.0	366
2004	18.7	2.3	278	18.6	5.1	58	18.7	2.1	337
2005	14.7	2.1	286	13.5	4.8	52	14.5	1.9	338
2006	15.3	2.3	255	13.6	5.2	44	15.1	2.1	299
2007	13.9	2.2	245	12.2	5.2	41	13.6	2.0	286
2008	13.0	2.2	239	14.0	5.3	43	13.1	2.0	282
All years	18.6	0.7	3101	16.4	1.5	598	18.3	0.6	3699

Notes: Rural Scotland defined as settlements with a population of less than 3,000.
Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

In-work Poverty

Under hypothesis 1d I have posited that the proportion of individuals in households with someone in the household in work and in poverty in rural Scotland is no different to the proportion in the rest of Scotland. As can be seen in table 4.4, the proportion of individuals in low income households with someone in work is consistently higher in rural Scotland.

Table 4.6: Percentage of individuals in poverty households (before housing costs) with at least one member of household in work, by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
1999	35.7	1.9	667	46.2	4.6	119	37.3	1.7	786
2000	37.4	1.9	617	44.6	4.5	121	38.6	1.8	738
2001	39.1	2.0	575	49.6	4.6	121	40.9	1.9	696
2002	36.5	2.3	458	53.2	4.8	109	39.7	2.1	567
2003	35.3	2.3	436	56.5	5.7	76	38.5	2.2	512
2004	36.4	2.5	382	49.3	5.8	75	38.5	2.3	457
2005	42.1	2.6	356	49.1	6.7	57	43.1	2.4	413
2006	40.9	2.7	330	51.8	6.7	56	42.5	2.5	386
2007	40.4	2.9	287	46.3	6.8	54	41.3	2.7	341
2008	36.1	2.9	274	40.7	6.7	54	36.9	2.7	328
All years	37.7	0.7	4382	48.8	1.7	842	39.5	0.7	5224

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median. Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

The Scotland-wide percentages closely follow the official estimates (Scottish Government 2015a) but bivariate regression suggests a significant difference across the rurality domain of

households with someone in work and in poverty ($p<0.001$). As a result I can conclude that hypothesis 1d can be rejected, and in-work poverty is significantly higher among households in rural Scotland than it is in the rest of the country.

Poverty among the Elderly

The rates of poverty among the elderly across Scotland, as derived from BHPS data, closely match official statistics (Scottish Government 2015a)[41]. Overall, elderly poverty is slightly lower in rural Scotland, but as can be seen in table 4.5, the poverty rate by year in rural Scotland fluctuates considerably. This perhaps is a reflection on the small number of pensioner respondents in the rural Scotland sample in the BHPS dataset, an issue discussed further in my concluding chapter. Bivariate regression suggests the difference in poverty rates between rural and the rest of Scotland is not significant (at 95% c.i.).

Given the lack of any statistically significant difference in elderly poverty rates between rural and the rest of Scotland I cannot reject the hypothesis that poverty rates among the elderly are the same in rural Scotland as they are in the rest of Scotland (hypothesis 1e).

Table 4.7: Percentage of pension age individuals with net income less than 60% of the GB median (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e	n
1999	30.9	2.0	559	26.1	3.8	134	30.0	1.7	693
2000	28.4	1.9	563	30.8	4.1	130	28.9	1.7	693
2001	26.0	1.9	554	31.1	4.0	135	27.0	1.7	689
2002	27.2	2.0	485	30.3	4.0	132	27.9	1.8	617
2003	27.6	2.1	464	24.0	3.8	129	26.8	1.8	593
2004	25.7	2.1	436	22.4	3.9	116	25.0	1.8	552
2005	23.5	2.0	430	14.2	3.4	106	21.6	1.8	536
2006	22.5	2.0	431	13.8	3.2	116	20.7	1.7	547
2007	21.3	2.0	417	18.3	3.7	109	20.7	1.8	526
2008	23.1	2.1	398	20.0	3.7	120	22.4	1.8	518
All years	25.9	0.6	4737	23.6	1.2	1227	25.4	0.6	5964

Notes: Rural Scotland defined as settlements with a population of less than 3,000.
Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

Fuel Poverty

BHPS holds household annual expenditure on electricity, gas, oil and coal. These household fuel items have been summed and the total divided by the household net income to derive the

[41] These and other poverty statistics are downloadable from: http://www.gov.scot/Publications/2015/06/7453/downloads Accessed 28/05/2016.

proportion spent on household fuel. According to Scottish Government definitions if the proportion exceeds 10 percent then the household is regarded as in fuel poverty, if greater than 20 percent it is in extreme fuel poverty[42]. The fuel poverty rates derived from BHPS data, show very similar trends to published rates (Wilson et al. 2012; Mueller et al. 2013), both at national and rural levels (table 4.6).

Table 4.8: Percentage of households in fuel poverty, by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
1999	15.4	1.0	1204	21.3	2.5	267	16.5	1.0	1471
2000	14.6	1.0	1283	23.9	2.6	280	16.3	0.9	1563
2001	12.1	0.9	1211	17.4	2.3	270	13.1	0.9	1481
2002	11.5	1.0	1053	20.6	2.6	248	13.2	0.9	1301
2003	10.2	1.0	983	14.1	2.3	234	10.9	0.9	1217
2004	11.0	1.0	924	15.4	2.4	221	11.9	1.0	1145
2005	11.3	1.0	913	14.2	2.5	204	11.8	1.0	1117
2006	16.7	1.3	885	26.0	3.2	192	18.4	1.2	1077
2007	18.1	1.3	818	24.0	3.2	179	19.2	1.2	997
2008	25.0	1.6	780	41.0	3.7	178	28.0	1.5	958
All years	14.3	0.3	10054	21.3	0.9	2273	15.6	0.3	12327

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in fuel poverty if they spend more than 10% of income on household fuels. Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

It is noticeable that the trend in fuel poverty rates follows closely that of fuel prices, particularly during the period 2003-2009 (Mueller et al. 2013: fig. 23). As Wilson et al. (2012) point out, the changes in fuel poverty rates directly reflect changes in fuel prices. Fuel prices rose dramatically from 2006 and this rise is reflected in fuel poverty rates. The higher fuel poverty rates in rural Scotland are likely therefore to be a reflection of the premium prices paid for fuel in such areas, plus the additional impact of less fuel choice (off the gas grid) and higher fuel demand as a result of the prevalence of particular housing types and their being hard to insulate in rural Scotland. More details on expenditures on household fuels is provided in the next section.

In terms of testing my hypothesis 1f, that household fuel poverty rates in rural Scotland are the same as the rest of Scotland, my analysis shows that this hypothesis can be rejected. Bivariate regression has shown that fuel poverty rates have proven to be significantly higher in rural Scotland compared to the rest of Scotland ($p<.001$).

[42] Definition of fuel poverty accessed from the Scottish Government website 14/04/16 http://www.gov.scot/Topics/Statistics/Browse/Housing-Regeneration/TrendFuelPoverty.

Poverty Persistence

The UK Government defines persistent poverty as those households that are in poverty in the current year and in at least two of the previous three years. Applying this definition to BHPS data we see the percentage of individuals in households suffering this form of poverty is slightly lower than official estimates (9% in 2008 (Scottish Government 2011a)).

Table 4.9: Percentage of individuals in households in persistent poverty (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2002	7.9	0.5	2488	7.1	1.1	552	7.8	0.5	3040
2003	9.7	0.6	2368	7.5	1.1	535	9.3	0.5	2903
2004	8.9	0.6	2152	5.9	1.1	489	8.3	0.5	2641
2005	8.4	0.6	2165	5.8	1.1	448	7.9	0.5	2613
2006	9.0	0.6	2050	3.9	1.0	413	8.1	0.6	2463
2007	7.7	0.6	1955	4.4	1.1	384	7.2	0.5	2339
2008	6.8	0.6	1848	4.9	1.1	387	6.5	0.5	2235
All years	8.4	0.2	15026	5.8	0.4	3208	7.9	0.2	18234

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Persistent poverty defined as in poverty in current year and in at least 2 of the previous 3 years. Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

In table 4.7 we can also see that persistent poverty in rural Scotland is lower than in non-rural Scotland. Bivariate regression suggests that this difference is statistically significant so in terms of hypothesis 1g I can state that persistent poverty is significantly lower in rural Scotland ($p<0.10$) than it is in the rest of Scotland and that the hypothesis can be rejected.

Factors Associated with a Household Being in Poverty in Scotland

In this section I test hypotheses 2a and 2b, for the former that poverty factors significantly associated with a rural Scotland household being in poverty are also associated with a non-rural Scotland household being in poverty, and for the latter go on to test if the extent of association of each factor with a household being in poverty is the same in rural Scotland as it is in the rest of Scotland.

The review of previous research on poverty in rural Scotland, as discussed in chapter two, has identified several factors thought to be associated with poverty in rural Scotland. In chapter two I highlighted the following: a fragile jobs market – a lack of employment opportunities, lower paid jobs with high levels of seasonal agricultural and tourism based work plus structural changes in farming, gender pay differences, plus a higher prevalence of someone in household holding down a second job, working from home or households suffering in-work poverty; a

lower benefit uptake; a higher cost of living and different consumption patterns – including increased levels of fuel poverty and high transport and grocery costs; a lack of affordable housing; health in the household, be that having a disabled person living in the household or subjective well-being; and household demographic issues. Although not regarded in the first House of Commons Scottish Affairs Committee report (2000) as an influence associated directly with rural poverty, car ownership is thought a necessity in rural areas. It may be revealing to examine car ownership among those in poverty and I have therefore included this element in further analysis below. The aim is to examine what Mattioli et al. (2016) refer to as car related economic stress (CRES), those households that need to spend a disproportionate amount of their income on car based mobility in order to access essential services and get to/from their place of work.

The testing of hypotheses 2a and 2b has been done in the following manner. First, a straightforward cross-sectional comparative analysis of various statistics in rural and non-rural Scotland. Such statistics should show if and by how much each factor varies in its prevalence across the rurality divide. Unfortunately, not all of the issues identified in chapter 2 are reflected directly with variables in BHPS. Where appropriate a proxy variable has been used and in the following text I identify these proxies and provide a rationale for their inclusion. Following on from this cross-sectional analysis I have then carried out more sophisticated analysis using logistic regression techniques to first test if factors are associated with poverty, both in rural and non-rural Scotland (hypothesis 2a), and then examine the extent to which the association with poverty of these factors varies across the 2-fold urban rural classification (hypothesis 2b).

Comparative Statistics

The poverty status is calculated using a household level variable[43], so most of the covariates discussed below are also measured at the household level where they are used in any regression analyses. These covariates refer either to the head of the household (e.g. age, gender), or relate to the household members (e.g. someone in household having a second job).

In this section I have first carried out a straightforward comparison of average occurrence across the rural/non-rural classification for each factor for which an appropriate BHPS variable exists. A summary of these results are shown in table 4.10 below. Those factors that do exhibit

[43] When comparing some of the poverty levels reported here with levels in earlier sections it should be noted that some of the earlier levels are at the individual rather than household level.

statistically significant difference in occurrence by rurality are marked by asterisks. The differences by rurality are also shown graphically in figures 4.1, 4.2, 4.4 and 4.5.

A fragile jobs market: there are several issues within this that were identified in chapter two as impacting on rural poverty. These are: the percentage of workless households; the number of people in the household who are currently working; a lower paid jobs market; a gender pay gap; high levels of seasonal work; and a higher prevalence of someone in household holding down a second job or home working.

A lack of employment opportunities may be reflected in the proportion of workless households, i.e. households in which no adults are in employment or are self-employed. I have created a working household binary variable indicating if someone in the household was employed or self-employed at the time of the survey. An alternative variable that could be used is to estimate the number of people in a household who are working. Clearly, this will vary by household size and the number of working age people within it. If for example rural households on average have more working age adults in the household then the rural mean is likely to be higher. Such a variable is going to be most useful in the transition models in the next two chapters and has not been included here. Instead, I have included in this section the working/workless household variable as the proxy for lack of employment opportunities. BHPS data suggests that the percentage of workless households is statistically significantly lower in rural Scotland (36%) than in the rest of the country (39%). Figure 4.1:a shows graphically the proportion of working rather than workless households, with confidence intervals.

Put another way, the proportion of households having any member in employment was consistently higher in rural Scotland up to 2006, when it then dropped below the proportion in the rest of Scotland (data by year not shown). Similarly, the number of household members in employment up to 2006 was also higher in rural Scotland and then dropped below the rest of Scotland from then onwards. The combination of lower pay and increased fuel prices from 2006 looks to impact on the members of rural household's likelihood of remaining in employment.

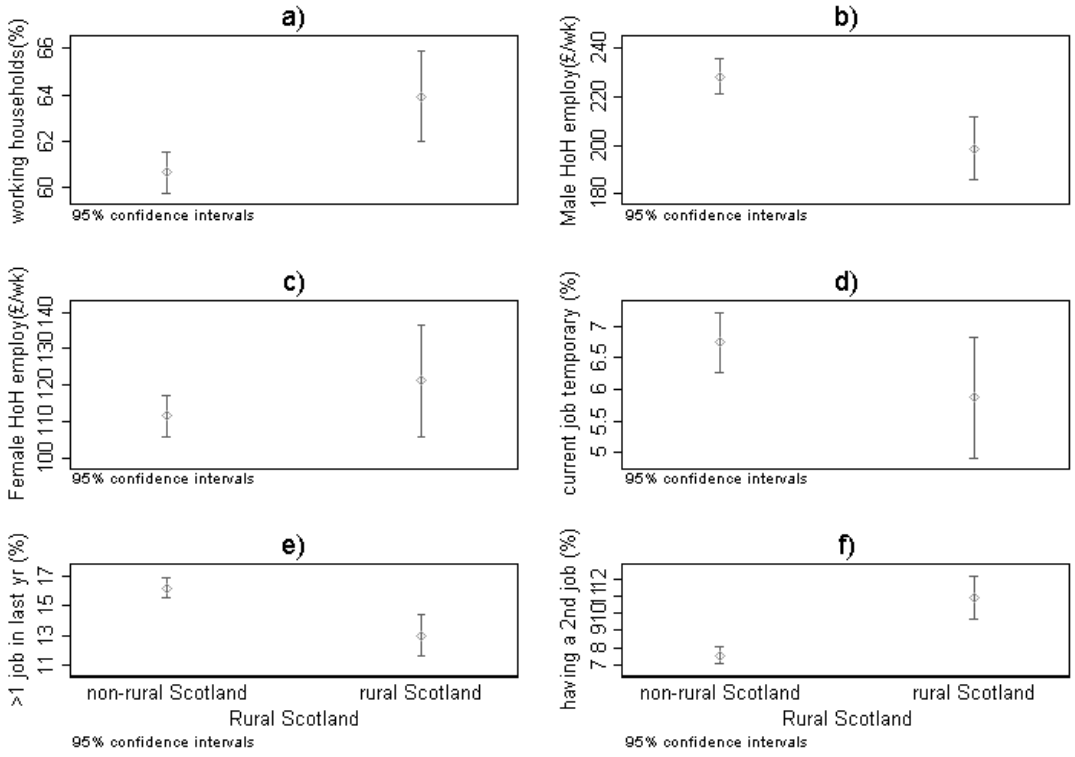
Table 4.10: Occurrence of factors associated with poverty in rural Scotland – Averaged across households in rural and the rest of Scotland

	Non-rural Scotland	Rural Scotland	Significantly different
Fragile jobs market			
Lack of employment: workless HHs	39.4%	36.1%	*
[#]Lower pay: in-work poverty	37.7%	48.8%	*
Gender pay gap: primary HH employment income - male	£228.45/wk	£198.82/wk	*
Primary HH employment income – female	£111.64/wk	£121.18/wk	
In seasonal/temporary work	6.7%	5.9%	
HHs with members in more than 1 job in last year	16.2%	13.0%	*
Having a second job	7.6%	10.9%	*
Working from home	Insufficient data	Insufficient data	
Lower benefit uptake			
Total household benefit (£/wk)	£85.89	£77.81	*
Proportion of households receiving benefit	74.2%	69.5%	*
Higher cost of living/different consumption			
Expenditure on food	£57.04/wk	£58.27/wk	
Food poverty (>50% hh income spent on food)	7.9%	8.4%	
Expenditure on household fuel	£723/yr	£883/yr	*
High transport costs (commuter journey time: mins)	24.7	30.1	*
Own or company car in HH	63.0%	81.5%	*
Health in the household			
Care of disabled member of HH	7.3%	7.8%	
[α]Subjective well-being (HoH GHQ36 score)	11.4	10.5	*
Subjective well-being (% exhibiting GHQ12 morbidity)	28.6%	23.8%	*
Lack of affordable housing			
Homeowner valuation if sold today	£112,004	£119,774	*
Social stratification (CAMSIS scale)	36.2	34.7	
Household demographics			
Proportion of single parent households	7.8%	5.9%	*
Three or more children in HH	4.1%	3.3%	
Lack of available childcare	Insufficient data	Insufficient data	
¥Age of HoH	49.1	53.2	*
Educational attainment - ISCED category			
1. Primary	28.2%	29.2%	
2. Low secondary	0.2%	0.1%	
3. Low secondary/vocational	27.3%	25.6%	
4. High secondary/vocational	14.9%	14.1%	
5. Higher vocational	16.6%	18.4%	
6. First degree	9.7%	10.7%	
7. Higher degree	3.2%	1.9%	
Pensionable age in household	32.3%	36.0%	*
Mean pension income among pensioner HHs (£/wk)	£77.67	£80.85	

Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000.
[α]Subjective well-being: a low score signifies better wellbeing.
¥Age of HoH: average age in 1999.
[#]Mean in-work poverty: individuals in low income households with someone in household in employment.

The head of household primary employment income for the period 1999 to 2008 shows slight differences across the urban-rural divide for both male and female heads. Male head of households earn significantly less in rural Scotland, averaging around £30 per week less than the non-rural male head of household average (fig 4.1:b). It is quite possible of course that head of households living in rural Scotland actually have their place of work in non-rural Scotland, and similarly, those living in non-rural Scotland could be working in rural parts of the country. The former is most likely among households in the accessible rural sub-category that is included in rural Scotland. The impact of this sub-category on my analyses is discussed further in my concluding chapter. The employment income among female head of households is actually higher in rural Scotland, averaging at £121.18 per week, almost £10 per week more than among female head of households in the rest of Scotland. The difference however is not statistically significant (fig 4.1:c).

Figure 4.1: Percentage of households (with confidence intervals) experiencing factors associated with rural poverty in Scotland, by rurality



Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000.

Table 4.10 shows that primary employment income among female head of households is lower than their male counterparts in both rural and the rest of Scotland. These figures do not

however tell us anything about any net gender pay gap for males and females doing the same job. They do though illustrate that female head of households in rural Scotland earn more from their primary employment than their female counterparts in the rest of Scotland.

With regard to the likelihood of more spells in short-term employment in rural Scotland the data in BHPS appears to be counter to the literature. The number of respondents having multiple employment spells looks to be lower among the rural population according to BHPS data. More than 16% of non-rural households have family members who have had more than one job in the last year. Among rural households this figure is significantly less at 13% (p=0.042, fig 4.1:e). However, the proportion of households with someone in temporary work appears to vary little by rurality, at around 6% regardless of rural classification (fig 4.1:d).

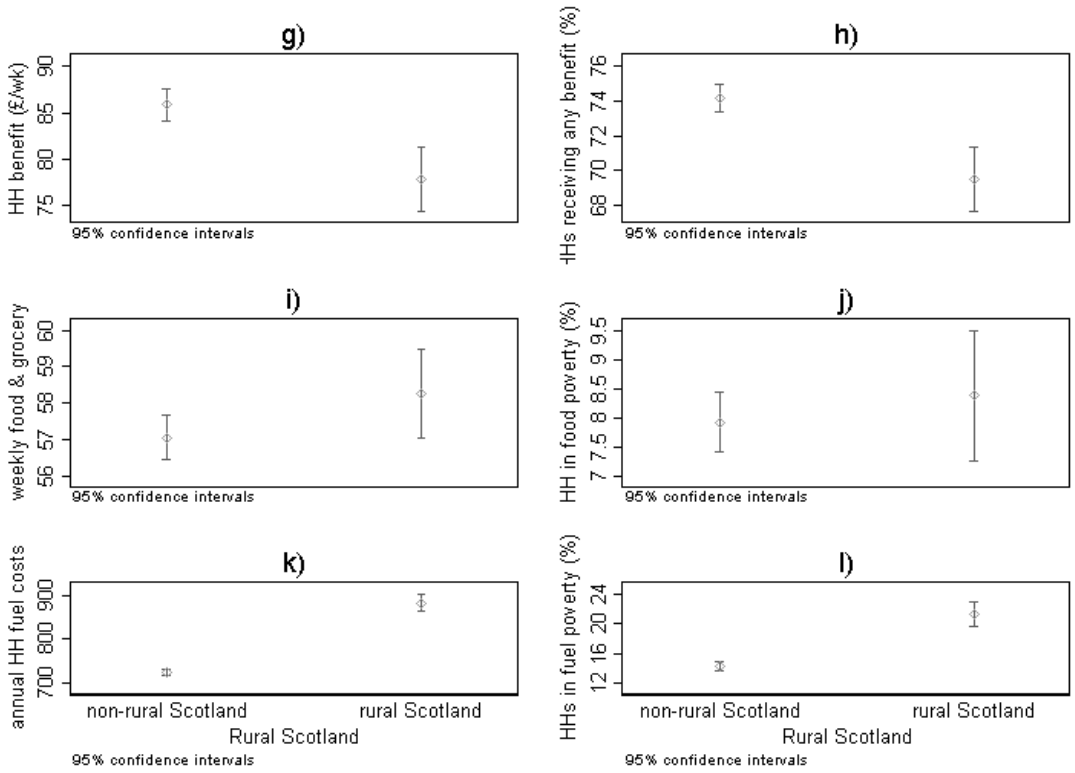
Data in BHPS suggest someone having a second job is more prevalent in rural households, with rural households averaging around 11%, significantly higher than the 7.6% in non-rural households between 1999 and 2008 (fig 4.1:f). Among households with income below the poverty line, rural households are almost twice as likely to have someone in a second job (5.2%) than their non-rural counterparts (2.8% - data not shown in table 4.10). These estimates appear to contradict the previously calculated mean number of jobs the respondent held in the last year but the reason for this may be down to the way each figure is estimated. In the case of the mean number of jobs, I am considering the count for the head of household only. For the second job in household estimates I am considering if *anyone* in the household has a second job. The estimates discussed here suggest that in rural areas it is family members other than the head of household who are more likely to have a second job compared to non-rural households.

Working from home appears to be a very unlikely option for respondents in rural or non-rural Scotland. Regardless of situation, only 1% of households in the BHPS data do so. The numbers are so small that this variable has been dropped from further analysis.

Lower benefit uptake: Two variables in the supplementary BHPS household income dataset could be used to assess benefit uptake: the actual amount in pounds per week of all benefits received by the household; and a Yes/No variable for the household receiving any benefit of any kind. During the period 1999 to 2008 the supplementary BHPS household income data suggest that household benefit income averages a statistically significant £8 per week less in rural compared to non-rural Scotland (fig 4.2:g). However, when household benefit income is examined by year we see rural household benefit income approaching the level of and then

overtaking non-rural household benefit income from 2006. This could be linked to a reduction from 2006 in the proportion of households in rural Scotland with at least one member in work (see table 4.6), or perhaps be linked to household fuel prices. In a later section in this chapter I note that household fuel prices rose dramatically around 2006. One possible argument is that these rises impacted sufficiently on household incomes for householders to overcome any reluctance to claim benefits in rural areas, and is something that could be looked at in another study.

Figure 4.2: Percentage of households (with confidence intervals) experiencing factors associated with rural poverty in Scotland, by rurality (continued)



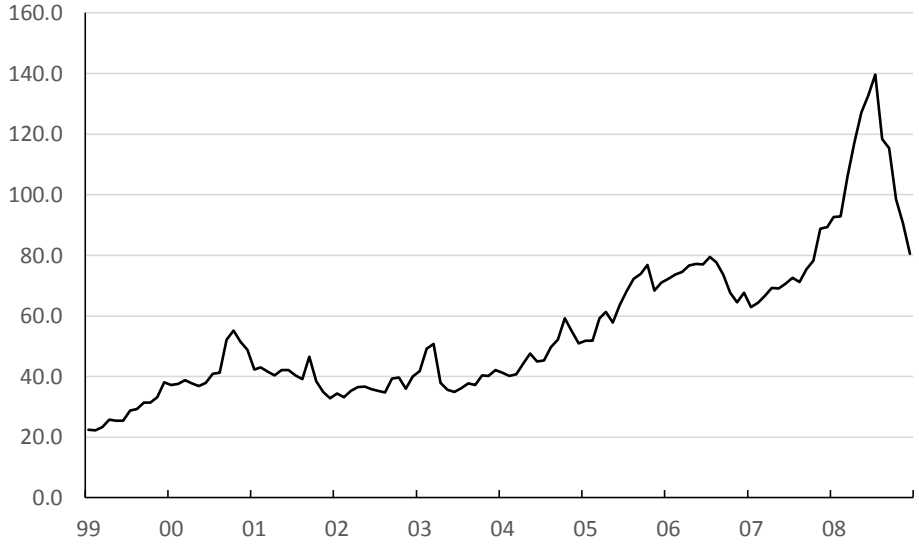
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000.

A statistically significant lower proportion of households in rural Scotland are in receipt of any benefits, just under 70% in rural compared to more than 74% in the rest of Scotland (fig 4.2:h), perhaps supporting the idea discussed in chapter one that benefit uptake may be lower in rural areas due to pride coupled with any stigma associated in making claims, a lack of anonymity, and the ethos of self-help. An alternative view may be that the lower poverty levels in rural Scotland reflect the level of benefit provision. It is noticeable however, that the proportion of rural households receiving any benefit increases considerably in the later years of

the study period, but to a lesser extent than the rise in actual benefit amounts as discussed above.

A higher cost of living and different consumption patterns: Included within this are household expenditure on food and household fuels, plus transport costs and levels of car ownership. BHPS respondents are asked how much their household spends on their weekly food and grocery bill. According to BHPS data, households in rural areas are spending around £1.20 per week more on their food bill than non-rural poor households averaged over the period 1999 to 2008 (fig 4.2:i). This difference is not statistically significant at the 95% confidence limit. When examined by year we see rural household food expenditure per week dropping below non-rural households for the years 2007 and 2008. This change in expenditure pattern is perhaps due to householders re-assigning their household expenditures following the rapid rise in household fuel prices from 2005, as illustrated by the retail price index for liquid fuels (Fig 4.3) (DECC 2016). This index is based on UK average prices so will not fully reflect the premium prices paid in the more remote areas of Scotland.

Figure 4.3: Retail price index (2010=100) for liquid fuels 1999-2008



Source: DECC (2016).

A similar expenditure pattern is observed in the proportion of households spending more than 50% of their household income on food. Overall this is slightly higher in rural Scotland (fig 4.2:j) but from 2006 the rate in rural Scotland drops below that of non-rural Scotland.

Table 4.11: Percentage of Households spending more than 50% of their net income on food

year	Non-rural	s.e.	Rural	s.e.	Scotland	s.e.
1999	9.8	0.81	9.9	1.78	9.8	0.74
2000	8.4	0.75	10.0	1.77	8.7	0.69
2001	6.2	0.67	9.3	1.73	6.7	0.63
2002	7.2	0.77	8.6	1.77	7.4	0.71
2003	6.5	0.76	7.0	1.64	6.6	0.69
2004	7.0	0.82	8.4	1.85	7.2	0.75
2005	7.0	0.83	8.2	1.90	7.2	0.76
2006	8.3	0.90	5.6	1.65	7.8	0.80
2007	8.5	0.95	5.4	1.67	8.0	0.84
2008	10.8	1.08	9.8	2.21	10.6	0.97
Total	7.9	0.26	8.4	0.57	8.0	0.24

Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000.

In the previous section I showed how fuel price increases have impacted on the number of households deemed to be in fuel poverty by year (see also fig 4.2:l). Here I show how these prices impacted on the average expenditure on household fuels. In non-rural Scotland this expenditure amounted to an average of £723 per year over the period 1999-2008. In rural Scotland over the same period the average was significantly higher at £881 per year (Fig 4.2:k). Tellingly, rural households with income below the poverty line were on average spending more on their household fuel bills (£807 per year) than non-poor households in the rest of Scotland (£742 per year). Over 60% of income poor households in rural areas were also in fuel poverty. Among income poor households in the rest of Scotland the proportion in fuel poverty was just short of 45%.

According to the motoring organisation RAC an estimated four-fifths of UK households are in what they describe as transport poverty, i.e. spending more than 10% of their household income on transport (both personal and public) (RAC 2012). The organisation suggests most of the expenditure is in buying and running a car. It is possible then that this proportion is likely to be higher in areas with high rates of car ownership or where car ownership and running costs (through higher fuel prices[44]) are high, for example in rural areas (Newman 2014).

Over the period 1999-2008 commutes by car are averaging more than 20% longer in rural compared to non-rural Scotland, according to data in BHPS (Fig 4.4:m). It would be revealing to be able to break these average commuter times down to rural/very rural and remote/very remote Scotland but a paucity of data in these categories does not allow for robust conclusions to be drawn. In addition, as a proxy variable for increased transport costs in rural Scotland this

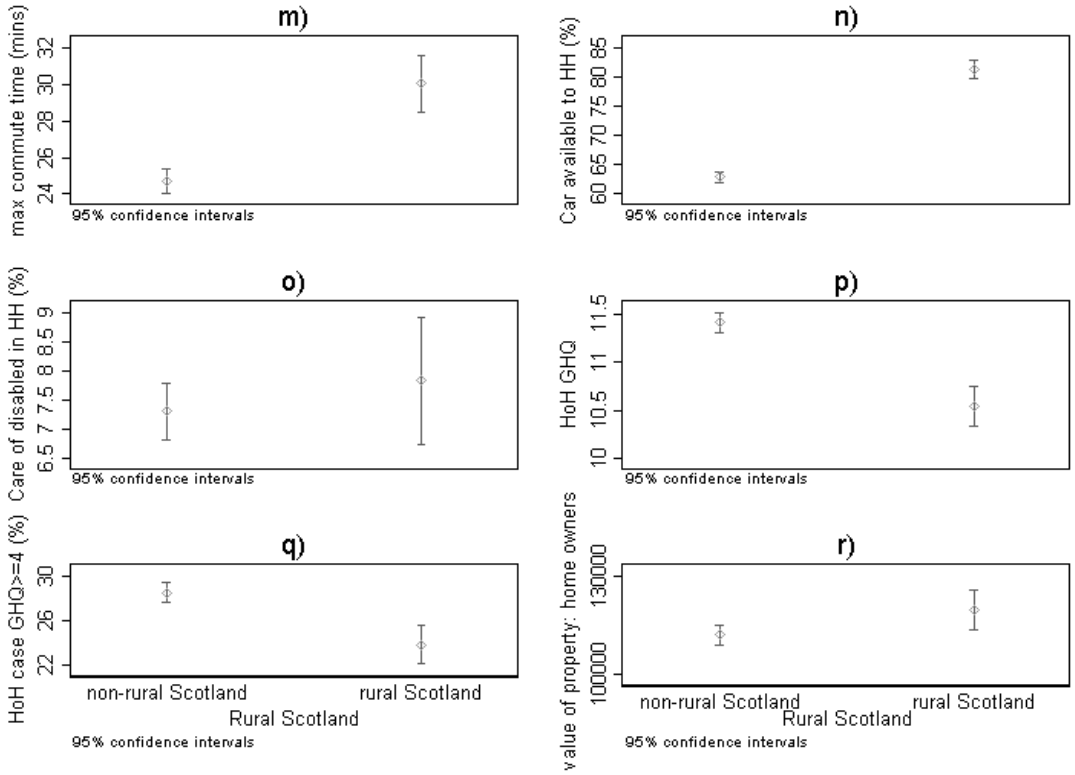
[44] http://www.whatgas.com/petrol-prices/scotland.html#.VtWFAU_cvcs provides details of how average local petrol prices deviate from the UK average. Accessed 01/03/2016.

variable only captures a proportion of such costs. It excludes fuel costs and other travel related costs that may be higher in rural areas. In chapter 3 I outlined an alternative measure that may better account for transport costs. The SIMD geographic access indicator provides a score reflecting the travel time, for both public and private transport, from every data zone to the nearest of several public services. The resulting access score is used in the analyses that follow. While not designed to be used in comparing the mean score in one area with another it is perhaps illustrative (and meaningless but included for completeness) that the mean SIMD geographic access score in rural Scotland is 42.6 while the mean in urban Scotland is statistically significantly lower at 13.4 (not shown graphically).

Car ownership: The Select Committee on Scottish Affairs on Poverty in Scotland (House of Commons Scottish Affairs Committee 2000) regarded car ownership as a necessity in rural areas of Scotland. The data in BHPS suggests this is the case: nearly 82% of rural households own a car or have a company car, while 63% of households in the rest of Scotland do so (table 4.10 and fig 4.4:n). Of the 18% of rural households without access to a car, two-thirds are pensioner households. Significantly, almost two thirds of rural households with income below the poverty line own a car, compared to less than a third of poor households in the rest of Scotland. The typical costs associated with running a car will therefore be taking up a portion of the low income of poorer households in many more instances in rural households than in households in the rest of Scotland.

Health in the household: Factors under consideration in this section are care for disabled member in household and subjective well-being. Under the former, BHPS includes a variable asking respondents if they care for a handicapped/other in the household. Around 7.5% of households have someone cared for in this way, be that in rural or non-rural Scotland. The difference between the two domains is insignificant (fig 4.4:o).

Figure 4.4: Percentage of households (with confidence intervals) experiencing factors associated with rural poverty in Scotland, by rurality (continued)

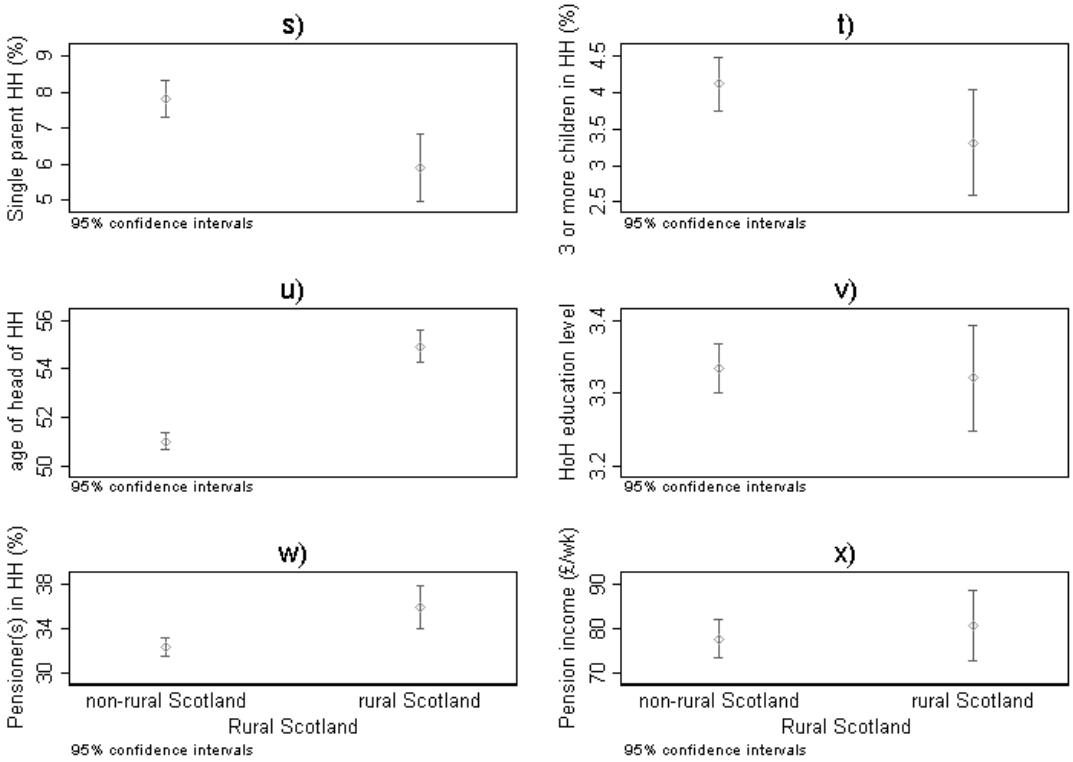


Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000.

In contrast, the mean subjective well-being (GHQ36) score for the head of household is significantly lower (and signifying better well-being) in rural Scotland (10.5), compared to the rest of the country (11.4) (fig 4.4:p). As described in chapter 3, this GHQ36 score is the sum of responses to the 12 questions that make up the measure. An alternative measure that records respondents exhibiting poor scores in four or more of the twelve questions (GHQ12) suggests that the proportion of head of households exhibiting possible psychiatric morbidity is significantly lower (fig 4.4:q) in rural Scotland (23.8%) compared to the rest of Scotland (28.6%).

A lack of affordable housing: Averaged over all years from 1999 to 2008 rural house price estimates have been around £8,000 higher than their non-rural estimates, a statistically significant difference (fig 4.4:r). However, given the highly subjective nature of this proxy variable and the relatively large number of cases where respondents did not make an estimate I have dropped this variable from further models.

Figure 4.5: Percentage of households (with confidence intervals) experiencing factors associated with rural poverty in Scotland, by rurality (continued)



Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000.

Social stratification: the mean CAMSIS scale score is slightly higher in the rest of Scotland (36.2) than in rural Scotland (34.7) although the difference is not statistically significant (results not shown in graph format but are shown in table 4.10). In Chapter 3 I described how higher CAMSIS scores suggest more advantaged occupations. The results suggest an average of more advantageous occupations in non-rural Scotland, which is perhaps counter-intuitive given the poverty rates in the two domains. One would perhaps expect an area with a higher mean CAMSIS score to show a lower poverty rate than an area with a lower mean CAMSIS score. I have shown in table 4.2 that the poverty rate in non-rural Scotland, with the higher mean CAMSIS score, is actually higher than in rural Scotland. A closer examination of poverty rates, considering *only* those head of households with a CAMSIS score, i.e. those currently working, reveals rates more in keeping with the mean CAMSIS scores. The poverty rate for non-rural households with head of household in work is 7.1% compared to 8.4% in rural Scotland. The differences highlighted in this analysis, in poverty rates across the rurality domain when including or excluding those without a current job perhaps identifies a need for further

research into the use of social stratification based on occupation when applied to poverty analysis in rural Scotland.

As described previously, I have used the CAMSIS scale for those respondents with a current occupation. Almost a half of respondents are not currently working so do not have any occupation, they therefore do not have a CAMSIS score. The rural Scotland sample size is already rather small and to reduce it further with the inclusion of this social stratification variable may render any results as not sufficiently robust to draw any meaningful conclusions. Including it would also deduct from my models the influence of circumstances among those head of households not currently working. On this basis I have excluded the CAMSIS variable from my regression models in this chapter and from all analyses in the following two chapters. The coefficients resulting from the inclusion of the CAMSIS variable in the in-poverty model are however shown in Appendix C. The CAMSIS variable shows negative association with poverty in non-rural Scotland but shows no association in rural areas of the country.

Lone parents: As already highlighted in chapter 2, one of the reasons for households being at greater risk of poverty in rural Scotland is thought to be a lack of affordable child-care provision impacting on take up of jobs or training. BHPS data actually suggests that average child care expenditure in rural Scotland has been around two thirds of that in the rest of Scotland during the period 1999 to 2008 (£44.62 per week in rural compared to £67.04 per week in the rest of Scotland). This price differential is across all childcare users, not lone parents only. When considering lone parent expenditure on childcare this premium disappears and the amount paid is similar regardless of location in Scotland. Such figures do not necessarily reflect any non-availability of childcare; a parent cannot pay for childcare if the childcare facility is not there. It may also be revealing to investigate the proportion of lone parents who have made a payment for child care within the rural and non-rural areas. This may better reflect the availability of childcare. However, the number of lone parents who have paid for childcare in BHPS is very small, too small to derive anything meaningful from their analysis.

As outlined above a lack of child care provision is regarded as a possible cause of increased poverty in rural Scotland. A lack of applicable paid for or free child care cases in the BHPS dataset mean that this cause cannot be examined further. However, it may still be instructive to include the lone parent variable in my analysis with the aim of identifying if lone parent poverty varies by rurality. Figure 4.5:s shows that single parent households are slightly, but statistically significant more prevalent in non-rural Scotland (7.8%) compared to rural Scotland

(5.9%). Poverty among lone parent households is around 5% higher in non-rural Scotland, with an average rate of 36.9% compared to 31.7% in rural Scotland.

Three or more children in household: the prevalence of three or more children in rural Scotland (3.3%) is lower than in the rest of Scotland (4.1%) but the difference is not statistically significant (at 95% c.i.) (fig 4.5:t).

Age of head of household: In chapter 2 I reported literature that suggests that age is an influence generally thought to be associated with poverty (DWP 2014; The Poverty Site 2010) and also showed how the age distribution of the population in 2010 varied considerably by remote rural, accessible rural and the rest of Scotland (Scottish Government 2012b; fig. 21). This age distribution is reflected in the average age of the head of household derived from BHPS data. In 1999 the mean age of the head of household was just over 53 years in rural Scotland but only 49 years in the rest of Scotland (table 4.8; fig 4.5:u).

Educational attainment: using UNESCO's statistical framework the International Standard Classification of Education (ISCED) as a measure of educational attainment we see very little difference in attainment across the rurality domain: the proportion at each attainment level varies little (table 4.10) or when viewing mean attainment level (fig 4.5:v).

Pensionable age in household and pension provision: The suggestion that lower pay in rural Scotland will impact on pension provision (Shucksmith et al. 1996) has been supported (Kotecha et al. 2013). According to these authors there are three key issues accounting for poverty among the elderly in rural areas: low earnings during their working career; a lack of financial planning being undertaken for retirement; and the effect of key life events. In chapter two I provided evidence that rates of pensioner household poverty have dropped over recent years, are similar for single pensioner or pensioner couple households, and are now lower than for non-pensioner households. But are these pensioner poverty rates different by rurality and has pension provision, in terms of private or occupation pension, varied across this domain also?

Certainly, the number of pensioner households is different by rurality. Around 36% of rural households have at least one person of pensionable age. This compares with a statistically significant different 32.3% in the rest of Scotland (fig 4.5:w). When examined by year, the proportions of households with persons of pensionable age shows gradual increases, regardless of location, particularly so from 2006 onwards. This increase is small in the rest of Scotland but more noticeable in rural areas. By 2008 more than 45% of rural households have at least one

person of pensionable age (the high in the rest of Scotland was much lower at just over 35% in 2007). Of course, the gradual increase by year in the proportion of households with pension age people in them could simply reflect the ageing of the sample. However, I have included the pensioner household variable in my analyses as it may prove to be beneficial to my dynamic models in the next two chapters.

According to the supplementary BHPS household income data the mean household pension income per week across all households is actually higher in rural Scotland (£38.50) than in the rest of Scotland (£31.61). There are a couple of reasons why these figures contradict the suggestions of Shucksmith (1996) and Kotecha et al. (2013). First, these means are derived by including all households, whether they receive a private or occupation pension or not, and regardless of age or household type. As such, they will include retirees who have taken their private or occupational pension before reaching the pension age. Secondly, there will be a proportion of well off households that can afford to retire to a rural location and this group, with private and occupation pensions swollen by their relatively high salaries, will be having an effect on the mean figures described above.

To reduce the possible effect on these figures of wealthy early retirees who have yet to reach the official pension age I have repeated this exercise but only including those households with someone of pensionable age. Among only those households with someone of pensionable age, which will of course include those early retirees who have reached this age, the mean private or occupation pension in rural Scotland is £80.85 while in the rest of Scotland it is £77.67, a difference that is not statistically significant (fig 4.5:x).

Shucksmith et al. (1996) and Kothecha et al. (2013) suggest lower pay in rural areas will impact on pension provision in later life. An alternative to looking at the pension provision currently received (as viewed above) is to look at how much occupation pension contributions are being made now and compare these figures across the rural and rest of Scotland divide. Occupational pension contributions are slightly higher in non-rural Scotland. Among households making such contributions the average in rural Scotland is £24.53 compared to a slightly higher £26.68 in the rest of Scotland. The difference is not statistically significant and the proportion of households making occupational contributions (37%) is the same across both rural and the rest of Scotland.

Regression Analysis

The cross-sectional analyses described above have for some factors shown considerable differences in average values between rural Scotland and the rest of Scotland. What these analyses have not shown is the extent to which these components are associated with poverty in rural Scotland or in the rest of the country, and to what extent that association varies by rurality. According to the literature these factors should all be significantly associated with poverty in rural Scotland when using the official definition of rural Scotland.

To examine these associations I have carried out random effect probit modelling, first with separate models for rural and the rest of Scotland in the manner described in the methodology and methods chapter, with the binary poverty variable as the dependent variable. Separate models for rural and the rest of Scotland have been created with the aim of better accounting for what Gibb et al. (1998) describe as uniquely rural forms of deprivation. I then go on to include interaction terms into my model, testing more formally how the association of my factors differ by rurality.

The building process for both models is illustrated by nested tables of results in tables 4.12 to 4.15. These tables show the development of the models from null models to the full models containing all of the variables described in the previous section. Given the likelihood of varying poverty outcomes among working age people and pensioners it is more appropriate to amend the head of household age variable to reflect this. As a result the age of head of household variable has be set to a dummy binary variable identifying those head of households who are 65 or over (60 or over among female head of households).

Nesting the results allows an examination of the impact of the inclusion of each variable to the models. If the addition of a variable results in a large change in the coefficient of other variables in the model then this suggests the possible existence of collinearity. Such an impact is particularly noticeable in table 4.13. The addition of the last variable in the rural Scotland model, household pension income, has resulted in a large change to the coefficient on several variables, for example, the head of household age over 65 and the gender of head of household. These extreme coefficient changes suggest the existence of a confounding variable (collinearity is an extreme form of confounding) and on this basis I have elected to remove the pension income variable from my later more parsimonious models that exclude non-significant variables.

Table 4.12: Nested results of probit regression illustrating impact of addition of variables associated with households being in poverty – rural Scotland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Working household		-1.322***	-0.672***	-0.626***	-0.643***	-0.623***	-0.600***	-1.351***	-1.353***	-1.484***	-1.444***
HoH employment income (£/wk)			-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.008***	-0.008***	-0.008***	-0.008***
HoH female				0.289	0.295	0.298	0.300	0.516**	0.459*	0.671***	0.682***
HH member in a temporary job					0.203	0.205	0.205	0.224	0.222	-0.101	-0.368
HH member had multiple jobs in previous year						-0.143	-0.137	-0.379*	-0.341	-0.419*	-0.371*
2nd job in HH							-0.328	-0.477*	-0.492*	-0.469	-0.436
HH benefit (£/wk)								-0.012***	-0.014***	-0.013***	-0.013***
HH receives any benefit									0.711***	0.654**	0.375
HH in food poverty										2.475***	1.906***
HH in fuel poverty											1.553***
Constant	-1.531***	-0.664***	-0.488***	-0.621***	-0.626***	-0.623***	-0.612***	0.776***	0.369	-0.031	-0.314
Observations	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
McFadden's Pseudo R^2	0.215	0.259	0.316	0.317	0.318	0.318	0.319	0.383	0.389	0.461	0.517
ll	-889	-838	-774	-773	-772	-772	-771	-698	-692	-610	-547

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

Table 4.13: Nested results of probit regression illustrating impact of addition of variables associated with households being in poverty – rural Scotland (continued)

	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Working household	-1.318***	-1.323***	-1.283***	-1.284***	-1.308***	-1.413***	-1.470***	-1.445***	-1.432***	-1.560***	-2.201***
HoH employment income (£/wk)	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.009***
HoH female	0.537**	0.548**	0.540**	0.535**	0.554**	0.379	0.440*	0.430*	0.516**	0.561**	0.267
HH member in a temporary job	-0.362	-0.360	-0.364	-0.369	-0.360	-0.389	-0.333	-0.334	-0.290	-0.284	-0.297
HH member had multiple jobs in previous year	-0.366	-0.362	-0.362	-0.363	-0.367	-0.357	-0.309	-0.307	-0.320	-0.347	-0.371
2nd job in HH	-0.424	-0.424	-0.407	-0.404	-0.417	-0.491	-0.458	-0.455	-0.423	-0.464	-0.543*
HH benefit (£/wk)	-0.013***	-0.013***	-0.013***	-0.013***	-0.013***	-0.014***	-0.014***	-0.014***	-0.015***	-0.015***	-0.016***
HH receives any benefit	0.394	0.398	0.385	0.381	0.380	0.358	0.337	0.324	0.285	0.345	0.303
HH in food poverty	1.907***	1.908***	1.919***	1.917***	1.928***	1.921***	1.862***	1.871***	1.842***	1.818***	1.993***
HH in fuel poverty	1.560***	1.558***	1.575***	1.574***	1.576***	1.578***	1.562***	1.562***	1.545***	1.509***	1.482***
Owned or company car in HH	-0.645***	-0.649***	-0.608***	-0.609***	-0.612***	-0.630***	-0.643***	-0.636***	-0.439*	-0.421*	0.025
Care of disabled in HH		0.138	0.130	0.121	0.119	0.152	0.205	0.206	0.069	0.081	0.124
SIMD Geographic Access domain score			-0.010**	-0.010**	-0.011**	-0.010*	-0.010**	-0.010**	-0.009*	-0.009*	-0.007
HoH GHQ				0.005	-0.005	-0.007	-0.006	-0.005	-0.005	-0.006	-0.017
Any HH member GHQ12>=4					0.191	0.217	0.191	0.190	0.193	0.203	0.238
Single parent HH						1.228***	1.200***	1.235***	1.427***	1.295***	1.389***
3 or more children in HH							1.329**	1.347***	1.398***	1.323**	1.144**
HoH aged 65 or over								0.097	-0.036	0.393	0.098
HoH education level									-0.280***	-0.281***	-0.196***
Pensionable age in HH										-0.722*	0.200
Pension income (£/wk)											-0.024***
Constant	0.149	0.147	0.548	0.503	0.581	0.727	0.763	0.719	1.407***	1.608***	2.012***
Observations	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351	2351
McFadden's Pseudo R^2	0.520	0.520	0.522	0.523	0.523	0.527	0.532	0.532	0.541	0.544	0.597
ll	-543	-543	-540	-540	-540	-535	-530	-530	-519	-517	-457

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

Table 4.14: Nested results of probit regression illustrating impact of addition of variables associated with households being in poverty – non-rural Scotland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Working household		-1.746***	-0.924***	-0.861***	-0.850***	-0.826***	-0.814***	-1.527***	-1.521***	-1.604***	-1.596***
HoH employment income (£/wk)			-0.006***	-0.006***	-0.006***	-0.006***	-0.006***	-0.008***	-0.008***	-0.008***	-0.007***
HoH female				0.465***	0.464***	0.463***	0.459***	0.651***	0.637***	0.680***	0.615***
HH member in a temporary job					-0.106	-0.089	-0.082	-0.190	-0.181	-0.167	-0.116
HH member had multiple jobs in previous year						-0.155*	-0.151*	-0.259***	-0.258***	-0.293***	-0.246**
2nd job in HH							-0.236*	-0.314*	-0.308*	-0.406**	-0.466***
HH benefit (£/wk)								-0.012***	-0.012***	-0.012***	-0.012***
HH receives any benefit									0.260**	0.208*	0.157
HH in food poverty										1.954***	1.409***
HH in fuel poverty											1.618***
Constant	-1.350***	-0.339***	-0.207***	-0.447***	-0.444***	-0.439***	-0.430***	1.028***	0.874***	0.628***	0.460***
Observations	10756	10756	10756	10756	10756	10756	10756	10756	10756	10756	10756
McFadden's Pseudo R^2	0.215	0.292	0.340	0.343	0.343	0.343	0.344	0.412	0.413	0.459	0.508
ll	-4383	-3951	-3681	-3664	-3663	-3662	-3659	-3280	-3276	-3020	-2747

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

Table 4.15: Nested results of probit regression illustrating impact of addition of variables associated with households being in poverty – non-rural Scotland (continued)

	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Working household	-1.427***	-1.424***	-1.424***	-1.424***	-1.429***	-1.458***	-1.513***	-1.574***	-1.552***	-1.602***	-1.927***
HoH employment income (£/wk)	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***
HoH female	0.359***	0.356***	0.357***	0.339***	0.343***	0.240**	0.237**	0.250***	0.228**	0.274***	0.114
HH member in a temporary job	-0.135	-0.136	-0.137	-0.143	-0.145	-0.130	-0.121	-0.130	-0.092	-0.107	-0.059
HH member had multiple jobs in previous year	-0.243**	-0.243**	-0.243**	-0.242**	-0.246**	-0.240**	-0.252**	-0.262***	-0.248**	-0.266***	-0.320***
2nd job in HH	-0.405**	-0.405**	-0.406**	-0.404**	-0.407**	-0.402**	-0.393**	-0.399**	-0.372**	-0.388**	-0.420**
HH benefit (£/wk)	-0.012***	-0.012***	-0.012***	-0.012***	-0.012***	-0.012***	-0.013***	-0.012***	-0.013***	-0.013***	-0.014***
HH receives any benefit	0.155	0.153	0.156	0.154	0.153	0.147	0.142	0.172*	0.109	0.159	0.287***
HH in food poverty	1.374***	1.375***	1.376***	1.373***	1.374***	1.355***	1.292***	1.281***	1.260***	1.261***	1.195***
HH in fuel poverty	1.647***	1.647***	1.649***	1.639***	1.638***	1.608***	1.590***	1.576***	1.566***	1.545***	1.456***
Owned or company car in HH	-0.783***	-0.781***	-0.774***	-0.769***	-0.769***	-0.756***	-0.768***	-0.779***	-0.680***	-0.668***	-0.468***
Care of disabled in HH		-0.064	-0.066	-0.083	-0.090	-0.057	-0.042	-0.044	-0.082	-0.070	0.017
SIMD Geographic Access domain score			-0.003	-0.002	-0.002	-0.003	-0.003	-0.003	-0.003	-0.002	-0.001
HoH GHQ				0.011**	0.007	0.007	0.006	0.005	0.002	0.000	-0.001
Any HH member GHQ12>=4					0.075	0.080	0.087	0.076	0.085	0.085	0.073
Single parent HH						0.625***	0.607***	0.522***	0.548***	0.434***	0.462***
3 or more children in HH							0.808***	0.768***	0.801***	0.739***	0.755***
HoH aged 65 or over								-0.243**	-0.316***	0.197	0.269
HoH education level									-0.165***	-0.168***	-0.127***
Pensionable age in HH										-0.712***	-0.272
Pension income (£/wk)											-0.020***
Constant	0.895***	0.895***	0.920***	0.801***	0.830***	0.887***	0.944***	1.048***	1.614***	1.713***	1.990***
Observations	10756	10756	10756	10756	10756	10756	10756	10756	10756	10756	10756
McFadden's Pseudo R^2	0.517	0.517	0.517	0.517	0.517	0.519	0.521	0.522	0.526	0.529	0.570
ll	-2698	-2698	-2698	-2696	-2696	-2683	-2672	-2669	-2644	-2631	-2399

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

The results for the full models testing the association of all variables in rural and non-rural Scotland are shown in table 4.16. Controlling for the effect of the influence of each variable in the manner shown provides a robust analysis of the factors thought to be associated with poverty in rural and the rest of Scotland.

Table 4.16: Coefficients of Probit regression models showing association of factors identified in the literature with poverty (before housing costs) in rural and non-rural Scotland

	Non-rural Scotland		Rural Scotland	
Working household	-1.602***	(0.129)	-1.560***	(0.310)
HoH employment income (£/wk)	-0.007***	(0.000)	-0.008***	(0.001)
HoH female	0.274***	(0.091)	0.561**	(0.254)
HH member in a temporary job	-0.107	(0.141)	-0.284	(0.326)
HH member had multiple jobs in previous year	-0.266***	(0.099)	-0.347	(0.229)
2nd job in HH	-0.388**	(0.165)	-0.464	(0.309)
HH benefit (£/wk)	-0.013***	(0.001)	-0.015***	(0.002)
HH receives any benefit	0.159	(0.105)	0.345	(0.298)
HH in food poverty	1.261***	(0.110)	1.818***	(0.245)
HH in fuel poverty	1.545***	(0.081)	1.509***	(0.149)
Owned or company car in HH	-0.668***	(0.092)	-0.421*	(0.225)
Care of disabled in HH	-0.070	(0.145)	0.081	(0.262)
SIMD Geographic Access domain score	-0.002	(0.004)	-0.009*	(0.005)
HoH GHQ	0.000	(0.007)	-0.006	(0.017)
Any HH member GHQ12>=4	0.085	(0.084)	0.203	(0.203)
Single parent HH	0.434***	(0.145)	1.295***	(0.458)
3 or more children in HH	0.739***	(0.220)	1.323**	(0.523)
HoH aged 65 or over	0.197	(0.163)	0.393	(0.303)
HoH education level	-0.168***	(0.025)	-0.281***	(0.063)
Pensionable age in HH	-0.712***	(0.164)	-0.722*	(0.405)
Constant	1.713***	(0.180)	1.608***	(0.568)
Observations	10756		2351	
McFadden's Pseudo R^2	0.529		0.544	
ll	-2631		-517	
bic	5466		1204	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$
ll = Log Likelihood
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

In the rural Scotland model around a half of the factor variables regarded in the literature as associated with rural poverty, actually show any degree of association with poverty once other influences are taken into account (columns labelled rural Scotland in table 4.16). It is noticeable that all of the variables that do show association with poverty in rural Scotland, with the exception of the SIMD geographic access score, also show similar association with poverty in non-rural Scotland. Those that do show association with poverty in both rural and non-rural

Scotland are: working households; head of household employment income; head of household female; the amount of household benefit; fuel poverty; food poverty; owned or company car available to household; single parent households; having three or more children in household; head of household education level; and pension age in household.

Two other variables show association with poverty only in the non-rural model. These are a household member had multiple jobs in previous year and second job in household.

Table 4.17: Coefficients of parsimonious Probit regression models showing association of factors identified in the literature with poverty (before housing costs) in rural and non-rural Scotland

	Non-rural Scotland		Rural Scotland	
Working household	-1.626***	(0.128)	-1.533***	(0.314)
HoH employment income (£/wk)	-0.007***	(0.000)	-0.008***	(0.001)
HoH female	0.283***	(0.090)	0.582**	(0.256)
HH member had multiple jobs in previous year	-0.269***	(0.099)	-0.360	(0.227)
2nd job in HH	-0.391**	(0.164)	-0.406	(0.306)
HH benefit (£/wk)	-0.012***	(0.001)	-0.013***	(0.002)
HH in food poverty	1.260***	(0.111)	1.797***	(0.251)
HH in fuel poverty	1.552***	(0.081)	1.537***	(0.152)
Owned or company car in HH	-0.673***	(0.091)	-0.425*	(0.222)
SIMD Geographic Access domain score	-0.002	(0.004)	-0.009*	(0.005)
Single parent HH	0.436***	(0.144)	1.287***	(0.459)
3 or more children in HH	0.746***	(0.220)	1.386***	(0.525)
HoH education level	-0.174***	(0.025)	-0.293***	(0.064)
Pensionable age in HH	-0.555***	(0.099)	-0.388	(0.341)
Constant	1.850***	(0.159)	1.748***	(0.534)
Observations	10756		2351	
McFadden's Pseudo R^2	0.528		0.541	
ll	-2635		-519	
bic	5418		1163	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$
ll = Log Likelihood, bic = Bayesian Information Criteria
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

Both the rural and non-rural models have within them a large number of variables, and as I have shown above many have proved to not be statistically significantly associated with a household being in poverty. Parsimonious models, excluding these non-significant variables, are shown for rural and non-rural Scotland in table 4.17. Such 'backward selection' of variables has potential problems and should be carried out with caution. The removal of a variable from a model can impact on the coefficients of the other variables, and the level of association of these variables with the outcome variable. The non-significant variables that were excluded are: household member in a temporary job; household receives any benefit; care of disabled in

household; both GHQ measures; head of household aged 65 or over; and pension income. In the parsimonious models the remaining variables have continued to show association with a household being in poverty. In addition, the loss of the non-significant variables has had very little impact on McFadden's pseudo R-squared in each model.

In the reduced form models of table 4.17, all of the variables show association with a household being in poverty in non-rural Scotland with the exception of the SIMD geographic access domain. In rural Scotland, two variables do not show such association, and did not in the full model, but have been included here to allow comparison of coefficients across the rurality domain. The variable household member had multiple jobs in previous year and second job in household show no association with poverty in rural Scotland but do so in non-rural Scotland.

The differences in the association of the variables of table 4.17 with poverty across rural and the rest of Scotland can be tested more formally by introducing 'interaction terms'. An interaction refers to how the effect on the dependent variable of one explanatory or independent variable depends on the level of one or more other independent variable. In the model above for example, if the effect of having 3 or more children in the household is greater among rural households than among households in the rest of Scotland then we say we have an interaction between three child households and rurality.

To test whether the magnitude of association of factors with poverty between rural and the rest of Scotland is significantly different a model has been developed with a binary rurality variable as a main effect, and a further model created with all of the rurality/variable interaction terms included. The addition of the rurality variable to the all of Scotland model (rather than the earlier separate models for rural and non-rural Scotland) has created a minor problem as this variable is highly correlated with the SIMD geographic access domain. To overcome this I have removed the latter from the model but in a later section attempt a similar model using this variable as the interaction term rather than the rurality variable.

Table 4.18 shows the coefficients resulting from models with and without the interaction terms. In the model without the interaction terms (model (a) in table 4.18) the rural Scotland variable shows association with a household being in poverty. The sign of the coefficient suggests rural Scotland households show a lower likelihood of being in poverty than non-rural households and fits in with the analysis of poverty rates in an earlier section of this chapter. There is a slight improvement in the model when the interaction terms are included, with McFadden's R-squared increasing by a small amount. Few of the coefficients on the interaction

terms on this expanded model show any statistical significance. On the face of it these interaction coefficients suggest very few factors show any significant difference in association with poverty in rural Scotland compared to the rest of Scotland. However, as outlined in the methodology chapter, interaction effects are complicated to compute and interpret in non-linear models (Norton et al. 2004).

Table 4.18: Coefficients of Probit regression model, with and without interaction terms, identifying factors associated with a household being in poverty (before housing costs)

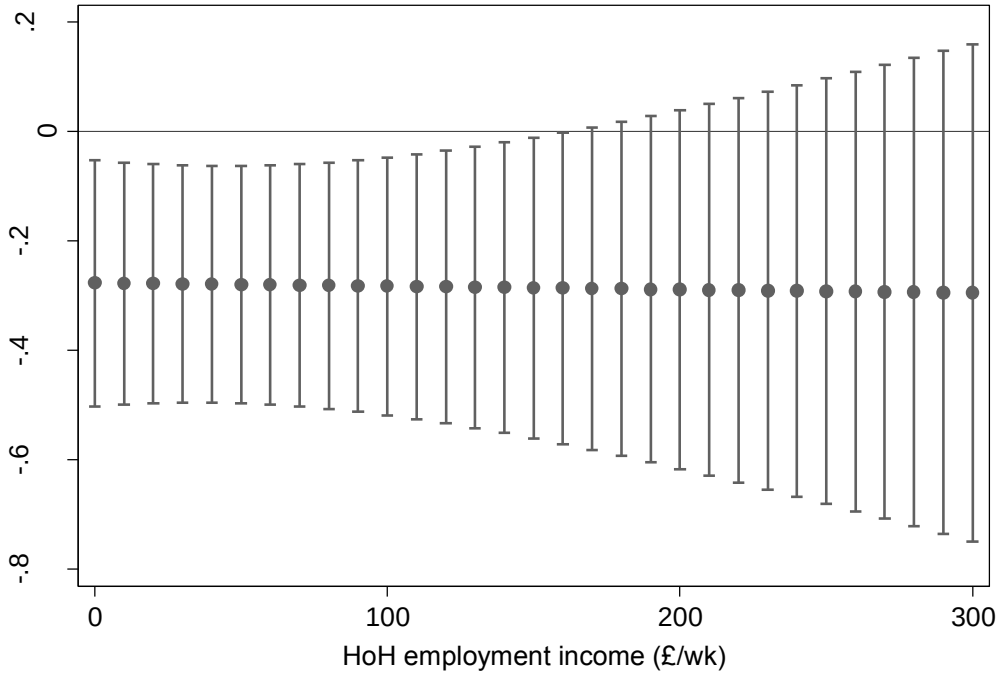
	(a) All Scotland		(b) Including interaction	
Working household	-1.627***	(0.118)	-1.655***	(0.130)
HoH employment income (£/wk)	-0.007***	(0.000)	-0.007***	(0.001)
HoH female	0.323***	(0.085)	0.292***	(0.092)
HH member had multiple jobs in previous year	-0.280***	(0.091)	-0.278***	(0.101)
2nd job in HH	-0.384***	(0.144)	-0.393**	(0.168)
HH benefit (£/wk)	-0.012***	(0.001)	-0.012***	(0.001)
HH in food poverty	1.336***	(0.100)	1.282***	(0.113)
HH in fuel poverty	1.531***	(0.071)	1.567***	(0.083)
Owned or company car in HH	-0.639***	(0.084)	-0.685***	(0.092)
Single parent HH	0.526***	(0.141)	0.440***	(0.148)
3 or more children in HH	0.826***	(0.202)	0.768***	(0.224)
HoH education level	-0.190***	(0.023)	-0.175***	(0.026)
Pensionable age in HH	-0.538***	(0.098)	-0.563***	(0.101)
Rural Scotland	-0.232**	(0.108)	-0.512	(0.444)
Rural Scotland # Working household			0.174	(0.300)
Rural Scotland # HoH employment income (£/wk)			0.000	(0.001)
Rural Scotland # HoH female			0.234	(0.242)
Rural Scotland # HH member had multiple jobs in previous year			-0.003	(0.229)
Rural Scotland # 2nd job in HH			0.019	(0.320)
Rural Scotland # HH benefit (£/wk)			0.001	(0.002)
Rural Scotland # HH in food poverty			0.316	(0.231)
Rural Scotland # HH in fuel poverty			-0.145	(0.151)
Rural Scotland # Owned or company car in HH			0.301	(0.224)
Rural Scotland # Single parent HH			0.705*	(0.408)
Rural Scotland # 3 or more children in HH			0.369	(0.527)
Rural Scotland # HoH education level			-0.107*	(0.061)
Rural Scotland # Pensionable age in HH			0.165	(0.321)
Constant	1.818***	(0.150)	1.856***	(0.160)
Observations	13107		13107	
McFadden's Pseudo R^2	0.528		0.529	
ll	-3168		-3161	
bic	6487		6596	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$
ll = Log Likelihood
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

I have used some Stata commands that can help better interpret the results of interaction models. The use of the *margins* and associated *marginsplot* commands allows a visual

interpretation of how the probability of being in poverty varies across rural and non-rural Scotland for each of the factors. As an example, the graph of figure 4.6 shows the average marginal effect across our rurality variable on the probability of being in poverty for various values of the head of household employment income. For the probability of a particular value to be significantly different in rural and non-rural areas then the graphed confidence limits for that value should not include zero. At the lower end of the income range, less than £180 per week, there appears to be a significant difference in the likelihood of being in poverty across the rurality domain (figure 4.6). The lower likelihood of poverty among rural households with low head of household employment income suggests that other members of rural households are contributing a higher proportion of total household income (than in the rest of Scotland), sufficient to bring their total income above the poverty line.

Figure 4.6: Average marginal effect of rurality on probability of being in poverty (before housing costs) for lower values (£0 to £300 per week) of head of household employment income



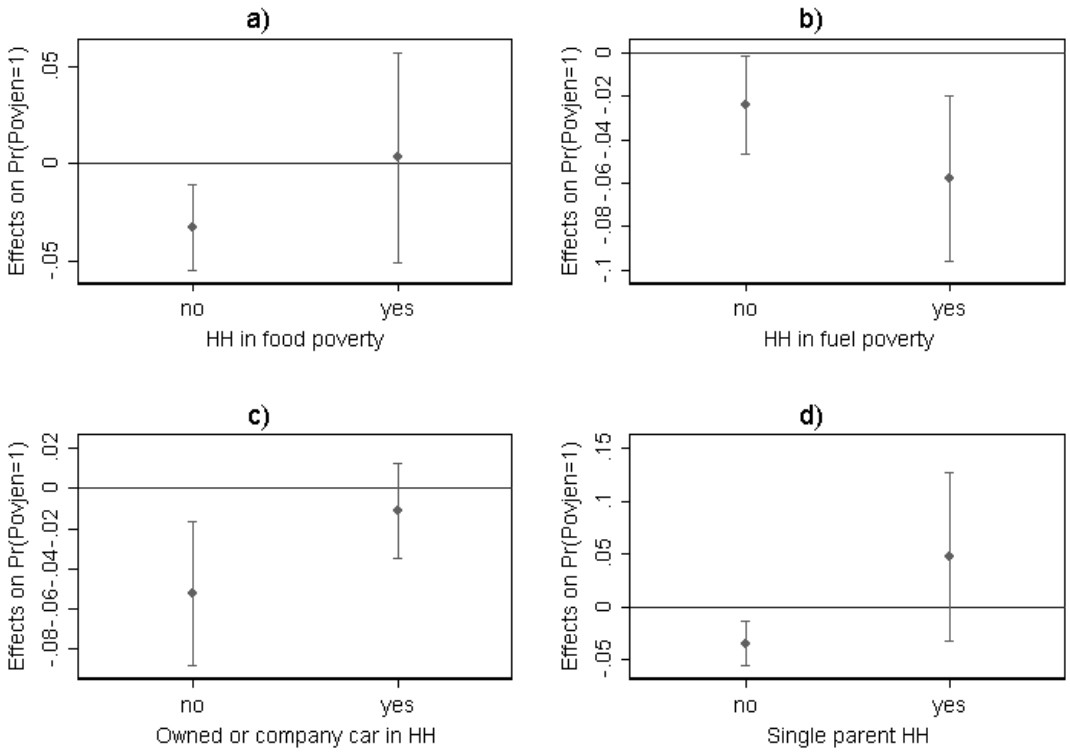
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

The use of the *margins* and *marginsplot* commands have been repeated for all of the interaction terms in my model in table 4.18. For brevity I have included below only the results

for those main effects that show any degree of significant difference in probability of being in poverty between rural and non-rural households, as shown in their marginal effects graphs.

Figure 4.7 illustrates four other factors that show different likelihood of being in poverty across the rurality domain. There looks to be a weak association in the difference between rural and rest of Scotland in poverty likelihood among households that are not in food poverty (fig 4.7:a), suggesting households in rural Scotland that spend less than 50% of their income on food face a significantly different likelihood of being in poverty than their non-rural counterparts. Graph b) in figure 4.7 shows how rural households that are in fuel poverty are significantly less likely to also be low income households than those in fuel poverty in the rest of the country. This suggests that when comparing rural and non-rural household that are in fuel poverty, a larger proportion of rural households are not also income poor. Fuel poverty is not restricted to low income households in rural Scotland and the reasons for it, being off the gas grid and housing quality issues appear to be more significant in rural areas.

Figure 4.7: Average marginal effect of rurality for four factors that show any significant difference by rurality in probability of being in poverty (before housing costs)

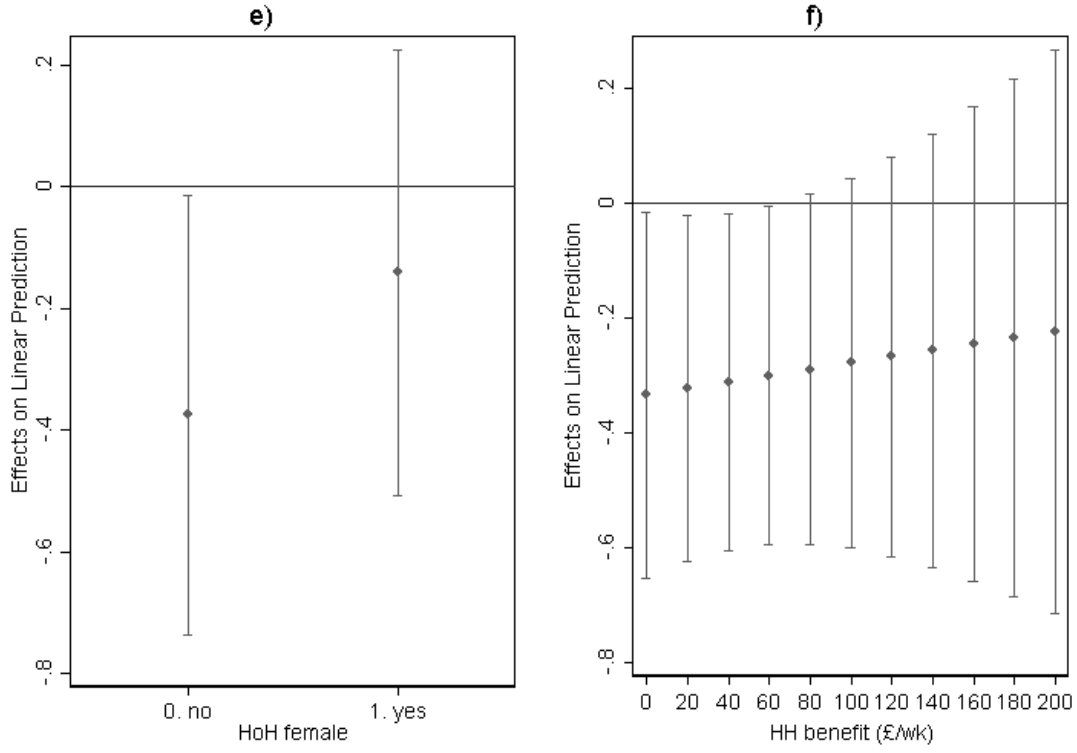


Notes: Poverty likelihood for factor variable value is significantly different by rurality if confidence interval does not include zero. Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

The likelihood of being in poverty for households *not* having access to a car or van also looks to be significantly different in rural Scotland compared to the rest of country (fig 4.7:c). A possible explanation for this difference is family types. The number of rural households without a car is made up of a lower percentage of working age households. Recall that two thirds of rural households without access to a car are pensioner households, while less than a half of non-rural households do not have such access. A household having access to a car or van shows no such difference by rurality.

The final graph of figure 4.7 (graph d), while illustrating that lone parent households do not face significantly different likelihood of being in poverty it is perhaps the other household types that do, albeit marginally so.

Figure 4.8: Average marginal effect of rurality on probability of being in poverty (before housing costs) for households headed by females and low levels of household benefit income



Notes: Poverty likelihood for factor variable value is significantly different by rurality if confidence interval does not include zero. Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

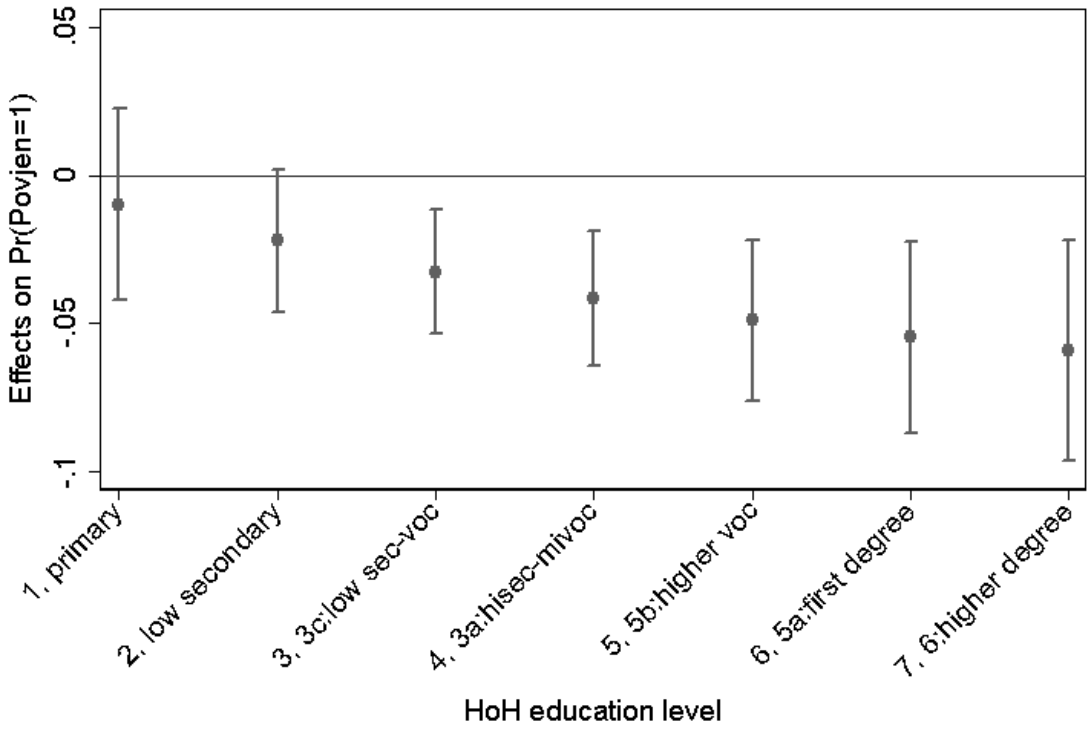
Rural households headed by males look to have a significantly lower likelihood of being in poverty than their non-rural counterparts (fig 4.8:e). The likelihood of a household headed by a

female being in poverty shows no such difference by rurality and reflects my earlier analysis of poverty rates by gender. As discussed earlier, most households headed by females are single adult households and my earlier analysis showed insignificant differences in rates of poverty by rurality among female single person households.

The amount of household benefit income appears to associate with differing likelihood of being in poverty across the rurality domain. At the lower end of the benefit income, less than £70 per week, rural households look to be significantly less likely to be in poverty than their non-rural counterparts with the same benefit income (4.8:f).

The final factor exhibiting any difference in poverty probability across the rurality domain is the head of household's highest educational attainment, on the ISCED scale. Those head of households with educational attainment above lower secondary look to have a lower likelihood of being in poverty in rural compared to non-rural Scotland (fig 4.9).

Figure 4.9: Average marginal effect of rurality on probability of being in poverty (before housing costs) for head of household highest education level



Notes: Poverty likelihood for factor variable value is significantly different by rurality if confidence interval does not include zero. Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median.

Sensitivity of Poverty Rates to Various Operationalisation Changes

This section is a brief examination of the impact that various operationalisation changes may have on poverty rates across Scotland. There are three such changes under consideration. Firstly, to set the rurality settlement size threshold in line with that used in England & Wales. Secondly, to calculate an alternative before housing cost poverty line, and finally to apply an after housing cost poverty line. The impact of these changes on poverty levels in rural and non-rural Scotland are shown below.

Adjusting Rurality Threshold to a Settlement Population of 10,000 or More

Setting the threshold at which a settlement is regarded as rural at a population of less than 10,000 is in line with the definition of rurality used in England and Wales. This means that the urban-rural categories of table 2.1 are grouped with categories 1 and 2 considered urban and categories 3 to 8 as rural. Under this alternative scheme, with the poverty line still set at 60% of median income before housing costs, the poverty rates are no longer significantly different by rurality (table 4.19). The urban average poverty rate is lower and the rural rate higher than under the 3,000 settlement population threshold, suggesting that the small towns with settlement populations of between 3,000 and 10,000 have a slightly higher average poverty rate than settlements with populations lower than 3,000 or above 10,000.

Table 4.19: Household poverty rates when a 10,000 settlement population threshold is used to identify rurality

Year	*Urban*	*s.e.*	*n*	*Rural*	*s.e.*	*n*	*Scotland*	*s.e*	*n*
1999	25.6	1.3	1173	20.6	1.8	530	24.0	1.0	1703
2000	22.7	1.2	1183	21.7	1.7	566	22.4	1.0	1749
2001	21.9	1.2	1098	21.7	1.8	548	21.9	1.0	1646
2002	20.6	1.3	955	23.9	1.9	494	21.7	1.1	1449
2003	21.7	1.4	920	19.3	1.8	476	20.9	1.1	1396
2004	20.7	1.4	835	19.1	1.9	446	20.1	1.1	1281
2005	19.0	1.4	816	14.8	1.7	438	17.5	1.1	1254
2006	20.1	1.4	798	16.1	1.9	386	18.8	1.1	1184
2007	16.6	1.3	773	15.9	1.9	365	16.3	1.1	1138
2008	18.8	1.4	729	17.5	2.0	365	18.4	1.2	1094
All years	21.1	0.3	9280	19.4	0.6	4614	20.7	0.3	13894

Notes: Rural Scotland defined as settlements with a population of less than 10,000. Households are in poverty if their equivalised income is less than 60% of median. Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

Gender poverty

Changing the rurality threshold to a population of 10,000 has little impact on the poverty rates among male single person households. With a 10,000 threshold the non-rural poverty

rate averages at 25.8%, slightly higher than when the 3,000 population threshold is applied. The rural rate is 22.3% using either threshold. There are differences across the rurality domain among female single person households when the 10,000 population threshold is applied. The near 6% gap in rates between non-rural and rural Scotland under the 3,000 population scheme is reduced considerably when the 10,000 threshold is used. Under the latter the non-rural poverty rates among female single person households is 36.2% while the rural rate is 34.5%. Under both threshold schemes the non-rural, rural and all Scotland poverty rates are statistically significantly higher among female single person households.

Child poverty

Child poverty in urban Scotland, when defined by settlement population size of greater than 10,000 people averages 19%, slightly higher than the rate for settlements of 3,000 or more. Conversely, the proportion in rural Scotland when defined by the larger 10,000 population threshold is lower than under the 3,000 threshold (15.8% compared to 16.4%). These small changes are sufficient to make the rates in rural and non-rural Scotland significantly different when a rurality population threshold of 10,000 is applied.

Pensioner poverty

Table 4.20: Individual pension age poverty rates when a 10,000 settlement population threshold is used to identify rurality

Year	*Urban*	*s.e.*	*n*	*Rural*	*s.e.*	*n*	*Scotland*	*s.e*	*n*
1999	31.5	2.1	473	26.8	2.9	235	29.9	1.7	708
2000	28.2	2.1	476	30.3	3.0	234	28.9	1.7	710
2001	24.1	2.0	468	32.5	3.1	234	26.9	1.7	702
2002	24.0	2.1	420	35.3	3.2	218	27.9	1.8	638
2003	24.6	2.1	403	31.5	3.2	216	27.0	1.8	619
2004	23.7	2.2	380	26.6	3.1	199	24.7	1.8	579
2005	21.2	2.1	378	21.3	3.0	183	21.2	1.7	561
2006	21.2	2.1	378	19.9	3.0	181	20.8	1.7	559
2007	19.8	2.1	378	20.7	3.1	174	20.1	1.7	552
2008	22.6	2.2	354	22.2	3.1	185	22.4	1.8	539
All years	24.4	0.7	4108	27.2	1.0	2059	25.3	0.6	6167

Notes: Rural Scotland defined as settlements with a population of less than 10,000. Households are in poverty if their equivalised income is less than 60% of median. Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.
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In contrast to the lower settlement size threshold (table 4.7), when a settlement size of 10,000 people is applied the rural percentage of individual pensioners in poverty is above that of urban Scotland. While the difference between rural and non-rural at the 10,000 population threshold is not statistically significant (it was not at the lower threshold either), the difference

between the two rurality percentages is reversed, suggesting that is the among the group of settlements between 3,000 and 10,000 that appear to have higher rates of pensioner poverty than the rest of the country. Analysis using a three category rurality variable (population less than 3,000, population between 3,000 and 10,000, urban Scotland) shows this to be the case. The mid-level settlement population range had an average pensioner poverty rate of 34.0%, significantly higher than the urban rate of 24.4% shown in table 4.20.

In-work poverty

The percentage of individuals living in poverty in households with at least one member in employment is similar across both rurality measures. In both the 3,000 and 10,000 threshold measures the proportion in urban Scotland, i.e. the proportion above each settlement threshold averages 37.7%. The proportion in in-work poverty when rural Scotland is defined by the 10,000 settlement size threshold is slightly lower than under the 3,000 settlement size threshold. Under both thresholds the difference by rurality is statistically significant.

Fuel poverty

Fuel poverty in settlements with a population above 10,000 is 14.2%, the same rate as for settlements above a population of 3,000 people. The fuel poverty rate in settlements under 10,000 is 17.7%, which is statistically significantly higher than that in urban Scotland. Raising the rurality threshold to a population of 10,000 sees the poverty rate among rural households more than 4% lower than they were with the 3,000 threshold (21.3% compared to 17.7%), emphasising that it is in the smaller settlements, less likely to be on the gas grid, where fuel poverty is highest.

Persistent poverty

Table 4.21: Percentage of individuals in households in persistent poverty when a 10,000 settlement population threshold is used to identify rurality

Year	*Non-rural*	*s.e.*	*n*	*Rural*	*s.e.*	*n*	*Scotland*	*s.e.*	*n*
2002	7.8	0.5	2617	8.3	1.1	637	7.9	0.5	3254
2003	9.4	0.6	2513	8.7	1.1	633	9.2	0.5	3146
2004	8.5	0.6	2269	6.9	1.0	592	8.2	0.5	2861
2005	7.9	0.6	2273	6.3	1.0	574	7.6	0.5	2847
2006	9.3	0.6	2121	4.7	1.0	489	8.4	0.5	2610
2007	7.4	0.6	2080	3.8	0.9	472	6.7	0.5	2552
2008	6.8	0.6	1955	4.2	0.9	476	6.3	0.5	2431
All years	8.2	0.2	15828	6.4	0.4	3873	7.8	0.2	19701

Persistent poverty defined as in poverty in current year and in at least 2 of the previous 3 years.
Notes: Rural Scotland defined as settlements with a population of less than 10,000. Households are in poverty if their equivalised income is less than 60% of median. Excludes movers between rural and non-rural. Source: BHPS waves 9-18.

Under the 10,000 settlement size scheme the addition of the small towns has increased the level of persistent poverty in the newly defined rural category to 6.4% from 5.8% when a 3,000 threshold was applied. The difference across the new 10,000 settlement population threshold is not significant. It was significantly different across the lower threshold.

Adjusting the Poverty Line to 70% of Median Household Incomes

The primary objective in raising the poverty line by a relatively small amount is to observe to what extent the poverty rates change by rurality, to test the extent to which household income sits just above the present poverty line of 60% of median household income. I could have applied alternative methods of generating a new poverty line, perhaps based solely on Scottish household incomes within BHPS but whichever method employed should illustrate the sensitivity of poverty rates to the poverty line. For this analysis I have compared a poverty line of 70% of median household incomes with that used throughout most of this thesis, 60% of median incomes and I revert back to a rurality definition of settlements of less than 3,000 population to allow comparison with most of the analyses of chapter 4. The new calculation results in a poverty line that is around 15% higher than the original.

Table 4.22: Comparison of poverty lines based on 60% and 70% of median household incomes (before housing costs)

Year	*Poverty line 60% median (£s per week)*	*Poverty line 70% median (£s per week)*
1999	140.47	163.88
2000	146.02	170.35
2001	152.43	177.83
2002	160.35	187.08
2003	160.26	186.98
2004	163.16	190.35
2005	161.46	188.37
2006	165.48	193.06
2007	164.77	192.23
2008	161.59	188.52

Source: BHPS waves 9-18.

The modest increase in the poverty line, from 60% of median to 70% of median household incomes, has resulted in quite substantial rises in poverty rates across non-rural and rural Scotland. The rise is slightly higher in rural Scotland, from an average of 18.7% to 28.4%, a rise of 9.7%. The rise in non-rural Scotland was 8.8% (21.4% to 30.2%). Although the poverty rates in non-rural and rural Scotland have moved closer to equivalence under the 70% poverty line

their difference remains statistically significant. The poverty rates in rural Scotland have risen more than they have in non-rural Scotland, suggesting that a higher proportion of rural households have their household income just above the 60% of median income poverty line. If rural households do face increased prices for household fuels and groceries then it is likely that more rural households face increased financial burden while not being below the poverty line.

Table 4.23: Percentage of households with net income less than 70% of the GB median (before housing costs), by wave for non-rural, rural and all of Scotland

Year	*Non-rural*	*s.e.*	*n*	*Rural*	*s.e.*	*n*	*Scotland*	*s.e.*	*n*
1999	34.4	1.3	1340	27.8	2.7	284	33.3	1.2	1624
2000	31.9	1.3	1379	29.0	2.7	290	31.4	1.1	1669
2001	31.0	1.3	1295	28.8	2.7	281	30.6	1.2	1576
2002	30.6	1.4	1116	32.2	2.9	255	30.9	1.2	1371
2003	29.4	1.4	1063	28.8	2.9	243	29.3	1.3	1306
2004	31.2	1.5	975	28.8	3.0	226	30.7	1.3	1201
2005	28.8	1.5	956	24.5	3.0	208	28.0	1.3	1164
2006	27.8	1.5	932	27.6	3.2	196	27.7	1.3	1128
2007	26.0	1.5	866	25.4	3.2	185	25.9	1.4	1051
2008	27.5	1.5	834	29.5	3.4	183	27.8	1.4	1017
All years	30.2	0.4	10756	28.4	0.9	2351	29.9	0.4	13107

Notes: Rural Scotland defined as settlements with a population of less than 3,000.
Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

Applying an After Housing Cost Poverty Line

In a section of chapter 2 I highlighted the considerable debate among poverty analysts on whether it is more accurate to measure poverty using an after housing cost (AHC) rather than before housing cost (BHC) measure. The primary argument is that the former will better reflect the actual disposable income of households. A particular issue is that the measure used can have a bearing on the poverty rates among sub-populations. I have tested the impact of an after housing cost poverty line derived in the manner described in the methodology and methods chapter. The AHC poverty line is still based on 60% of median household incomes and the analysis here retains the official rural Scotland definition of settlements of less than 3,000 people.

As with the before housing cost measure, the poverty rates AHC are significantly lower in rural Scotland (table 4.24). These figures and the downward trend are very similar to official statistics[45]. The poverty rates are similar BHC and AHC but the gap between non-rural and rural rates has reduced slightly. This is perhaps surprising given the lower average housing costs in

[45] http://www.gov.scot/Publications/2017/03/2213/4 Accessed 21st march 2017

rural Scotland (unadjusted figures of £147/month compared to £184/month in non-rural Scotland) which would be expected to result in a lower AHC poverty rate, but may instead suggest that a higher proportion of rural household have their household income sitting just above the BHC poverty line and once housing costs are accounted they then fall below the AHC poverty line. This suggestion is perhaps supported by the poverty rates calculated when a 70% of median household income poverty line was applied to BHPS data (table4.23).

Table 4.24: Percentage of households with net income less than 60% of the GB median after housing costs, by wave for non-rural, rural and all of Scotland

Year	*Non-rural*	*s.e.*	*n*	*Rural*	*s.e.*	*n*	*Scotland*	*s.e.*	*n*
1999	25.1	1.2	1340	21.1	2.4	284	24.4	1.1	1624
2000	18.9	1.1	1379	19.0	2.3	290	18.9	1.0	1669
2001	21.9	1.1	1295	20.6	2.4	281	21.6	1.0	1576
2002	21.1	1.2	1116	20.4	2.5	255	21.0	1.1	1371
2003	20.0	1.2	1063	15.6	2.3	243	19.2	1.1	1306
2004	20.5	1.3	975	17.3	2.5	226	19.9	1.2	1201
2005	18.6	1.3	956	14.9	2.5	208	18.0	1.1	1164
2006	18.8	1.3	932	15.8	2.6	196	18.3	1.2	1128
2007	15.5	1.2	866	14.6	2.6	185	15.3	1.1	1051
2008	18.6	1.3	834	19.1	2.9	183	18.7	1.2	1017
All years	20.2	0.4	10756	18.1	0.8	2351	19.8	0.3	13107

Notes: Rural Scotland defined as settlements with a population of less than 3,000.
Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

Table 4.25: Percentage of pension age individuals with net income less than 60% of the GB median after housing costs, by wave for non-rural, rural and all of Scotland

Year	*Non-rural*	*s.e.*	*n*	*Rural*	*s.e.*	*n*	*Scotland*	*s.e*	*n*
1999	30.4	1.9	559	24.6	3.7	134	29.3	1.7	693
2000	20.2	1.7	563	23.8	3.8	130	20.9	1.5	693
2001	22.2	1.8	554	28.1	3.9	135	23.4	1.6	689
2002	21.4	1.9	485	21.2	3.6	132	21.4	1.7	617
2003	22.6	1.9	464	19.4	3.5	129	21.9	1.7	593
2004	19.3	1.9	436	14.7	3.3	116	18.3	1.6	552
2005	17.4	1.8	430	13.2	3.3	106	16.6	1.6	536
2006	16.5	1.8	431	16.4	3.5	116	16.5	1.6	547
2007	12.5	1.6	417	14.7	3.4	109	12.9	1.5	526
2008	14.8	1.8	398	16.7	3.4	120	15.3	1.6	518
All years	20.2	0.6	4737	19.6	1.1	1227	20.1	0.5	5964

Notes: Rural Scotland defined as settlements with a population of less than 3,000.
Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

Data in BHPS supports the suggestion of McKendrick et al (2011) and others that poverty rates after housing costs are lower than before housing cost figures for pensioner households, while for child poverty the reverse is true. The after housing costs poverty rate among

pensioner households was averaging at just over 20% (table 4.25), and before housing costs poverty was averaging more than 5% higher. In table 4.5 I showed that the BHC poverty rate among households with children averaged at 18.3% across Scotland while the AHC poverty rate was 20.4% (data not shown).

Housing costs are considerably lower among pensioner households, averaging at less than £50 per month compared to nearly £230 per month among the remaining non-pensioner households (both estimates unadjusted). Among households with children the average housing costs are similar by rurality, £288 per month in non-rural households and £284 per month in rural Scotland households (both estimates unadjusted). Housing costs are also likely to be lower among single person households and this is reflected in the lower AHC poverty rates for both single female and single male households. The difference in poverty rates by gender is still significant in the AHC measure (23.9% among male and 30.3% among female single person households – data not shown). The AHC poverty rates for both male and female single person households are lower in rural and non-rural Scotland than the BHC measure. However, as with the BHC measure the AHC rates are not significantly different by rurality for either gender.

Table 4.26: Percentage of individuals in poverty households after housing costs with at least one member of household in work, by wave for non-rural, rural and all of Scotland

Year	*Non-rural*	*s.e.*	*n*	*Rural*	*s.e.*	*n*	*Scotland*	*s.e*	*n*
1999	44.3	1.9	695	50.0	4.7	116	45.1	1.7	811
2000	44.8	2.2	518	55.0	4.6	120	46.7	2.0	638
2001	46.1	2.1	575	57.4	4.5	122	48.1	1.9	697
2002	47.0	2.3	468	63.2	4.7	106	50.0	2.1	574
2003	46.1	2.5	399	67.5	5.4	77	49.6	2.3	476
2004	50.4	2.5	405	60.2	5.4	83	52.0	2.3	488
2005	54.1	2.5	388	63.2	5.9	68	55.5	2.3	456
2006	54.7	2.7	349	59.4	6.2	64	55.4	2.4	413
2007	59.0	2.9	295	57.1	6.7	56	58.7	2.6	351
2008	58.0	2.9	300	59.7	5.8	72	58.3	2.6	372
All years	49.2	0.8	4392	58.7	1.7	884	50.8	0.7	5276

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households are in poverty if their equivalised income is less than 60% of median. Excludes movers between rural and non-rural.
Source: BHPS waves 9-18.

In-work poverty is higher in both rural and non-rural Scotland under the AHC measure with levels in rural Scotland significantly higher than in non-rural Scotland (as is it with the BHC measure). It is noticeable that once housing costs are taken into account the in-work poverty rates increase substantially, to almost 60% in rural Scotland and nearly 50% in non-rural Scotland, rises of around 10% in each case (table 4.26).

Conclusion and Discussion

In this chapter I have used BHPS data to derive a Great Britain wide poverty line for the period 1999 to 2008. These estimates have been adjusted for household size & composition and converted to January 2010 prices. They range from a low of £140 per household per week in 1999 to a high of £165 per week in 2006, when they show a decline to just below £162 per week in 2008. I have then gone on to use this poverty line to identify the poverty status of all households in the manner described in chapter 3.

I have tested a total of ten hypotheses. Hypothesis 1, that poverty rates (BHC) in rural Scotland are the same as they are in non-rural Scotland, has been rejected. BHPS data suggests that poverty rates in rural Scotland have been consistently lower than in non-rural Scotland during the period 1999-2008. This is on the basis that rural Scotland is as defined by the Scottish Government and that the poverty line is 60% of median household income. It is noticeable however, that the poverty rate in rural Scotland rises in the years 2007 and 2008, even though the poverty line for these years has gone down. One would expect these percentages to drop given the lower poverty lines in these years. There appears to be an issue from 2006 that is impacting negatively on household income in rural Scotland to a greater extent than in the rest of the country.

Given the significantly higher poverty rates among female single person households in rural, non-rural and all of Scotland so hypothesis 1a can be rejected, poverty rates among single male households are not the same as poverty rates among female single person households. When comparing poverty rates by gender across the rurality domain, non-rural Scotland sees higher rates than rural Scotland for both male and female single person households but in each case the difference by rurality is not significant. Hypothesis 1b cannot therefore be rejected.

Hypothesis 1c also cannot be rejected; child poverty rates in rural Scotland are not significantly different to the levels in non-rural Scotland. Across all years the difference averages at just over 2% lower in rural Scotland compared to non-rural Scotland.

In-work poverty is significantly higher in rural Scotland so hypothesis 1d, that the proportion of individuals living in a household where someone in the household is in work and the household is in poverty, is the same in rural Scotland as it is in the rest of Scotland, can be rejected. In rural Scotland the level of in-work poverty is approaching 50%, elsewhere it is less than 40%.

Hypothesis 1e however cannot be rejected. Poverty rates among the elderly in rural Scotland show no significant difference to the levels in the rest of Scotland. The average poverty rate across all years is slightly lower in rural Scotland at 23.6% compared to 25.9% in non-rural Scotland.

Household fuel poverty rates in rural Scotland are significantly higher than they are in the rest of Scotland, so hypothesis 1f can be rejected. The comparative analysis of expenditure on household fuels provides further evidence of this. In rural Scotland this averaged at £883 per year, in the rest of the country it was significantly lower at £723 per year. The larger household fuel bills faced by rural households is particularly noticeable when expenditure is examined more closely. Rural households with income below the poverty line were on average spending more on their household fuel bills (£807 per year) than non-poor households in the rest of Scotland (£742 per year). Over 60% of income poor households in rural areas were also in fuel poverty. Among income poor households in non-rural Scotland the proportion in fuel poverty was just short of 45%. Additionally, the rise in fuel poverty rates across Scotland from 2006, particularly so in rural Scotland, coincides with the rise in household fuel prices from that year. The rise in rural household fuel poverty rates between 2006 and 2008 more than doubled the rise in the rest of the country. It is perhaps this rise in fuel prices, which also affected motor fuels, that has impacted to a greater extent on rural household's capacity to generate income resulting in increasing levels of poverty from 2006, as described above.

Hypothesis 1g can be rejected. Persistent poverty rates in rural Scotland are lower than they are in non-rural Scotland and statistically significantly so, albeit at $p<0.10$. In rural Scotland, the proportion of households in poverty in the current year and in two of the previous three years show an all-years average of 5.8% compared to a higher 8.4% in the rest of the country.

An important element of this chapter was to test that factors identified in the literature as associated with poverty in rural Scotland actually show such association when the Scottish Government definition of rural Scotland is applied to BHPS data. Further, is that association unique to rural Scotland or does it apply to the rest of the country too? Hypothesis 2a tests that poverty factors significantly associated with a rural Scotland household being in poverty are also associated with a non-rural Scotland household being in poverty. The testing of this hypothesis has been carried out in two steps: first a comparison analysis of how the factors vary in their prevalence across rural and the rest of Scotland; and then applying probit

regression techniques to identify the association with poverty of the factors identified in previous research for each of the categories of the 2-fold urban rural classification.

The comparison analysis has shown that the prevalence and/or means for around two-thirds of the factors vary significantly by rurality. The percentage of workless households is lower in rural Scotland, at least up to 2006 when the level increased above that of the rest of the country. Male head of households in rural Scotland earn significantly less per week than their non-rural counterparts. Among female head of households the slightly higher earnings in rural Scotland is not significant. Someone in the household having a second job looks to be significantly more common in rural Scotland. BHPS data also suggests that it is more likely in rural areas for family members other than the head of household to have a second job.

Benefit income and the proportion of households receiving benefit is significantly lower in rural Scotland. Car ownership is significantly more prevalent in rural Scotland. Commuting journey times are also longer in rural Scotland. Other factors that exhibit significantly different rates of prevalence across the rurality domain are subjective well-being (better health in rural Scotland); possible psychiatric morbidity (lower in rural Scotland); single parent household (lower in rural Scotland); age; and pensioner household (both higher in rural Scotland). The results for the mental health variables support the rather scant literature that suggests that, with the exception of suicide among men, mental health is probably better in rural areas (Nicholson 2008; SAMH 2012).

The follow-up probit regression models have shown that not all of the factors identified in my literature review, that are thought to be associated with a household being in poverty in rural Scotland, actually show such association once the effects of other factors have been accounted for and the official definition of rural Scotland has been applied. The factor variables that do show association with a rural household being in poverty are: working household; head of household employment income; head of household female; household benefit amount; food poverty; fuel poverty; having access to own or company car; the SIMD geographic access domain score; single parent households; three or more children in household; head of household educational attainment; and pensioner age in household.

All of these factor variables, with the exception of the SIMD geographic access domain score, also show significant association with non-rural households being in poverty. Under a strict interpretation of hypothesis 2a it cannot be rejected given that the variables that show association with poverty in rural Scotland **also** do so in the rest of the country.

There are however several factor variables that show no association with a rural household being in poverty. Two of these though do show association with non-rural households being in poverty: household member had multiple jobs in previous year; second job in household. As a result more of the factors show association with a household being in poverty in non-rural Scotland than they do in rural Scotland, which is contrary to what would be expected given these factors are supposed to be particularly associated with rural Scotland households being in poverty.

The effect of the removal from my models of non-significant variables has been tested in parsimonious models with little effect on the goodness of fit. The introduction of interaction terms to my parsimonious model has allowed the testing of the differences in strength of the associations of the factors with a household being in poverty across the rurality variable. By estimating the average marginal effect on poverty probability of various values of the factor variables it is possible to identify those factor variables which exhibit different degrees of association with a household being in poverty across the rurality domain. This process has identified some factors that fail hypothesis 2b, that in other words exhibit an association with a household in rural Scotland being in poverty that is significantly different than for a household in non-rural Scotland. The factors that show such significant differences in poverty likelihood between rural Scotland and the rest of Scotland are:

- head of household employment income in the range £0-170 per week;
- household benefit income below £70;
- head of household male;
- household not in fuel poverty;
- no car available to household members;
- household types other than single parent;
- head of household educational attainment (above low secondary).

At the lower end of the range of head of household incomes, the likelihood of poverty among rural households is significantly lower than in non-rural households where the head of household also has a low employment income. This suggests household income contributions by other means when the head of household has low employment income in rural areas, perhaps other members of the household contributing to the household income 'pot' to a greater extent than their non-rural counterparts sufficient to bring the total income above the poverty line. Similarly, rural households receiving benefit income below £70 have a lower

likelihood of being in poverty, suggesting that they somehow supplement their household income to a greater extent than non-rural households, sufficient to also bring their income above the poverty line.

All of these hypotheses have been tested by applying the definitions of poverty and rurality described in chapter 2 to BHPS data for the years 1999 to 2008. The hypotheses relating to the difference in poverty rates by rurality across Scotland and among various sub-populations, plus those relating to the comparison of factors, were each tested with and without weights (as described and for the reasons outlined in chapter 3). The conclusions for every one of these hypotheses were the same regardless of weighting being applied or not. In my concluding chapter I discuss in more detail the results of the testing of all hypotheses, in particular looking at the apparent mismatch between the official definition of rural Scotland and that used in some of the research that identified factors associated with rural poverty, and with the low number of factors that have been shown here to make the same association. This could have an impact on poverty alleviating policies targeted at rural and non-rural Scotland.

In the final section of this chapter I considered the impact that various operationalisation changes may have on poverty rates across Scotland. In the first I re-defined the rurality variable so that it was in line with that used in England & Wales. This was done not with the specific aim of comparing poverty rates between countries of the United Kingdom but was due to the low number of cases in some of the urban-rural categories that meant any other grouping of these categories, perhaps by remoteness, would suffer the same issues that I have experienced surrounding a lack of statistical robustness when making inferences resulting from few cases.

By re-defining rurality as settlement with a population of less than 10,000 effectively adds small towns, be they remote or accessible, to the rural category. Results suggest that poverty rates in these small towns are higher than in rural areas defined by 3,000 settlement population threshold. Female single person households show poverty rates significantly higher than male single person households regardless of the rurality threshold used. Poverty rates among households with children are significantly higher in urban than in rural Scotland when the 10,000 people threshold is applied. No such difference was apparent under the 3,000 settlement population threshold, suggesting that poverty rates among small town households with children are low. Conversely, poverty rates among pensioner households look to be higher in small towns. The results for fuel poverty emphasis that it is the smaller settlements, less likely to be on the gas grid, that suffer the highest levels.

For my second operationalisation change I calculated an alternative before housing cost poverty line of 70% rather than 60% of median household income with the official definition of rurality back in place. The results indicate that a higher proportion of rural households have income that is between the 60% and 70% poverty lines, putting increased financial burden on rural households facing increased prices for household fuels and groceries. The final operationalisation change was to create a poverty line of 60% of median household income after housing costs, which should provide a better measure of the actual disposable income of households. Poverty rates AHC are significantly lower in rural Scotland than in non-rural Scotland, as they were under the BHC measure. Lower average housing costs in rural Scotland would suggest that the gap between non-rural and rural poverty rates would increase under the AHC measure but this was not the case. The impact of housing costs among pensioner households and households with children is as previously described in the literature. Poverty rates after housing costs are lower than before housing cost figures for pensioner households, while for child poverty the reverse is true. Lower housing costs among single person households, both male and female, also makes the poverty rates AHC lower than BHC. In-work poverty levels AHC look to be significantly higher than rates BHC, perhaps suggesting a sizeable proportion of in-work households have income that is just above the poverty line BHC and when housing costs are included their income falls below the poverty line AHC.

In the next two chapter I extend my analysis to test hypotheses that examine poverty dynamics, examining how transition events impact on a household's entry into poverty (in chapter 5) and exit from poverty (in chapter 6). Do the factors identified in the literature show association with a household moving into poverty or exiting poverty in rural Scotland when using the official Scottish Government definition of rural Scotland?

Chapter 5: Analysis II – Poverty Dynamics: Entering Poverty

Introduction

In the previous chapter I have examined hypotheses relating to the probability of a household being in poverty in rural Scotland. In doing so I have identified several factors that show some association with a household being in poverty and how that association varies across the rurality domain. Arguably of more value is an examination of how these factors, some of which are time varying, impact on a rural household's entry into and exit from poverty and how this impact may differ from the rest of Scotland. Of particular interest is whether the factors identified in the literature show association with entry into poverty (or exit from poverty - in the next chapter), when the official definition of rural Scotland is applied to BHPS data. The aim is to assess if moves into and out of poverty are associated with particular changes in household circumstances, and how these may differ by rurality.

In this chapter I consider individual's entry into poverty and test hypothesis 3: that rates of entry into poverty in rural Scotland are the same as they are in the rest of Scotland. In chapter four I also tested any differences in poverty levels for various sub-populations. It would have been useful to do something similar for this entry into poverty model, but the low number of households in some categories do not allow for statistically robust conclusions to be drawn. The rates of entry into poverty by rurality are shown but formal hypothesis testing has not been carried out for the sub-populations.

I have then gone on to test hypothesis 4a: that the time varying and non-time varying poverty factors associated with a household's entry into poverty in rural Scotland are also associated with a household's entry into poverty in the rest of Scotland; and hypothesis 4b: the extent of association of each factor with a household entering poverty is the same in rural Scotland as it is in the rest of Scotland.

The analysis that follows is similar in layout to that in chapter three: first a look at the rates of entry into poverty among the Scottish population and various sub-populations; then a comparative analysis of the rates of occurrence of the time varying and non-time varying factor variables; followed by a more detailed logistic regression analyses that tests hypothesis 4a; and finally, the addition of interaction variables to my regression equation to test hypothesis 4b. As

outlined in the methodology and methods chapter, the analysis of poverty dynamics is best achieved at the individual rather than household level and this is the approach taken here.

Rates of Entering Poverty across Scotland

An individual is deemed to have entered poverty if at year *t* their household's income has dropped below the poverty line having previously, at year *t-1* been at or above the poverty line. The rate of entry into poverty is then the proportion of those not in poverty at year *t-1* that are in poverty at year *t*. It may be revealing to also calculate those individuals entering poverty as a proportion of all cases in the previous year. There are then two methods by which the rates of entering poverty can be calculated, either as a percentage of all individuals or as a percentage of only those individuals that were at or above the poverty line at year *t-1*. The former methodology has not been repeated for the sub-population analysis that follows.

Table 5.1 shows the percentage of individuals entering poverty at each wave as a proportion of all cases in the previous year, where rural is as defined by the Scottish Government rural/non-rural classifications.

Table 5.1: Percentage of individuals entering poverty (before housing costs) at each wave for rural and non-rural Scotland as a proportion of all cases in the previous year

	Non-Rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	6.0	0.4	3047	5.0	0.9	642	5.9	0.4	3,689
2001	7.5	0.5	2841	6.7	1.0	643	7.4	0.4	3,484
2002	5.8	0.5	2488	6.5	1.1	552	5.9	0.4	3,040
2003	6.6	0.5	2368	3.9	0.8	535	6.1	0.4	2.903
2004	6.6	0.5	2152	7.4	1.2	489	6.7	0.5	2,641
2005	4.0	0.4	2165	3.4	0.9	448	3.9	0.4	2,613
2006	6.0	0.5	2050	5.6	1.1	413	5.9	0.5	2,463
2007	5.5	0.5	1955	8.6	1.4	384	6.0	0.5	2,339
2008	5.7	0.5	1848	8.8	1.4	387	6.3	0.5	2,235
All years	6.0	0.2	20914	6.1	0.4	4493	6.0	0.2	25407

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

Entry into poverty in rural Scotland, as a proportion of all individuals, averages 6.1 percent across the nine waves, slightly higher than the 6.0% across non-rural Scotland (table 5.1). Perhaps of more interest is the rate of entry into poverty among those individuals that were not in poverty in the previous year. Across Scotland the average rate of entry into poverty for previously non-poor individuals is 8.2%. In non-rural Scotland and in rural Scotland the rate is the same, 8.2% (table 5.2). The difference is clearly not statistically significant.

Table 5.2: Percentage of non-poor individuals entering poverty (before housing costs) at each wave for rural and non-rural Scotland

	Non-Rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	99.4	0.7	1954	8.1	1.4	397	9.2	0.6	2351
2001	10.2	0.7	2095	9.2	1.3	467	10.0	0.6	2562
2002	7.9	0.6	1827	8.7	1.4	415	8.0	0.6	2242
2003	8.9	0.7	1743	5.3	1.1	398	8.2	0.6	2141
2004	8.8	0.7	1605	9.2	1.5	391	8.9	0.6	1996
2005	5.5	0.6	1574	4.5	1.1	337	5.3	0.5	1911
2006	7.6	0.7	1602	6.9	1.4	333	7.5	0.6	1935
2007	7.2	0.7	1493	10.6	1.8	311	7.8	0.6	1804
2008	7.3	0.7	1459	11.3	1.8	300	8.0	0.6	1759
All years	8.2	0.2	15352	8.2	0.5	3349	8.2	0.2	18701

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

A lack of any significant difference in the rate of entry into poverty across the rurality domain means that hypothesis 3 cannot be rejected. It is noticeable though that entry rates in rural Scotland rise above non-rural Scotland rates in 2007 and 2008. Earlier in this thesis I described the rise in the price of household and transport fuels from 2005/06 and it is noticeable that the rise in the rate of entry into poverty in rural Scotland closely follows these price hikes. It is possible that the effects of fuel price rises impacts on a household's capacity to generate income to a greater extent in rural Scotland compared to the rest of the country. One possible explanation is that among some rural households employment is given up as the increased costs of travelling to and from work outweighs the income benefits of that job.

As with the poverty rates given in the previous chapter (table 4.2), an analysis has been carried out on the bias that may be introduced by household size change. A comparison of all year percentage of households entering poverty shows a slight drop of 0.3 percent among non-rural households when those households that show a change in the number of people living in it are excluded. The percentage among rural households remains unchanged. Household size change appears to have little impact on rates of entering poverty and what small changes there have been do not affect the conclusion regarding hypothesis 3.

Rates of Entering Poverty among Sub-populations

In this section I have compared by rurality the rates of entry into poverty by gender and for households with children, in-work households, household with elderly members and households in fuel poverty. I have restricted these comparisons to the measure that assesses

annual poverty entry rates based on the proportion of individuals not in poverty in the previous year.

Not included here is an examination of rates of entry into poverty of households in persistent poverty. By definition, the identification of persistent poverty requires four years of data, the current year plus three previous years. To therefore establish a transition variable for persistent poverty would result in very few years of data remaining with which to draw any conclusions. As a result I have dropped persistent poverty from this section and the equivalent section in the next chapter.

Rates of Entering Poverty by Gender

In the manner of the section in the previous chapter looking at poverty by gender I assume that in a household with an adult couple, either both partners are in poverty or neither is in poverty, and any differences in rates of entry into poverty by gender are for the most part only going to be observable in single adult households. As shown in the comparative analysis of this chapter the number of lone parent households moving into poverty each year is very low. Recorded below in table 5.3 and 5.4 are the rates of entry into poverty among single person households for males and females respectively. Both male and female single person households show lower rates of entering poverty in rural Scotland than in non-rural Scotland, and for female single person households this difference is statistically significant within 90% confidence intervals.

Table 5.3: Percentage of non-poor male single person households entering poverty (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	11.9	2.8	134	19.0	8.8	21	12.9	2.7	155
2001	11.7	2.7	145	3.7	3.7	27	10.5	2.3	172
2002	15.5	3.4	116	12.0	6.6	25	14.9	3.0	141
2003	13.2	3.3	106	0.0	0.0	23	10.9	2.7	129
2004	13.6	3.4	103	9.1	6.3	22	12.8	3.0	125
2005	14.3	3.7	91	9.5	6.6	21	13.4	3.2	112
2006	14.1	3.8	85	4.5	4.5	22	12.1	3.2	107
2007	6.8	2.7	88	11.1	7.6	18	7.5	2.6	106
2008	11.1	3.3	90	7.7	7.7	13	10.7	3.1	103
All years	12.5	1.1	958	8.3	2.0	192	11.8	1.0	1150

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

Across Scotland female single person households (17.1%) are statistically more likely to enter poverty than their male counterparts (11.8%). When compared by rurality it is only non-rural Scotland single person households that show statistically significant differences in poverty rates by gender of single person households. A further observation is that the rate of entry into poverty among single person households, regardless of gender, is considerably higher than for the general population.

Table 5.4: Percentage of non-poor female single person households entering poverty (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	20.0	3.3	150	14.8	7.0	27	19.2	3.0	177
2001	20.9	3.2	163	28.1	8.1	32	22.1	3.0	195
2002	20.7	3.5	135	7.4	5.1	27	18.5	3.1	162
2003	17.4	3.5	115	3.4	3.4	29	14.6	3.0	144
2004	20.4	3.8	113	7.1	5.0	28	17.7	3.2	141
2005	12.4	3.1	113	11.1	6.2	27	12.1	2.8	140
2006	18.2	3.5	121	6.5	4.5	31	15.8	3.0	152
2007	14.2	3.3	113	11.5	6.4	26	13.7	2.9	139
2008	15.8	3.3	120	24.1	8.1	29	17.4	3.1	149
All years	18.0	1.1	1143	12.9	2.1	256	17.1	1.0	1399

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

Households with Children Entering Poverty

The rate of entry into poverty among households with children is slightly higher in rural Scotland compared to the rest of the country, but the difference is not statistically significant (table 5.5). A caveat to these figures is that the number of households with children that have entered poverty is small and the rural percentages fluctuate considerably by year, so any inference should be viewed with a degree of caution.

Table 5.5: Percentage of non-poor households with children entering poverty (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	7.8	0.9	927	2.4	1.2	166	7.0	0.8	1093
2001	11.7	1.0	1004	11.3	2.1	222	11.6	0.9	1226
2002	7.5	0.9	856	10.2	2.2	186	8.0	0.8	1042
2003	9.3	1.0	821	8.0	2.1	163	9.0	0.9	984
2004	9.6	1.1	789	14.2	2.7	169	10.4	1.0	958
2005	3.7	0.7	760	4.3	1.7	138	3.8	0.6	898
2006	5.6	0.8	762	9.1	2.6	121	6.1	0.8	883
2007	7.7	1.0	704	15.0	3.4	113	8.7	1.0	817
2008	5.1	0.8	704	14.9	3.2	121	6.5	0.9	825
All years	7.7	0.3	7327	9.8	0.8	1399	8.1	0.3	8726

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

In-work Households Entering Poverty

The number of individuals in in-work households entering poverty is low, averaging at 4.9% each year across Scotland (table 5.6). The rate of entry is significantly higher in rural compared to non-rural Scotland. Evidence highlighted in the previous chapter suggests that in-work poverty is significantly higher in rural Scotland.

Table 5.6: Percentage of individuals in non-poor in-work households entering poverty (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	5.2	0.6	1487	3.7	1.0	325	4.9	0.5	1812
2001	5.6	0.6	1601	7.5	1.3	387	6.0	0.5	1988
2002	4.7	0.6	1434	7.1	1.4	337	5.1	0.5	1771
2003	5.6	0.6	1390	6.5	1.4	324	5.8	0.6	1714
2004	4.9	0.6	1276	5.6	1.3	304	5.1	0.6	1580
2005	2.8	0.5	1271	1.6	0.8	255	2.6	0.4	1526
2006	4.0	0.5	1285	5.6	1.5	248	4.3	0.5	1533
2007	4.4	0.6	1199	10.1	2.0	227	5.3	0.6	1426
2008	3.8	0.6	1178	7.7	1.8	220	4.4	0.6	1398
All years	4.6	0.2	12121	6.1	0.5	2627	4.9	0.2	14748

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

Elderly Households Entering Poverty

The rate of entry into poverty by individuals in pensioner households is lower in rural Scotland (10.4%) than in non-rural Scotland (11.7%), although in both areas the rate fluctuates considerably, but the difference is not statistically significant (table 5.7). As with previous sub-population poverty entry rates the numbers are low, but again the rates in rural Scotland rise sharply for the years 2007 and 2008.

Table 5.7: Percentage of individuals in non-poor pensioner households entering poverty (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	13.3	1.8	361	19.5	4.4	82	14.4	1.7	443
2001	14.0	1.7	400	10.3	3.3	87	13.3	1.5	487
2002	12.1	1.7	348	10.3	3.3	87	11.7	1.5	435
2003	11.1	1.8	323	4.5	2.2	89	9.7	1.5	412
2004	9.8	1.7	297	8.0	2.9	87	9.4	1.5	384
2005	8.7	1.6	299	6.3	2.8	79	8.2	1.4	378
2006	12.4	1.9	315	7.3	2.7	96	11.2	1.6	411
2007	10.2	1.7	313	12.4	3.5	89	10.7	1.5	402
2008	12.2	1.9	312	14.6	3.6	96	12.7	1.7	408
All years	11.7	0.6	2968	10.4	1.1	792	11.4	0.5	3760

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

Households in Fuel Poverty Entering Poverty

Table 5.8 shows the rate of entry into poverty among individuals in households that are in fuel poverty. The average rate in rural Scotland is 35.4% which is statistically significantly lower than in non-rural Scotland (39.9%). This difference reflects one of the findings of the previous chapter. There I showed that a higher proportion of households are in fuel poverty regardless of their income poverty status. As a result a household in fuel poverty in rural Scotland is more likely (than a non-rural household in fuel poverty) to remain above the income poverty line. All of the sub-population analyses on entry into poverty rates are based on a low number of cases in rural Scotland, and this issue looks to particularly impact on the rates of entry into poverty for households in fuel poverty.

Table 5.8: Percentage of individuals in non-poor households in fuel poverty entering income poverty (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	56.3	3.8	269	27.3	5.1	82	47.4	3.2	351
2001	63.0	3.8	235	39.5	5.6	89	55.5	3.2	324
2002	45.1	4.2	212	37.3	5.6	80	42.4	3.4	292
2003	64.1	4.2	226	33.3	7.4	54	56.6	3.8	280
2004	58.5	4.5	163	65.3	6.9	55	60.5	3.7	218
2005	34.0	4.7	135	41.7	10.3	28	35.4	4.3	163
2006	25.6	2.7	304	27.1	5.8	62	25.9	2.4	366
2007	28.9	2.9	280	33.3	6.1	69	29.8	2.6	349
2008	22.6	2.3	387	28.8	4.3	117	24.2	2.0	504
All years	39.9	1.2	2211	35.4	0.2	636	38.8	0.1	2847

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes. Excludes movers between rural and non-rural. Source: BHPS 1999-2008.

Factors Associated with a Household's Entry into Poverty

Comparative Statistics

As in the in-poverty analysis in the previous chapter, I have carried out some basic comparative cross-section analysis, this time comparing the extent to which time varying and non-time varying variables occur in rural and non-rural Scotland.

Table 5.9: Percentage of individuals in households experiencing time varying transitioning factors related to entering poverty (before housing costs) in rural and non-rural Scotland

	Non-rural Scotland	Rural Scotland	Significantly different
Number in work in HH decreased	9.6%	8.6%	*
Drop in HoH employment income	21.2%	22.6%	
Change from in-work to non-work HH	3.4%	3.0%	
Amount of HH benefit decreased	30.7%	27.6%	***
HH stopped receiving any benefit	3.5%	2.9%	
HH entered food poverty	5.0%	5.4%	
HH entered fuel poverty	8.3%	11.7%	***
Expenditure on HH fuel increased	53.4%	54.7%	
Car no longer avail to HH	2.4%	1.9%	*
Care burden increased in HH	2.0%	2.1%	
Subjective well-being worsens (GHQ36)	43.6%	42.5%	
Change from healthy to possible psych morbidity in HH	13.9%	11.2%	***
Newly lone parent with dependent children	3.4%	2.3%	***
Number of children increased to 3 or more	0.7%	0.8%	*
Newly pensioner HH	1.3%	1.6%	
HH pension income decreased	7.5%	9.5%	**

Source: BHPS 1999-2008.

* $p < 0.10$, ** $p < .05$, *** $p < .01$.

Notes: Rural Scotland defined as settlements with a population of less than 3,000.

As can be seen in table 5.9, approximately a half of the transition factors vary significantly in their occurrence by rurality. Four show strong statistically significant difference in their rates of change. A drop in the amount of total household welfare benefits occurs significantly less often in rural Scotland, while the rate of entry into fuel poverty is significantly higher in rural Scotland. Someone in the household developing a subjective well-being score that suggests the presence of a possible psychiatric disorder occurs significantly less often in rural Scotland and newly lone parent also occurs significantly less often in rural Scotland. It is noticeable that the rate of change of some of the factors is extremely low, among households moving to three children for example. Such low numbers, as shown earlier, can have an impact on regression analysis results. This issue is discussed in more detail in a later section of this chapter.

Regression Analysis

The cross-sectional analysis of the previous section has shown that the rate of change for around a half of the transition variables vary little across the rurality domain. The only variables that showed any statistically significant difference in their rates of change were: a drop in the amount of household benefit; entry into fuel poverty; possible psychiatric morbidity presenting in household; and newly lone parent with dependent children. In this section I have tested the extent to which the transition and some time-invariant variables are associated with a household's entry into poverty in rural and non-rural Scotland, and to what extent that association varies by rurality when rural Scotland is as defined by the Scottish Government.

As with the in-poverty analysis, all of the variables have been included in separate rural and rest of Scotland regression models. Running models separately like this highlights any differences in statistical significance by rurality and also allows the significance of one variable to be tested with the effects of all of the other variables taken into account in each model. The comparative analysis of table 5.9 shows that some transitions occur very infrequently and for these variables it is perhaps more appropriate to use their non-transitioning form in my models. The variables with very low occurrence rates are transitions in car availability to household, care burden, lone parent with dependent children, three or more children, and pensioner households. The non-transitioning form of each of these variables have been applied to my models, with the exception of the pensioner household variable. This is highly correlated with the dummy age over 65 variable so has been dropped.

Random effects probit regression has been used to examine the association between the output variable, entering poverty, and the transition & time invariant variables. Some of the

factors used in earlier models are time invariant, meaning that their values do not change across time. Gender is an obvious example, although it is noted that my model uses the gender of the head of household as a factor and this could change through divorce/separation, death of spouse/partner or re-marriage/re-partnering. Also of importance to my models is a consideration of time invariant effects of the time invariant values, e.g. is the effect of gender at time 1 the same as the effect at all other time points. Given that my models are looking for any interaction effect it is necessary to include these time invariant factors in my transition models. The time invariant variables included in my rural and non-rural models are gender of head of household, the dummy variable identifying head of households over the age of 65, the head of household education level, and the SIMD geographic access domain score.

Tables 5.10 To 5.13 Illustrates the development of my models for rural and non-rural Scotland. Nesting the results in this way allows an examination of the impact of the inclusion of each variable to the models. If the addition of a variable results in a large change in the coefficient of other variables in the model suggests the possible existence of collinearity. An example of this can be seen in tables 5.13. The addition of the last variable in the non-rural Scotland model, the variable household pension income decreased, has resulted in a large change to the coefficient on the head of household age over 65 variable, with it dropping from 0.27 to 0.124. This coefficient change suggests existence of a confounding variable (collinearity is an extreme form of confounding) and I have elected to remove the age variable from my later more parsimonious models that exclude non-significant variables. I could have elected to remove the pension variable instead but this variable is statistically significant in both the rural and non-rural Scotland poverty models while the age variable was not significant in the rural model. For similar reasons I also dropped the variables relating to households moving into food and fuel poverty. Similarly, in both the rural and non-rural models the number in household variable correlates highly with a household moving from an in-work to a non-work household. As a result I have removed the latter from the parsimonious models.

Table 5.10: Nested results of probit regression illustrating impact of addition of variables associated with individuals entering poverty – rural Scotland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
# in work in HH decreased		0.381***	0.323***	0.115	0.102	0.104	0.227*	0.226*	0.231*	0.234*	0.127
Drop in HoH employment income			0.289***	0.294***	0.332***	0.358***	0.359***	0.359***	0.355***	0.383***	0.400***
Change from in-work to non-work HH				0.883***	0.873***	0.874***	0.847***	0.848***	0.851***	0.834***	0.867***
2nd job in HH					-0.539***	-0.534***	-0.523***	-0.524***	-0.509***	-0.493***	-0.461***
HH member had multiple jobs in last year						-0.234**	-0.243**	-0.242**	-0.242**	-0.218**	-0.208*
Amount of HH benefit decreased							0.552***	0.555***	0.542***	0.529***	0.516***
HH stopped receiving any benefit								-0.029	-0.003	0.019	0.069
HoH female									0.122	0.101	0.143
HoH aged 65 or over										0.238**	0.115
Education level											-0.127***
Constant	-1.750***	-1.720***	-1.805***	-1.807***	-1.751***	-1.712***	-1.872***	-1.872***	-1.891***	-1.947***	-1.495***
Observations	3349	3349	3349	3349	3349	3349	3349	3349	3349	3349	3349
McFadden's Pseudo R^2	.036	.044	.050	.062	.071	.073	0. 87	0. 87	0. 87	0. 90	.091
ll	-942	-904	-899	-887	-879	-877	-854	-854	-854	-852	-830

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes.

Table 5.11: Nested results of probit regression illustrating impact of addition of variables associated with individuals entering poverty – rural Scotland (continued)

	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
# in work in HH decreased	0.126	0.119	0.126	0.122	0.155	0.153	0.148	0.167
Drop in HoH employment income	0.403***	0.408***	0.401***	0.357***	0.346***	0.346***	0.311***	0.319***
Change from in-work to non-work HH	0.865***	0.856***	0.857***	0.855***	0.834***	0.840***	0.846***	0.859***
2nd job in HH	-0.463***	-0.466***	-0.479***	-0.419***	-0.414***	-0.415***	-0.403***	-0.405***
HH member had multiple jobs in last year	-0.209*	-0.209*	-0.216*	-0.165	-0.178	-0.175	-0.149	-0.144
Amount of HH benefit decreased	0.514***	0.510***	0.524***	0.519***	0.522***	0.510***	0.494***	0.485***
HH stopped receiving any benefit	0.071	0.075	0.067	-0.143	-0.161	-0.145	-0.166	-0.174
HoH female	0.143	0.065	0.053	0.055	0.053	-0.002	-0.002	-0.007
HoH aged 65 or over	0.116	0.063	0.077	0.090	0.080	0.110	0.139	0.058
Education level	-0.127***	-0.118***	-0.126***	-0.114***	-0.112***	-0.115***	-0.115***	-0.115***
SIMD Geographic Access domain score	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001
Owned or company car in HH		-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**
Care of disabled in HH			-0.249	-0.169	-0.171	-0.171	-0.176	-0.170
Subjective wellbeing worsens (GHQ36)				0.010	0.064	0.061	0.060	0.067
Presence of possible psychiatric disorder in HH					-0.340**	-0.336**	-0.324**	-0.336**
Single parent HH						0.219	0.220	0.219
3 or more children in HH							0.361*	0.379*
HH pension income decreased								0.291***
Constant	-1.559***	-1.246***	-1.206***	-1.233***	-1.224***	-1.240***	-1.246***	-1.241***
Observations	3349	3349	3349	3349	3349	3349	3349	3349
McFadden's Pseudo R^2	.091	..094	.095	.122	.125	.126	.128	.130
ll	-830	-827	-826	-773	-770	-769	-767	-765

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes.

Table 5.12: Nested results of probit regression illustrating impact of addition of variables associated with individuals entering poverty – non-rural Scotland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
# in work in HH decreased		0.913***	0.875***	0.475***	0.472***	0.476***	0.558***	0.559***	0.553***	0.585***	0.594***
Drop in HoH employment income			0.185***	0.105**	0.105**	0.135***	0.170***	0.171***	0.169***	0.214***	0.230***
Change from in-work to non-work HH				1.460***	1.446***	1.396***	1.425***	1.424***	1.380***	1.353***	1.280***
2nd job in HH					-0.377***	-0.354***	-0.342***	-0.342***	-0.316***	-0.292***	-0.278***
HH member had multiple jobs in last year						-0.369***	-0.347***	-0.347***	-0.331***	-0.293***	-0.261***
Amount of HH benefit decreased							0.770***	0.777***	0.737***	0.734***	0.691***
HH stopped receiving any benefit								-0.052	-0.018	0.018	0.066
HoH female									0.475***	0.458***	0.396***
HoH aged 65 or over										0.398***	0.239***
Education level											-0.178***
Constant	-1.884***	-1.997***	-2.057***	-2.035***	-1.985***	-1.898***	-2.213***	-2.213***	-2.329***	-2.425***	-1.743***
Observations	15352	15352	15352	15352	15352	15352	15352	15352	15352	15352	15352
McFadden's Pseudo R^2	.062	.102	.103	.135	.137	.143	.181	.181	.190	.194	.218
ll	-4225	-3915	-3908	-3772	-3762	-3735	-3569	-3569	-3530	-3512	-3406

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes.

Table 5.13: Nested results of probit regression illustrating impact of addition of variables associated with individuals entering poverty – non-rural Scotland (continued)

	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
# in work in HH decreased	0.592***	0.593***	0.602***	0.630***	0.629***	0.623***	0.651***	0.667***
Drop in HoH employment income	0.228***	0.233***	0.222***	0.252***	0.251***	0.252***	0.249***	0.263***
Change from in-work to non-work HH	1.279***	1.211***	1.220***	1.258***	1.262***	1.253***	1.242***	1.235***
2nd job in HH	-0.278***	-0.246***	-0.248***	-0.198**	-0.198**	-0.189**	-0.170*	-0.171*
HH member had multiple jobs in last year	-0.261***	-0.264***	-0.266***	-0.305***	-0.305***	-0.298***	-0.304***	-0.294***
Amount of HH benefit decreased	0.692***	0.684***	0.695***	0.717***	0.716***	0.709***	0.693***	0.691***
HH stopped receiving any benefit	0.063	0.053	0.033	-0.058	-0.063	-0.044	0.013	0.013
HoH female	0.394***	0.200***	0.191***	0.172***	0.173***	0.094	0.096	0.096
HoH aged 65 or over	0.237***	0.116*	0.139**	0.160**	0.163**	0.209***	0.270***	0.124*
Education level	-0.177***	-0.143***	-0.147***	-0.148***	-0.148***	-0.147***	-0.153***	-0.157***
SIMD Geographic Access domain score	-0.003	0.000	-0.000	0.001	0.001	0.000	-0.001	-0.000
Owned or company car in HH		-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***
Care of disabled in HH			-0.339***	-0.375***	-0.373***	-0.360***	-0.362***	-0.366***
Subjective wellbeing worsens (GHQ36)				0.048	0.036	0.039	0.033	0.037
Presence of possible psychiatric disorder in HH					0.072	0.077	0.083	0.088
Single parent HH						0.312***	0.290***	0.314***
3 or more children in HH							0.661***	0.677***
HH pension income decreased								0.550***
Constant	-1.700***	-1.280***	-1.231***	-1.284***	-1.289***	-1.318***	-1.341***	-1.371***
Observations	15352	15352	15352	15352	15352	15352	15352	15352
McFadden's Pseudo R^2	.218	.233	.235	.286	.286	.287	.294	.300
ll	-3406	-3341	-3333	-3112	-3112	-3105	-3077	-3052

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes.

Table 5.14: Probit coefficients from models testing national and rural factors and their association with individuals in households entering poverty (before housing costs) in non-rural and rural Scotland

	Non-rural Scotland		Rural Scotland	
# in work in HH decreased	0.667***	(0.066)	0.167	(0.138)
Drop in HoH employment income	0.263***	(0.054)	0.319***	(0.093)
Change from in-work to non-work HH	1.235***	(0.093)	0.859***	(0.196)
2nd job in HH	-0.171*	(0.098)	-0.405***	(0.151)
HH member had multiple jobs in last year	-0.294***	(0.057)	-0.144	(0.109)
Amount of HH benefit decreased	0.691***	(0.047)	0.485***	(0.089)
HH stopped receiving any benefit	0.013	(0.104)	-0.174	(0.217)
HoH female	0.096	(0.062)	-0.007	(0.127)
HoH aged 65 or over	0.124*	(0.074)	0.058	(0.113)
Education level	-0.157***	(0.018)	-0.115***	(0.029)
SIMD Geographic Access domain score	-0.000	(0.002)	0.001	(0.002)
Owned or company car in HH	-0.007***	(0.001)	-0.004**	(0.002)
Care of disabled in HH	-0.366***	(0.091)	-0.170	(0.159)
Subjective wellbeing worsens (GHQ36)	0.037	(0.047)	0.067	(0.077)
Presence of possible psychiatric disorder in HH	0.088	(0.062)	-0.336**	(0.141)
Single parent HH	0.314***	(0.092)	0.219	(0.188)
3 or more children in HH	0.677***	(0.083)	0.379*	(0.207)
HH pension income decreased	0.550***	(0.072)	0.291***	(0.112)
Constant	-1.371***	(0.096)	-1.241***	(0.214)
Observations	15352		3349	
McFadden's Pseudo R^2	0.300		0.130	
ll	-3052		-765	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$
ll = Log Likelihood
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes.

One issue when considering dynamic models such as those employed here is how quickly a change in any transition variable impacts on the dependent or outcome variable. In my models there could be a change in a transition variable that impacts on a household entering poverty at a year later than current. All of the factors have been tested to see if there exists a lag effect, for example to see if the change in the number of working adults only impacts on poverty status in the year after the change rather than in the actual year that the change took place. None of the variables showed such a delayed impact in either the rural or non-rural Scotland models.

In the previous chapter I produced reduced form versions of my in-poverty models excluding non-significant variables. I have done the same here, retaining those variables associating with a household entering poverty in either rural or non-rural Scotland (table 5.15),

with the exception of the variables described above that exhibit high level of correlation. The removal of the non-significant variables has had very little effect on the goodness of fit (as measured by McFadden's R-squared) or the significance of most variables. Interestingly, the number of working members in the household in rural Scotland is now significant in the reduced model.

The parsimonious models of table 5.15 have been tested for initial conditions in the same manner applied in the previous chapter. A comparison of coefficients in the pooled 10 year and pooled 7 year data shows no significant difference among any of them, suggesting initial conditions are not an issue in my entering poverty model.

Under one strict interpretation of hypothesis 4a, that poverty factors associated with a household's entry into poverty in rural Scotland are also associated with a household's entry into poverty in the rest of Scotland, finding the four factors not showing such association in both domains results in the hypothesis being rejected.

Table 5.15: Coefficients of parsimonious Probit regression models showing association of factors identified in the literature with households entering poverty (before housing costs) in rural and non-rural Scotland

	Non-rural Scotland		Rural Scotland	
# in work in HH decreased	0.966***	(0.056)	0.407***	(0.124)
Drop in HoH employment income	0.288***	(0.050)	0.341***	(0.090)
2nd job in HH	-0.243**	(0.095)	-0.456***	(0.153)
HH member had multiple jobs in last year	-0.313***	(0.056)	-0.194*	(0.111)
Amount of HH benefit decreased	0.671***	(0.043)	0.499***	(0.089)
Education level	-0.162***	(0.017)	-0.139***	(0.031)
Owned or company car in HH	-0.008***	(0.001)	-0.004***	(0.001)
Care of disabled in HH	-0.291***	(0.083)	-0.233	(0.160)
Presence of possible psychiatric disorder in HH	0.097*	(0.056)	-0.360***	(0.139)
Single parent HH	0.395***	(0.080)	0.292*	(0.170)
3 or more children in HH	0.674***	(0.077)	0.504**	(0.199)
HH pension income decreased	0.620***	(0.067)	0.350***	(0.119)
Constant	-1.193***	(0.069)	-1.058***	(0.159)
Observations	15352		3349	
McFadden's Pseudo R^2	0.217		0.117	
ll	-3359		-824	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$
ll = Log Likelihood
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes.

Some of the variables in table 5.15 show differing strengths of association with entering poverty in rural and the rest of Scotland. These differences can be tested more formally by introducing interactions terms as applied in the previous chapter. Again, I am testing how the effect on the dependent variable of one explanatory or independent variable depends on the level of one or more of the other independent variables. I have again added the binary rurality variable as a main effect. Table 5.16 shows the results of all Scotland models first without and then with interaction terms included.

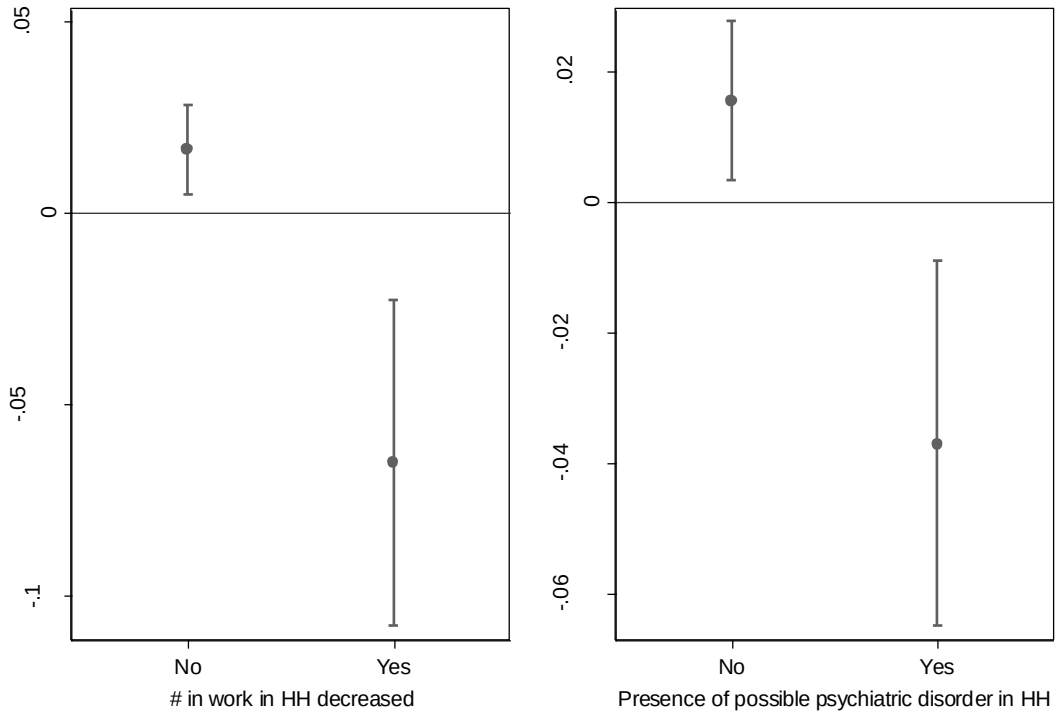
Table 5.16: Coefficients of Probit regression model, including all interaction terms, identifying transition factors associated with individual's entry into poverty (before housing costs)

	All Scotland		Including interactions	
# in work in HH decreased	0.857***	(0.051)	0.959***	(0.055)
Drop in HoH employment income	0.297***	(0.044)	0.282***	(0.049)
2nd job in HH	-0.308***	(0.081)	-0.244***	(0.094)
HH member had multiple jobs in last year	-0.287***	(0.049)	-0.312***	(0.055)
Amount of HH benefit decreased	0.638***	(0.039)	0.666***	(0.043)
Education level	-0.156***	(0.015)	-0.160***	(0.016)
Owned or company car in HH	-0.007***	(0.001)	-0.008***	(0.001)
Care of disabled in HH	-0.282***	(0.073)	-0.289***	(0.082)
Presence of possible psychiatric disorder in HH	0.021	(0.052)	0.096*	(0.056)
Single parent HH	0.372***	(0.071)	0.389***	(0.078)
3 or more children in HH	0.622***	(0.073)	0.667***	(0.076)
HH pension income decreased	0.560***	(0.058)	0.613***	(0.066)
Rural Scotland	0.159***	(0.060)	0.132	(0.183)
Rural Scotland # # in work in HH decreased			-0.554***	(0.141)
Rural Scotland # Drop in HoH employment income			0.080	(0.104)
Rural Scotland # 2nd job in HH			-0.242	(0.185)
Rural Scotland # HH member had multiple jobs in last year			0.108	(0.130)
Rural Scotland # Amount of HH benefit decreased			-0.159	(0.102)
Rural Scotland # Education level			0.010	(0.036)
Rural Scotland # Owned or company car in HH			0.003*	(0.002)
Rural Scotland # Care of disabled in HH			0.030	(0.187)
Rural Scotland # Presence of possible psychiatric disorder in HH			-0.477***	(0.155)
Rural Scotland # Single parent HH			-0.106	(0.195)
Rural Scotland # 3 or more children in HH			-0.156	(0.229)
Rural Scotland # HH pension income decreased			-0.242*	(0.136)
Constant	-1.161***	(0.063)	-1.182***	(0.068)
Observations	18701		18701	
McFadden's Pseudo R^2	0.195		0.199	
ll	-4204		-4184	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$
ll = Log Likelihood
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their income drops below 60% of median incomes.

In the previous chapter I highlighted the assertion by Norton et al. (2004) that interaction effects are complicated to compute and interpret in non-linear models. As with the earlier model that included interaction terms, the coefficients on the entry into poverty model of table 5.16 suggests little in the way of statistically significant interactions. However, I have again made use of the *margins* and associated *marginsplot* commands to obtain a visual interpretation of how the probability of entering poverty varies across rural and non-rural Scotland, for each of the variables.

Figure 5.1: Average marginal effect of rurality on the probability of individuals entering poverty (before housing costs) when the number of members working in household decrease and when there is the presence of a possible psychiatric disorder in the household



Notes: The likelihood of entering poverty for factor variable value is significantly different by rurality if confidence interval does not include zero. The presence of possible psychiatric disorder is suggested by a GHQ12 score of four or more. Rural Scotland defined as settlements with a population of less than 3,000. Households enter poverty if their equivalised income drops below 60% of median incomes.

The use of the *margins* and *marginsplot* commands has identified only two of the rural interactions showing a significantly different probability of entering poverty across the rurality domain. Figure 5.1 shows two graphs. The graph on the left illustrates the average marginal effect, i.e. the difference between rural and non-rural Scotland, on the probability of entering poverty for individuals living in households where the number in work has decreased. The

graph on the right shows the average marginal effect for individuals living in a household where a member is exhibiting a possible psychiatric disorder, i.e. someone in the household has a GHQ12 score of 4 or more. In both variables the probability of entering poverty is significantly lower among individuals living in rural compared to non-rural Scotland.

None of the remaining variable interactions show any significant marginal effects but, given that there appears to be a difference in the extent of association in a couple of variables, hypothesis 4b, that the extent of association of each factor with a household entering poverty is the same in rural Scotland as it is in the rest of Scotland, can be rejected.

Conclusion and Discussion

In this chapter I have shown that an individual's mean rate of entry into poverty over the years 1999 to 2008, as a proportion of all cases, varies little across the two category rurality domain, at just above 6%. These poverty rates take no account of the poverty status in the previous year. A more proper examination of rates of entry into poverty requires calculations based only on those individuals that were not in poverty in the previous year. Under this methodology the rate of previously non-poor individuals entering poverty averages 8.2% in both rural and non-rural Scotland. These rates are not statistically significantly different. As a result, hypothesis 3, that rates of entry into poverty in rural Scotland are the same as they are in non-rural Scotland, cannot be rejected.

I have also shown that among sub-populations, the rate of entry into poverty among single person households is significantly higher than for the general population. Female single person households in rural Scotland enter poverty at a significantly lower rate than their female counterparts in non-rural Scotland. Across Scotland, female single person households show significantly higher rates of entering poverty than male single person households. Among households with children individual's entry into poverty is slightly higher in rural Scotland and among the elderly it is slightly lower than the rate in non-rural Scotland. In each of these sub-populations the differences are not statistically significant. However, among individuals in in-work households the rate of entry into poverty is significantly higher in rural Scotland. It should be noted that individual poverty entry rates, particularly among rural Scotland sub-populations, need to be viewed with some caution given the low number of cases. Entry into poverty among individuals in fuel poverty is significantly lower in rural Scotland. This perhaps reflect earlier results showing a higher proportion of rural Scotland households were in fuel poverty,

regardless of their income poverty status, and therefore rural households in fuel poverty are more to retain their income non-poor status.

To aid the testing of hypotheses 4a and 4b I have created transition variables identifying the one-way change in some variables that are typically associated with a household's income falling below the poverty line. I have compared the percentage of individuals experiencing each of the time varying transitions, and five show statistically significant differences in their rates of change across the rural non-rural categories. A drop in the amount of household benefit occurs significantly less frequently in rural Scotland, perhaps reflecting increased fluctuation in benefit income in non-rural Scotland, while entry into fuel poverty is significantly more frequent than in non-rural Scotland, in line with higher priced fuels in rural Scotland. Someone in the household developing a subjective well-being score that suggests the presence of possible psychiatric disorder occurs significantly less often in rural Scotland. Becoming a lone parent with dependent children occurs less often in rural Scotland but a household's pension decrease occurs significantly more often.

One objective in this chapter was to test Hypothesis 4a; that poverty factors associated with a household's entry into poverty in rural Scotland are also associated with a household's entry into poverty in the rest of Scotland. Several variables showed a degree of association (at 95% confidence interval) with individuals in households entering poverty in rural Scotland. These were:

- Number in work in household decreased
- Drop in head of household employment income
- Second job in household
- Household benefit income decreasing
- Education level (on the ISCED scale)
- Owned or company car available to household
- Presence of possible psychiatric morbidity in household
- Three or more children in household
- Household pension income decreasing

All of these variables also associate with individuals entering poverty in non-rural Scotland. In addition, the variables household member had multiple jobs in previous year, care of disabled in household and single parent households were also associated with non-rural individuals entering poverty. Since there are variables that associate with entry into poverty in

non-rural Scotland but not in rural Scotland, hypothesis 4a can be rejected. As in the earlier poverty models, the apparent mismatch in how rural Scotland was defined in the research found in some literature, when compared to the official Scottish government definition, has been revealed by the number of variables showing association with rural individual entry into poverty in the BHPS data. Of all the variables tested none showed association with entry into poverty in rural Scotland only.

Hypothesis 4b can also be rejected. This tests that the extent of association of each factor with entering poverty is the same in rural Scotland as it is in non-rural Scotland. Here two variables were identified as having a statistically significant difference in association with entry into poverty across the rurality domain, a decrease in the number of household members in work and the presence of possible psychiatric morbidity in a household.

The results in this chapter have shown that changes in supposedly distinct rural poverty factors do not uniquely associate with individuals entering poverty in rural Scotland alone. Those factors that do show such association with entry into poverty in rural Scotland also do so in non-rural Scotland.

In the next chapter I have described the results of similar analyses, this time examining how the transition variables associate with an individual's exiting poverty. I have tested that the factors identified in the literature show association with individuals exiting poverty in rural Scotland when the official Scottish Government definition of rural Scotland is applied to BHPS data.

Chapter 6: Analysis III – Poverty Dynamics: Exiting Poverty

Introduction

In this chapter I consider a household's exit from poverty and test three hypotheses. A key objective is to test that factors identified in the literature show association with a household exiting poverty when the Scottish Government two-fold rural categorisation is applied. To achieve this the three hypotheses tested are: hypothesis 5, that the rates of exit from poverty in rural Scotland are the same as they are in the rest of Scotland; hypothesis 6a, that the change in poverty factors associated with a household's exit from poverty in rural Scotland are also associated with a household's exit from poverty in the rest of Scotland; and hypothesis 6b, the extent of association of each transitioning factor with a household's exit from poverty is the same in rural Scotland as it is in the rest of Scotland.

In so doing, I have followed the procedure of the previous chapter, first examining the rates of exit from poverty of all individuals across the two category rurality classification (to test hypothesis 5) and then repeating for various sub-populations. As in the previous chapter the transition rates among sub-populations have not been tested formally via hypotheses due to low numbers, but the rates have been recorded for completeness. I have then gone on to compare the rates of occurrence of the transition variables, and then carried out detailed regression techniques to test hypotheses 6a and 6b.

Rates of Exiting Poverty across Scotland

An individual is deemed to have exited poverty if at year *t* their household's income has risen above the poverty line having previously, at year *t-1* been below the poverty line. The rate of exiting poverty is then the proportion of those in poverty at year *t-1* that rise above the poverty line at year *t*. It is plausible and perhaps revealing to also calculate those individuals exiting poverty as a proportion of all cases in the previous year. There are then two methods by which the rates of exiting poverty can be calculated, either as a percentage of all individuals or as a percentage of only those individuals that were in poverty at year *t-1*. Analysis of poverty exit rates among the various sub-populations below has been restricted to the latter methodology.

Under the former method shown in table 6.1, exit rates are slightly lower in urban Scotland, averaging at 6.5% across all waves compared to 6.9% in rural areas but the difference

is not statistically significant. The rate of exit from poverty will to some extent be a reflection of poverty levels; a household cannot move out of poverty if it was not in poverty at year *t-1*, and I have shown in chapter four that poverty levels in rural Scotland are lower than in the rest of the country.

Table 6.1: Percentage of individuals exiting poverty (before housing costs) at each wave for rural and non-rural Scotland as a proportion of all individuals at time t-1

	Non-Rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	6.9	0.5	3047	6.4	1.0	642	6.8	0.4	3689
2001	6.4	0.5	2841	7.6	1.1	643	6.6	0.4	3484
2002	6.9	0.5	2488	7.4	1.1	552	7.0	0.5	3040
2003	6.8	0.5	2368	9.2	1.3	535	7.2	0.5	2903
2004	6.7	0.5	2152	3.3	0.8	489	6.1	0.5	2641
2005	6.9	0.6	2165	7.1	1.2	448	7.0	0.5	2613
2006	5.8	0.5	2050	5.8	1.2	413	5.8	0.5	2463
2007	6.3	0.6	1955	7.3	1.3	384	6.5	0.5	2339
2008	5.3	0.5	1848	8.3	1.4	387	5.8	0.5	2235
All years	6.5	0.2	20914	6.9	0.4	4493	6.6	0.2	25407

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

When considering the rate of exiting poverty **only** among those individuals that were in poverty at year *t-1*, we see that around 33% of individuals exit poverty each year in non-rural Scotland, compared to a significantly higher exit rate of nearly 40% in rural Scotland (table 6.2).

Table 6.2: Percentage of individuals exiting poverty (before housing costs) at each wave for rural and non-rural Scotland that were previously in poverty at time t-1

	Non-Rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	31.3	1.8	667	34.4	4.4	119	31.8	1.7	786
2001	29.5	1.8	617	40.5	4.5	121	31.3	1.7	738
2002	29.9	1.9	575	33.9	4.3	121	30.6	1.8	696
2003	35.2	2.2	458	45.0	4.8	109	37.0	2.0	567
2004	33.3	2.3	436	21.1	4.7	76	31.5	2.1	512
2005	39.3	2.5	382	42.7	5.8	75	39.8	2.3	457
2006	33.4	2.5	356	42.1	6.6	57	34.6	2.3	413
2007	37.6	2.7	330	50.0	6.7	56	39.4	2.5	386
2008	34.2	2.8	287	59.3	6.8	54	38.1	2.6	341
All years	33.1	0.7	4108	39.6	1.7	788	34.2	0.7	4896

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

Rates of Exiting Poverty among Sub-populations

Rates of Exiting Poverty by Gender

In line with my analysis of poverty by gender in earlier chapters I only consider in this section single person households. The exiting from poverty of lone parent households is analysed in a later section of this chapter. The rate of exit from poverty among single person households, as a proportion of those in poverty in the previous year, differs from the general population (shown above in table 6.2 at 34.2%). Female single person households exit poverty rate is just over 32%, around 6.5% lower than male single person households (38.7%), a difference that is not statistically significant. These figures need viewing with caution as there are low numbers of single households exiting poverty, particularly among male households.

Table 6.3: Percentage of poor male single person households exiting poverty (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	52.4	7.8	42	44.4	17.6	9	51.0	7.1	51
2001	30.6	7.8	36	22.2	14.7	9	28.9	6.8	45
2002	34.4	8.5	32	16.7	16.7	6	31.6	7.6	38
2003	47.4	8.2	38	20.0	20.0	5	44.2	7.7	43
2004	29.0	8.3	31	50.0	22.4	6	32.4	7.8	37
2005	45.2	9.1	31	50.0	22.4	6	45.9	8.3	37
2006	52.9	8.7	34	33.3	21.1	6	50.0	8.0	40
2007	28.6	8.7	28	0.0	0.0	5	24.2	7.6	33
2008	30.4	9.8	23	42.9	20.2	7	33.3	8.8	30
All years	40.0	2.9	295	32.2	6.1	59	38.7	2.6	354

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes. Excludes movers between rural and non-rural. Source: BHPS 1999-2008.

Table 6.4: Percentage of poor female single person households exiting poverty (before housing costs), by wave for non-rural, rural and all of Scotland

Year	Non-rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	36.5	4.9	96	36.8	11.4	19	36.5	4.5	115
2001	37.9	4.8	103	33.3	12.6	15	37.3	4.5	118
2002	21.8	4.7	78	27.8	10.9	18	22.9	4.3	96
2003	27.1	4.8	85	21.4	11.4	14	26.3	4.4	99
2004	32.5	5.4	77	23.1	12.2	13	31.1	4.9	90
2005	33.3	5.7	69	50.0	13.9	14	36.1	5.3	83
2006	36.9	6.0	65	22.2	14.7	9	35.1	5.6	74
2007	39.0	6.4	59	50.0	16.7	10	40.6	6.0	69
2008	19.1	5.8	47	22.2	14.7	9	19.6	5.4	56
All years	32.1	1.8	679	32.2	4.3	121	32.1	1.7	800

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes. Excludes movers between rural and non-rural. Source: BHPS 1999-2008.

Among male single person households the poverty exit rate in non-rural Scotland (40%) looks to be higher than it is in rural Scotland (32% - table 6.3). Among females the exit rates by rurality are very similar at around 32% (table 6.4).

Households with Children Exiting Poverty

The rate of exit from poverty among individuals in households with children that were in poverty at year *t-1* averages at 36% across Scotland, slightly higher than the general population poverty exit rates of table 6.2, which may indicate an increase imperative to get out of poverty among households with children (table 6.5). This suggestion should be viewed with some caution given the low number of households that included children **and** were in poverty each year *t-1*. Among rural households the average is just over 49% of individuals, a statistically significantly higher rate than non-rural Scotland (41.5%). Again, the issue of a small number of households and individuals in our sub-population, among rural and non-rural households, is reflected in the fluctuating year to year exit rates. This issue is discussed further in my conclusion chapter.

Table 6.5: Percentage of individuals in poor households with children exiting poverty (before housing costs), by wave for non-rural, rural and all of Scotland

	Non-Rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	31.8	2.5	349	38.6	6.5	57	32.8	2.3	406
2001	24.5	2.5	294	59.2	7.1	49	29.5	2.5	343
2002	32.1	2.7	296	45.1	7.0	51	34.0	2.6	347
2003	40.1	3.3	227	54.2	7.3	48	42.6	3.0	275
2004	32.5	3.4	197	18.8	7.0	32	30.6	3.1	229
2005	41.9	3.6	191	40.5	8.2	37	41.7	3.3	228
2006	28.3	3.5	166	48.3	9.4	29	31.3	3.3	195
2007	39.3	4.1	145	79.2	8.5	24	45.0	3.8	169
2008	41.9	4.3	136	85.7	7.8	21	47.8	4.0	157
All years	33.7	1.1	2001	49.4	2.7	348	36.0	1.0	2349

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

In-work Households Exiting Poverty

The all years average rates of exit from poverty of individuals in in-work households that were in poverty at year *t-1* are significantly higher in rural (46%) than in non-rural Scotland (39.1% - table 6.6) and as may be expected these rates of exit are higher than among the

general population. This analysis is based on those individuals in households that are in-work in the current year and in poverty in the previous year. What it does not do is take account of the household's in-work status at year *t-1.* A household could have been in-work or workless in the previous year. It would perhaps be revealing to consider exit from poverty rates only among those households that were in work in the previous **and** current years. Unfortunately, the number of households meeting these criteria would be even lower than shown in table 6.6, making any conclusions debateable. However, a transitioning in-work variable has been created for the regression models of the next section.

Table 6.6: Percentage of individuals in poor in-work households exiting poverty (before housing costs), by wave for non-rural, rural and all of Scotland

	Non-Rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	32.8	3.0	238	40.0	6.7	55	34.1	2.8	293
2001	40.7	3.2	231	48.1	6.9	54	42.1	2.9	285
2002	33.8	3.2	225	40.0	6.4	60	35.1	2.8	285
2003	49.1	3.9	167	65.5	6.3	58	53.3	3.3	225
2004	41.6	4.0	154	20.9	6.3	43	37.1	3.4	197
2005	43.9	4.2	139	32.4	7.8	37	41.5	3.7	176
2006	30.0	3.8	150	46.4	9.6	28	32.6	3.5	178
2007	45.2	4.3	135	51.7	9.4	29	46.3	3.9	164
2008	40.5	4.6	116	80.0	8.2	25	47.5	4.2	141
All years	39.1	1.2	1555	46.0	2.5	389	40.5	1.1	1944

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

Elderly Households Exiting Poverty

The rate of exit from poverty among pensioners that were in poverty at year *t-1* averages at just over 30% across Scotland, slightly lower than the general poverty exit rates of table 6.2, perhaps reflecting the reduced opportunity for income increases among pensioner households (table 6.7). Among individuals in rural and non-rural households the average is just above 30%, showing no significant difference in exit rates by rurality.

Table 6.7: Percentage of individuals in poor pensioner households exiting poverty (before housing costs), by wave for non-rural, rural and all of Scotland

	Non-Rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	32.9	3.6	173	31.4	8.0	35	32.7	3.3	208
2001	34.4	3.8	160	20.0	6.4	40	31.5	3.3	200
2002	23.6	3.6	144	23.8	6.7	42	23.7	3.1	186
2003	25.8	3.8	132	25.0	6.9	40	25.6	3.3	172
2004	26.6	3.9	128	16.1	6.7	31	24.5	3.4	159
2005	33.0	4.5	112	53.8	10.0	26	37.0	4.1	138
2006	41.6	4.9	101	46.7	13.3	15	42.2	4.6	116
2007	33.0	4.8	97	50.0	12.9	16	35.4	4.5	113
2008	27.0	4.7	89	40.0	11.2	20	29.4	4.4	109
All years	30.7	1.4	1136	30.6	2.8	265	30.7	1.2	1401

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

As with other sub-population statistics the number of households in rural Scotland is low, and among pensioner households the number exiting poverty average at less than seven rural households per year.

Households in Fuel Poverty Exiting Poverty

Individuals in households in fuel poverty that were in income poverty at year *t-1* exit income poverty at a statistically significantly higher rate in rural Scotland (46%) compared to non-rural Scotland (35% - table 6.8).

Table 6.8: Percentage of individuals in households in fuel poverty exiting income poverty (before housing costs), by wave for non-rural, rural and all of Scotland

	Non-Rural	s.e.	n	Rural	s.e.	n	Scotland	s.e.	n
2000	30.8	2.4	364	41.8	5.6	79	32.7	2.2	443
2001	28.8	2.4	347	52.1	6.0	71	32.8	2.3	418
2002	37.0	2.8	292	34.2	5.6	73	36.4	2.5	365
2003	32.2	3.2	208	56.8	5.8	74	38.7	2.9	382
2004	33.2	3.3	199	31.3	8.3	32	32.9	3.1	231
2005	40.9	3.5	203	45.5	6.8	55	41.9	3.1	258
2006	33.1	3.7	160	41.0	8.0	39	34.7	3.4	199
2007	46.0	3.8	176	44.7	8.2	38	45.8	3.4	214
2008	41.8	3.6	184	64.9	8.0	37	45.7	3.4	221
All years	35.0	1.0	2133	46.0	2.2	498	37.1	0.9	2631

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

The significantly different rates of exiting poverty perhaps reflects the higher fuel expenditure and therefore the higher levels of fuel poverty among rural households that are not income poor. Rural households may have their income rise above the poverty line but they are more likely to be in fuel poverty than non-rural households transitioning out of income poverty.

Factors Associated with a Household's Exit from Poverty

Comparative Statistics

Cross-sectional analyses of the proportion of individuals experiencing each transitioning variable are similar in rural and non-rural Scotland (table 6.9). The few exceptions, showing statistically significant difference, are identified in the last column of table 6.9 and some of these differences are illustrated graphically in figure 6.1. It is clear from the results in table 6.9 that some of the transitions occur rarely. Examples showing low frequency of occurrence are households that are no longer lone parent, where the number of children drops below three and the household no longer has any pension age family members.

Table 6.9: Percentage of individuals experiencing time varying transitioning factors related to exiting poverty (before housing costs) in rural and non-rural Scotland

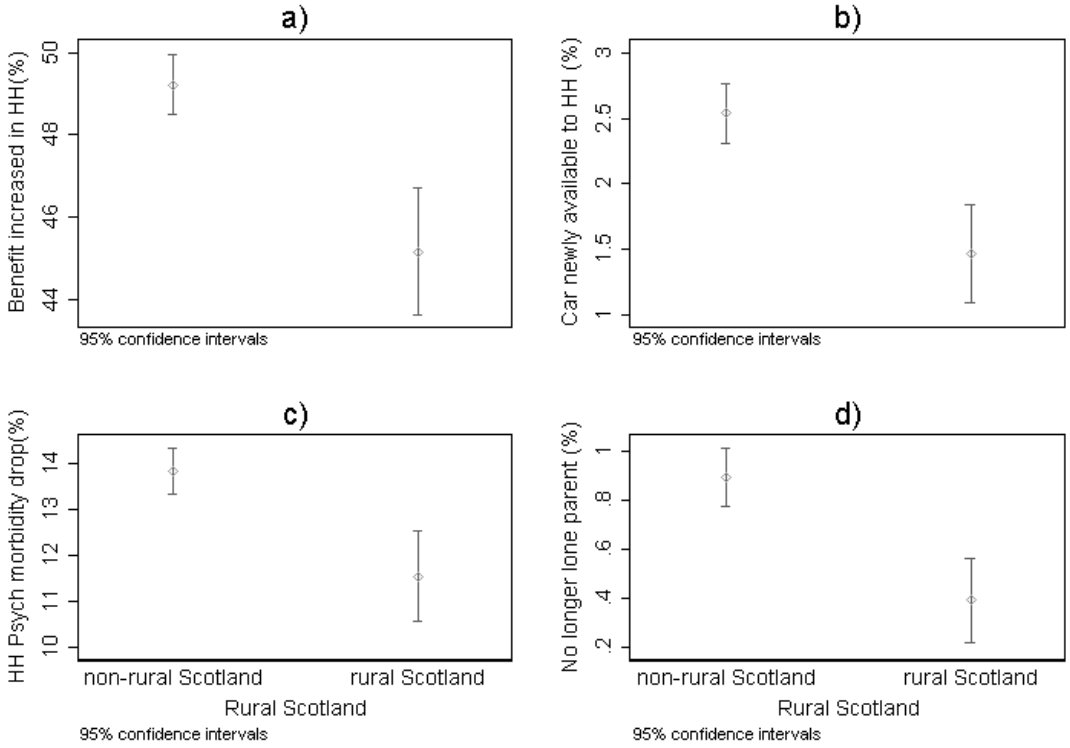
	Non-rural Scotland	Rural Scotland	Significantly different
Number in work in HH increased	10.6%	7.9%	***
Rise in HoH employment income	35.7%	32.5%	**
Change from non-work to in-work HH	3.0%	2.4%	**
Amount of HH benefit increased	49.2%	45.2%	**
HH started receiving any benefit	3.8%	3.5%	
HH exited food poverty	5.3%	5.2%	
HH exited fuel poverty	7.2%	10.4%	***
Expenditure on HH fuel decreased	40.1%	40.9%	
Car newly available to HH	2.5%	1.5%	***
Care burden decreased in HH	1.7%	1.4%	
HoH subjective well-being improves (GHQ36)	41.8%	42.2%	
Change from possible psych morbidity to healthy in HH	13.8%	11.5%	***
No longer lone parent with dependent children	0.9%	0.4%	**
Number of children decreased below 3	1.2%	0.6%	
Previously pensioner HH	0.2%	0.2%	
HH pension income increased	12.8%	15.2%	**

Source: BHPS 1999-2008.
* $p < 0.10$, ** $p < .05$, *** $p < .01$.
Notes: Rural Scotland defined as settlements with a population of less than 3,000.

There are several transition variables that show statistically significant difference in their occurrence across the rurality domain. Some of these differences are highlighted graphically in

figure 6.1 for four of the variables: an increase in the amount of benefit a household receives (fig 6.1:a); a car newly available to household (fig 6.1:b); a change from the possibility of there being someone in the household suffering possible psychiatric problems (GHQ12) (fig 6.1:c); and households no longer being lone parent with dependent children (fig 6.1:d). Household benefit increase occurs significantly less frequently in rural households, perhaps reflecting lower levels of fluctuation in benefit incomes among some households in rural Scotland or rural households are not applying for benefits when they could. A move to healthier GHQ health scores in the household and a change from a lone parent household with dependent children both occur significantly less frequently in rural households. These differences are probably explained by lower levels of poor GHQ scores and lone parent households in rural Scotland (chapter 4). Households cannot move from these states if they are not in them in the first place.

Figure 6.1: Some transition variables with statistically significant different rates of occurrence across rural and non-rural Scotland



Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes. Excludes movers between rural and non-rural.
Source: BHPS 1999-2008.

Regression Analysis

All of the transition factors, with a few exceptions, have been included in separate rural and rest of Scotland regression models. As explained in the previous chapter, models have been run separately to highlight any differences in statistical significance by rurality and also allow the significance of one variable to be tested with the effects of all of the other variables taken into account in each model. The transition factors not used in my models are the variables identifying individuals in households that no longer have pension age members, those households newly acquiring access to a car or van, and those households exiting fuel and food poverty. There are a very low numbers of cases for the former variable and the fuel and food poverty transition measures each correlate with the outcome variable (households exiting poverty), an issue that can impact on model coefficients as described earlier in this thesis. Given the low number of cases I have elected to use the access to car or van variable as it is rather than as a transition variable.

As in the entering poverty models above, probit regression has been used to examine the associations between the exit from poverty output variable and time varying and time invariant variables. In the previous chapter I outlined the importance to my models of a consideration of time invariant effects of the time invariant values, e.g. is the effect of gender at time 1 the same as the effect at all other time points. Within my models I am looking for any interaction effect so it is necessary to include these time invariant factors in my transition models. The time invariant variables included in my rural and non-rural models are gender of head of household, the dummy variable identifying head of households over the age of 65, the head of household education level, and the SIMD geographic access domain score.

Among the time varying variables it is the change in the variable from year *t-1* to time *t* that is being tested with exiting poverty for those individuals that were in poverty at year *t-1*, in separate rural and non-rural Scotland models. In line with earlier models I have also tested for any lag effect in transitions. For these exit from poverty models no lag effect on any of the transitioning variables have been identified. The results of probit regression models for non-rural and rural Scotland are shown in table 6.14. The development of these models is illustrated by the nested results shown in tables 6.9 to 6.13. As previously explained, nesting the results in this way allows for an examination of the impact of the inclusion of each variable to the models. If the addition of a variable results in a large change in the coefficient of other variables in the model this suggests the possible existence of collinearity. As can be seen in the nested tables the addition of the pension increased variable impacts on some coefficients,

particularly for the head of household aged 65 or over variable. Intuitively, this makes some sense given the connection between age and pensions. It then becomes a choice of which to leave out of the model. In this instance I have elected to leave out the age variable as it looks to be insignificant anyway.

Table 6.10: Nested results of probit regression illustrating impact of addition of variables associated with households exit poverty – rural Scotland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
# in work in HH increased		0.777***	0.595***	0.611**	0.602**	0.588**	0.536**	0.516**	0.523**	0.988***
Increase in HoH employment income			0.405*	0.405*	0.408*	0.390*	0.421*	0.390	0.384	0.602**
Change from non-work to in-work HH				-0.027	-0.011	0.032	0.166	0.169	0.245	0.161
2nd job in HH					0.891***	0.769***	0.800***	0.764***	0.715***	0.805***
HH member had multiple jobs in previous year						0.733***	0.733***	0.700***	0.604***	0.611***
HoH female							-0.562***	-0.556***	-0.570***	-0.697***
HoH aged 65 or over								-0.154	0.119	0.051
Education level (ISCED scale)									0.207***	0.259***
Amount of HH benefit increased										1.044***
Constant	-0.131**	0.058	-0.003	-0.004	-0.092	-0.145	0.041	0.100	-0.611***	-1.462***
Observations	664	664	664	664	664	664	664	664	664	664
McFadden's Pseudo R^2	0.066	0.075	0.082	0.083	0.100	0.113	0.126	0.127	0.159	0.213
ll	-501	-424	-421	-421	-413	-407	-401	-400	-386	-361

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes.

Table 6.11: Nested results of probit regression illustrating impact of addition of variables associated with households exit poverty – rural Scotland (continued)

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
# in work in HH increased	0.986***	0.963***	0.966***	0.972***	1.000***	0.992***	0.961***	0.945***	0.945***
Increase in HoH employment income	0.559**	0.576**	0.557**	0.559**	0.436*	0.461*	0.459*	0.481*	0.507**
Change from non-work to in-work HH	0.178	0.211	0.196	0.193	0.231	0.238	0.317	0.333	0.262
2nd job in HH	0.791***	0.780***	0.769***	0.772***	0.743***	0.775***	0.798***	0.751***	0.770***
HH member had multiple jobs in previous yr	0.653***	0.663***	0.659***	0.664***	0.628***	0.598***	0.571***	0.576***	0.587***
HoH female	-0.655***	-0.651***	-0.595***	-0.591***	-0.667***	-0.671***	-0.583***	-0.602***	-0.548***
HoH aged 65 or over	0.033	0.063	0.089	0.090	-0.002	-0.022	-0.078	-0.125	-0.502**
Education level (ISCED scale)	0.249***	0.252***	0.244***	0.245***	0.235***	0.238***	0.260***	0.261***	0.235***
Amount of HH benefit increased	0.971***	0.961***	0.953***	0.953***	0.976***	0.986***	1.006***	1.011***	0.953***
HH started receiving any benefit	0.682	0.686	0.657	0.658	0.983**	0.985**	0.990*	0.975*	1.013*
SIMD Geographic Access domain score		0.005	0.004	0.004	0.003	0.004	0.003	0.004	0.003
Owned or company car in HH			0.003	0.003	0.002	0.002	0.002	0.002	0.001
Someone cares for handicapped in HH				0.048	-0.003	-0.028	0.014	-0.024	0.068
HoH subjective wellbeing improves (GHQ36)					-0.058	-0.128	-0.124	-0.120	-0.107
No longer possible psychiatric disorder in HH						0.331	0.319	0.330	0.334*
Single parent HH							-0.346	-0.323	-0.271
3 or more children in HH								-0.218	-0.102
HH pension income increased									1.101***
Constant	-1.416***	-1.630***	-1.801***	-1.811***	-1.625***	-1.632***	-1.639***	-1.611***	-1.563***
Observations	664	664	664	664	664	664	664	664	664
McFadden's Pseudo R^2	0.220	0.221	0.222	0.222	0.266	0.270	0.270	0.271	0.294
ll	-358	-357	-357	-357	-337	-335	-335	-334	-323

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes.

Table 6.12: Nested results of probit regression illustrating impact of addition of variables associated with households exit poverty – non-rural Scotland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
# in work in HH increased		0.877***	0.672***	0.746***	0.745***	0.704***	0.651***	0.693***	0.688***	0.917***
Increase in HoH employment income			0.761***	0.767***	0.747***	0.721***	0.711***	0.761***	0.773***	0.929***
Change from non-work to in-work HH				-0.126	-0.106	-0.097	-0.028	-0.040	-0.045	0.023
2nd job in HH					0.422***	0.405***	0.389***	0.430***	0.372***	0.492***
HH member had multiple jobs in previous year						0.264***	0.244***	0.279***	0.230**	0.298***
HoH female							-0.263***	-0.272***	-0.253***	-0.259***
HoH aged 65 or over								0.227***	0.286***	0.229***
Education level (ISCED scale)									0.087***	0.123***
Amount of HH benefit increased										0.862***
Constant	-0.320***	-0.280***	-0.369***	-0.369***	-0.391***	-0.409***	-0.271***	-0.346***	-0.579***	-1.296***
Observations	3339	3339	3339	3339	3339	3339	3339	3339	3339	3339
McFadden's Pseudo R^2	0.009	0.055	0.079	0.079	0.081	0.083	0.088	0.090	0.113	0.157
ll	-2452	-2132	-2079	-2079	-2073	-2069	-2058	-2053	-2001	-1903

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes.

Table 6.13: Nested results of probit regression illustrating impact of addition of variables associated with households exit poverty – non-rural Scotland (continued)

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
# in work in HH increased	0.915***	0.925***	0.906***	0.936***	0.981***	0.982***	0.981***	0.955***	0.996***
Increase in HoH employment income	0.927***	0.922***	0.925***	0.976***	1.020***	1.020***	1.020***	1.040***	1.060***
Change from non-work to in-work HH	0.025	0.006	0.055	0.036	0.028	0.027	0.028	0.034	0.004
2nd job in HH	0.485***	0.495***	0.437***	0.469***	0.493***	0.492***	0.492***	0.485***	0.542***
HH member had multiple jobs in previous year	0.293***	0.293***	0.283***	0.284***	0.280**	0.281**	0.280**	0.264**	0.286***
HoH female	-0.258***	-0.260***	-0.120*	-0.086	-0.117	-0.117	-0.116	-0.110	-0.109
HoH aged 65 or over	0.227***	0.229***	0.256***	0.296***	0.254***	0.253***	0.252***	0.189**	0.005
Education level (ISCED scale)	0.122***	0.124***	0.102***	0.111***	0.117***	0.117***	0.117***	0.123***	0.123***
Amount of HH benefit increased	0.853***	0.856***	0.880***	0.865***	0.897***	0.897***	0.897***	0.917***	0.915***
HH started receiving any benefit	0.095	0.096	0.051	0.055	0.074	0.075	0.074	0.025	-0.074
SIMD Geographic Access domain score		-0.007**	-0.007**	-0.006*	-0.007*	-0.007*	-0.007*	-0.005	-0.005
Owned or company car in HH			0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
Someone cares for handicapped in HH				0.633***	0.606***	0.605***	0.606***	0.637***	0.653***
HoH subjective wellbeing improves (GHQ36)					-0.085	-0.083	-0.083	-0.086	-0.082
No longer possible psychiatric disorder in HH						-0.010	-0.010	-0.002	-0.003
Single parent HH							-0.004	0.002	0.028
3 or more children in HH								-0.357***	-0.327***
HH pension income increased									0.560***
Constant	-1.290***	-1.213***	-1.408***	-1.537***	-1.500***	-1.499***	-1.498***	-1.495***	-1.540***
Observations	3339	3339	3339	3339	3339	3339	3339	3339	3339
McFadden's Pseudo R^2	0.157	0.158	0.165	0.174	0.231	0.231	0.231	0.234	0.241
ll	-1903	-1901	-1884	-1865	-1735	-1735	-1735	-1728	-1712

* $p < 0.10$, ** $p < .05$, *** $p < .01$

ll = Log Likelihood

Source: BHPS 1999-2008.

Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes.

Table 6.14: Probit coefficients from full models testing national and rural factors and their association with individuals exiting poverty (before housing costs) in non-rural and rural Scotland

	Non-rural Scotland		Rural Scotland	
# in work in HH increased	0.996***	(0.124)	0.945***	(0.290)
Increase in HoH employment income	1.060***	(0.098)	0.507**	(0.243)
Change from non-work to in-work HH	0.004	(0.157)	0.262	(0.360)
2nd job in HH	0.542***	(0.136)	0.770***	(0.269)
HH member had multiple jobs in previous year	0.286***	(0.110)	0.587***	(0.194)
HoH female	-0.109	(0.081)	-0.548***	(0.177)
HoH aged 65 or over	0.005	(0.105)	-0.502**	(0.236)
Education level (ISCED scale)	0.123***	(0.022)	0.235***	(0.055)
Amount of HH benefit increased	0.915***	(0.071)	0.953***	(0.169)
HH started receiving any benefit	-0.074	(0.138)	1.013*	(0.522)
SIMD Geographic Access domain score	-0.005	(0.004)	0.003	(0.003)
Owned or company car in HH	0.004***	(0.001)	0.001	(0.002)
Someone cares for handicapped in HH	0.653***	(0.114)	0.068	(0.236)
HoH subjective wellbeing improves (GHQ36)	-0.082	(0.058)	-0.107	(0.129)
No longer possible psychiatric disorder in HH	-0.003	(0.090)	0.334*	(0.198)
Single parent HH	0.028	(0.097)	-0.271	(0.264)
3 or more children in HH	-0.327***	(0.111)	-0.102	(0.198)
HH pension income increased	0.560***	(0.100)	1.101***	(0.213)
Constant	-1.540***	(0.118)	-1.563***	(0.317)
Observations	3339		664	
McFadden's Pseudo R^2	0.241		0.294	
ll	-1712		-323	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$
ll = Log Likelihood
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes.

In the previous two chapters I produced parsimonious or reduced form versions of my in-poverty and entering models in each case excluding non-significant variables. I have done the same here, retaining those variables associating with a household exiting poverty in either rural or non-rural Scotland (table 6.15). The removal of the non-significant variables, plus the two variables showing weak significance, has had very little effect on the goodness of fit (as measured by McFadden's R-squared) but in the case of the rural model, the gender variable is now significantly associated with a household exiting poverty.

In my parsimonious models we see that all of the variables that do show association with a household exit from poverty in rural Scotland also do so in non-rural Scotland with the single exception households headed by females. Individuals in rural Scotland households headed by females have a lower likelihood of exiting poverty in rural Scotland than their counterparts in households headed by men. No such head of household gender association exists among non-

rural households. The sign of all other coefficients are as may be expected. An increase in the number of working adults in the household for example associates with an increased likelihood of exiting poverty in both rural and non-rural Scotland. Having three or more children in a non-rural household looks to reduce the likelihood of exiting poverty for individuals in such households compared to those in households without three or more children.

Table 6.15: Coefficients of parsimonious Probit regression models showing association of factors identified in the literature with individuals exiting poverty (before housing costs) in rural and non-rural Scotland

	Non-rural Scotland		Rural Scotland	
# in work in HH increased	0.956***	(0.090)	1.093***	(0.220)
Increase in HoH employment income	1.015***	(0.089)	0.671***	(0.233)
2nd job in HH	0.500***	(0.130)	0.827***	(0.248)
HH member had multiple jobs in previous year	0.280***	(0.105)	0.678***	(0.191)
HoH female	-0.065	(0.070)	-0.586***	(0.151)
Education level (ISCED scale)	0.112***	(0.020)	0.253***	(0.044)
Amount of HH benefit increased	0.875***	(0.066)	0.997***	(0.163)
Owned or company car in HH	0.004***	(0.001)	0.003	(0.002)
Someone cares for handicapped in HH	0.677***	(0.101)	0.117	(0.220)
3 or more children in HH	-0.359***	(0.103)	-0.096	(0.182)
HH pension income increased	0.576***	(0.084)	0.976***	(0.197)
Constant	-1.595***	(0.093)	-1.844***	(0.260)
Observations	3339		664	
McFadden's Pseudo R^2	0.164		0.235	
ll	-1839		-347	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$
ll = Log Likelihood
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes.

Under one interpretation so hypothesis 6a, that poverty factors associated with a household's exit from poverty in rural Scotland are also associated with a household's exit from poverty in non-rural Scotland could be accepted. However, and in line with earlier models, the existence of variables not showing association with exiting poverty in both rurality domains results in the hypothesis being rejected.

Clearly, some of the variables in table 6.15 show differing strengths of association with exiting poverty across rural and non-rural Scotland. As with earlier models, these differences can be tested more formally by introducing interactions terms. Again, I am testing how the effect on the dependent variable of one explanatory or independent variable depends on the level of one or more other independent variables. I have again added the binary rurality variable as a main effect. Table 6.16 shows the results of models first without and then with all interaction terms included.

Table 6.16: Coefficients of Probit regression models, including all interaction terms, identifying transition factors associated with individual's exit from poverty (before housing costs)

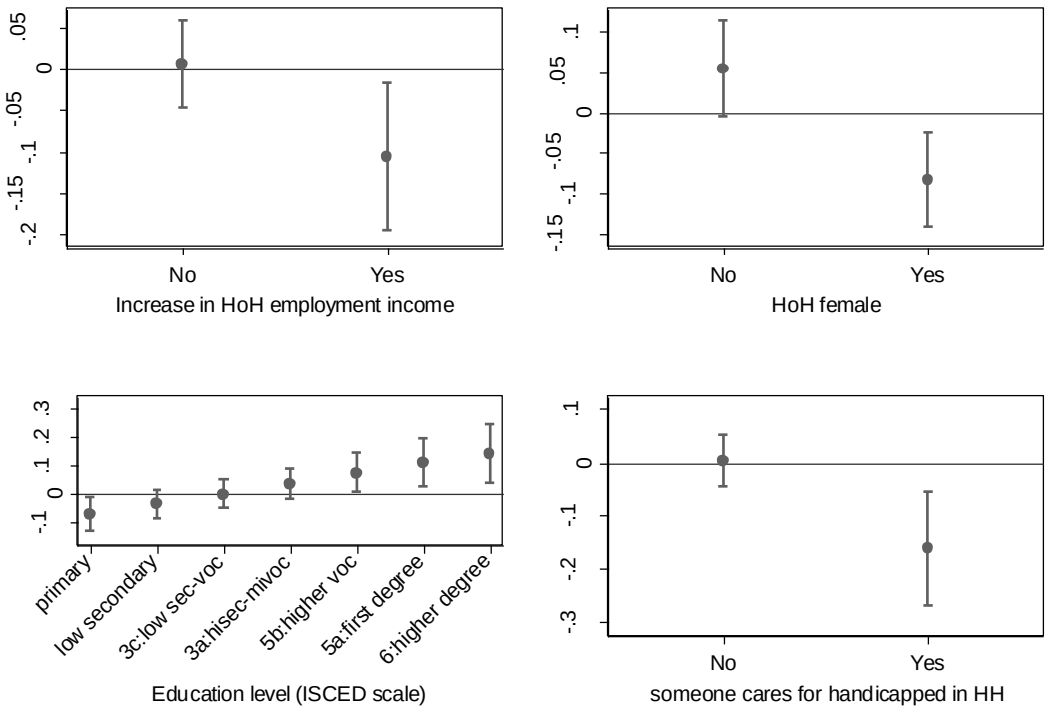
	All Scotland		Including interactions	
# in work in HH increased	0.955***	(0.082)	0.959***	(0.090)
Increase in HoH employment income	0.938***	(0.084)	1.022***	(0.089)
2nd job in HH	0.593***	(0.114)	0.502***	(0.130)
HH member had multiple jobs in previous year	0.376***	(0.091)	0.280***	(0.105)
HoH female	-0.138**	(0.063)	-0.066	(0.070)
Education level (ISCED scale)	0.136***	(0.019)	0.113***	(0.021)
Amount of HH benefit increased	0.891***	(0.061)	0.878***	(0.066)
Owned or company car in HH	0.004***	(0.001)	0.004***	(0.001)
Someone cares for handicapped in HH	0.562***	(0.090)	0.681***	(0.101)
3 or more children in HH	-0.297***	(0.092)	-0.361***	(0.104)
HH pension income increased	0.644***	(0.077)	0.579***	(0.085)
Rural Scotland	-0.018	(0.086)	-0.217	(0.271)
Rural Scotland # # in work in HH increased			0.111	(0.237)
Rural Scotland # Increase in HoH employment income			-0.370	(0.230)
Rural Scotland # 2nd job in HH			0.306	(0.263)
Rural Scotland # HH member had multiple jobs in previous year			0.375*	(0.216)
Rural Scotland # HoH female			-0.504***	(0.160)
Rural Scotland # Education level (ISCED scale)			0.136***	(0.049)
Rural Scotland # Amount of HH benefit increased			0.098	(0.164)
Rural Scotland # Owned or company car in HH			-0.001	(0.002)
Rural Scotland # Someone cares for handicapped in HH			-0.569**	(0.241)
Rural Scotland # 3 or more children in HH			0.280	(0.204)
Rural Scotland # HH pension income increased			0.375*	(0.206)
Constant	-1.626***	(0.087)	-1.600***	(0.093)
Observations	4003		4003	
McFadden's Pseudo R^2	0.175		0.182	
ll	-2203		-2186	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$
ll = Log Likelihood
Source: BHPS 1999-2008.
Notes: Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their income rises above 60% of median incomes.

Perhaps surprisingly given the poverty exit rates of table 6.2, the rural Scotland main effect in the All Scotland model of table 6.16, without the interaction terms, does not associate with individuals exiting poverty. A visual inspection of coefficients on the interaction model of table 6.16 suggests that some variables show statistically significant interaction with rurality. I have again used the *margins* and associated *marginsplot* commands to test for such interactions more thoroughly and to also obtain a visual interpretation of how the probability of exiting poverty varies across rural and the rest of Scotland for each of the variables in the parsimonious model of table 6.15. As can be seen in figure 6.2, individuals in households where the head has increased their employment income have a lower likelihood of exiting poverty

living in rural Scotland compared to those in non-rural Scotland. The same difference in likelihood of exiting poverty across the rurality domain applies to individuals in households headed by females or where someone is caring for a handicapped person in the household. Those individuals living in rural Scotland with higher levels of educational attainment look to have a statistically significant higher likelihood of exiting poverty than their non-rural counterparts. None of the remaining variable interactions show any significant marginal effects.

Figure 6.2: Average marginal effect of rurality on the probability of individuals exiting poverty (before housing costs) by head of household employment income and gender plus educational attainment (ISCED) and care of disabled in household



Notes: The likelihood of exiting poverty for factor variable value is significantly different by rurality if confidence interval does not include zero. Rural Scotland defined as settlements with a population of less than 3,000. Households exit poverty if their equivalised income rises above 60% of median incomes.

Given that these variables show significant difference in likelihood of exiting poverty across the rurality domain means that hypothesis 6b, the extent of association of each factor with a household's exit from poverty is the same in rural Scotland as it is in non-rural Scotland, can be rejected.

Conclusion and Discussion

The primary aim of this chapter was the testing of hypotheses 5, 6a and 6b. This involved testing that factors found in the literature show association with exit from poverty, when the Scottish Government definition of rural Scotland is applied to data from BHPS. In so doing, I have also examined the rates of exit from poverty for various sub-populations across the Scottish Government two category urban rural classifications. Data from BHPS suggests that, of those individuals in poverty in the previous year, their rate of exit from poverty is significantly higher in rural Scotland than it is in non-rural Scotland. As a result hypothesis 5, that the rates of exit from poverty in rural Scotland are the same as they are in the rest of Scotland, can be rejected.

Most of the sub-populations have shown no significantly different rates of exit from poverty by rurality. Single person household poverty exit rates show no significant difference by rurality (or by gender). Individuals in rural households with children exit poverty at a significantly higher rate than their non-rural counterparts but low numbers mean these results need to be viewed with a degree of caution. Poverty exit rates are similar among individuals in households with elderly members. There is a significant difference in the rates of exiting poverty among individuals in in-work households and households in fuel poverty. The rate of exit is significantly higher in rural Scotland in both variables, in the latter perhaps reflecting the higher levels of fuel poverty among rural households that are not income poor. A key observation from this analysis is the low numbers of sub-population individuals in the rural Scotland category, which is hardly surprising given that analysis in this chapter is restricted to individuals in poverty in any year, amounting to roughly 20 per cent of total cases each year. These low numbers also meant that the differences in transition rates by rurality were not formally tested by hypotheses and any inferences derived from the statistics shown should be carried out with a degree of caution.

In order to test hypotheses 6a and 6b it was necessary to create transition variables that identify the one-way change in factors that are typically associated with a household's exit from poverty. Comparative analysis has shown that some of these transition variables occur with varying frequency across the Scottish Government two category urban-rural classification. There are several transition variables that show a statistically significant difference. These are: an increase in the number of household members in employment; a rise in head of household employment income; a change from a non-working to an in-work household; households exiting fuel poverty; an increase in the amount of benefit a household receives; a car newly

available to household; a change from the possibility of there being someone in the household suffering possible psychiatric problems (GHQ12); households no longer being lone parent with dependent children; and an increase in household pension. All of these variables with the exception of exiting fuel poverty each occurred significantly less frequently in rural Scotland.

Hypothesis 6a tests that the change in poverty factors associated with an individual's exit from poverty in rural Scotland are also associated with an individual's exit from poverty in the rest of Scotland. Results from my parsimonious models, excluding non-significant variables, suggest that eight variables are associated with individuals in households exit from poverty in rural Scotland. All eight of these variables also show association with exit from poverty in non-rural Scotland. These common variables are:

- An increase in the number in household who are working
- Increase in head of household employment income
- Second job in household
- Household member had multiple jobs in previous year
- Head of household female
- Education level (ISCED scale)
- An increase in total household benefit
- Household pension income increased

Increasing the number in the household who are working increases the likelihood of exiting poverty regardless of rurality but, as the in-work poverty rates have shown in chapter 4, getting in to work is no guarantee of not suffering poverty, particularly in rural Scotland. In rural Scotland, individuals in households headed by women show decreased likelihood of exiting poverty compared to individuals in rural households headed by men. A further three variables show association with exit from poverty in non-rural Scotland only. These are: owned or company car available to household; care of disabled in household; and three or more children in the household. These and a few other variables were included in my models in their non-transition form given the very low number of transitioning events.

Again, the apparent mismatch in what rural Scotland meant in the literature and in the official Scottish government definition has shown itself in the number of variables showing association with exit from poverty in the BHPS data. Less than a half of the eighteen variables tested showed such association in rural Scotland and all showed association with exiting poverty in non-rural Scotland too. The remaining factors thought in the literature to be

associated with rural poverty show no such association when the Scottish Government definition of rural Scotland is applied. A possible explanation is that different definitions of rural Scotland have been used in the literature.

Under a narrow interpretation of hypothesis 6a, that **only** considered factors associated with exit from poverty in rural Scotland, it is possible to say that hypothesis 6a cannot be rejected, given that each of the variables associated with exit from poverty in rural Scotland were also associated with exit from poverty in non-rural Scotland. Three variables are associated with individuals in household exit from poverty in non-rural Scotland, but they do not show such association in rural Scotland. This would result in the hypothesis being rejected under a wider interpretation that included factors not showing association with exit from poverty in rural Scotland also not showing association in non-rural Scotland.

Some variables show statistically significant difference in their levels of association with exiting poverty by rurality. These are: increase in head of household employment income; head of household female; the level of highest education attainment; and care of disabled in household. With the exception of the education variable the remaining variables each suggest that individuals meeting their descriptions in rural Scotland have a lower likelihood of exiting poverty than their non-rural counterparts. Given that there are factors exhibiting this difference I can as a result say that hypothesis 6b, that the extent of association of each factor with a household's exit from poverty is the same in rural Scotland as it is in the rest of Scotland, can be rejected.

Chapter 7: Conclusions

Introduction

This thesis has been an attempt to better understand the extent of poverty in rural Scotland and how the factors associated with that poverty may differ in the rest of the country. In my first chapter I highlighted the paucity of research that focused on rural poverty, provided a historical perspective on poverty in rural Scotland from the late 17th century up to the end of the 20th century, and described the various theories surrounding poverty. Key to the understanding of the extent of poverty in rural Scotland is defining which areas of Scotland can be described as rural and just what poverty means. In chapter two I have identified from the literature various definitions of poverty, at a national level and for various sub-populations, and outlined the Scottish Government urban-rural classification system defining rural Scotland. I then described the method by which the Scottish Government identifies areas of Scotland experiencing the highest concentrations of poverty, illustrating that such a method is not suited to identifying poverty that is spatially dispersed, as it often is in rural areas.

All of the analyses in this thesis have been based upon the premise that in a free trade Liberal/Keynesian economy there are effectively two ways in which a household's 'income' can vary from one year to the next sufficient to move that household into or out of poverty. Either the household income changes directly, through changes in labour incomes for example, or there is a household change that impacts on the equivalising factor, e.g. becoming a lone parent or a change in the number of children in the household. In chapter two I identified factors of rural life meeting this premise, that have either been shown to be associated with poverty in rural areas of Scotland or exhibit different rates of occurrence across the urban-rural domain. I concluded chapter two with a short section identifying how secondary datasets have previously been used in poverty analysis.

This thesis was an empirical examination of poverty in rural Scotland that made use of longitudinal data. In chapter three, I described some of the advantages of using longitudinal over cross-sectional data in poverty analysis, and the selected datasets on which my analyses have been based. Also in this chapter, I described the data management steps carried out, the analytical methods employed, the methodological issues that can present themselves when using large datasets, and how these issues were addressed.

My data analysis was split across three chapters. In the first of these, chapter four, I used BHPS data to derive a GB-wide poverty line on which the poverty status of households and individuals for all models were based. Throughout most of this thesis a poverty line has been set at 60% of median household income, adjusted for household size and composition and converted to January 2010 prices, and rural Scotland has been defined as settlements and areas with a population of less than 3,000. These definitions have been used in chapter four to compare across the rurality domain the proportion of households, and in some cases individuals, in poverty for the general population and each of several sub-populations. The only exception to these poverty line and rurality definitions has been in the short section in chapter four assessing the sensitivity of poverty rates to various operationalisation changes to each definition. To test that the factors identified in the literature do show association with a household being in poverty when the Scottish Government definition of rural Scotland is applied to the data, probit regression models were created, with all factors as independent or input variables and the poverty status as the output or dependent variable. Prior to this I carried out a comparative analysis of the prevalence of each factor by rurality and by year. This was to first give some indication as to why the factor may have been regarded as showing association with rural poverty, and second to show how the factor prevalence changed year by year over the study period. More details of the results of these steps are included in the key findings section that follows.

My next two analysis chapters followed a similar layout but considered individuals moving into and out of poverty respectively. BHPS data is not suited to dynamic analysis at the household level so analysis for these two chapters was carried out at the individual rather than household level. The variables used in these analyses related to household or individual characteristics. The aim in these chapters was to test that changes in the factors identified in the literature show association with individuals entering or exiting poverty, when the Scottish Government definition of rural Scotland is applied to BHPS data. In chapter five I examined individuals moving into poverty. The rate of entry into poverty was compared across the rurality domain for the general population and sub-populations. I compared the rate at which the factors changed their status each year and also tested via probit regression models if these transitioning factors showed association with individuals entering poverty in both rurality domains. I then tested if the depth of these associations were similar in rural and non-rural Scotland. The same procedure was applied in chapter 6, this time with all of my analyses relating to individuals exiting poverty.

Key Findings

The equivalised GB-wide poverty line was around £140 per household per week in 1999, and gradually increased up to 2006 when it was £165 per household per week. Thereafter, the poverty line dropped slightly, down to just below £162 per household per week by 2008. Under the Scottish Government definition of rural Scotland the rate at which household income (BHC) was below 60% of median household income, has been consistently significantly lower in rural Scotland than in the rest of the country during this study period 1999-2008. The opposite appears to be the case across most of the rest of Europe. Using the same 60% of median income methodology to derive their poverty line, rural poverty in rural France, for example is 25% compared to 13% in cities, and in Portugal, in 2000, rural poverty was 33% compared to just 16% in urban areas (Bertolini et al. 2008). The key difference is how rural areas are defined in Scotland compared to these other countries, an issue that I examine further later in this chapter.

Even though the poverty line dropped from 2006 the proportion of households in poverty in rural Scotland actually increased, while the proportion in the rest of Scotland followed the pattern of the poverty line and dropped slightly. There appears to be an issue that occurred from 2006 that impacts on poverty levels in rural Scotland but not so in the rest of the country. Possible explanations for this contrast are given below.

The poverty rates by gender shown in this thesis are limited to single person households since poverty is typically measured at the household level in most national statistics so the main differences in poverty rates by gender reflect patterns within single adult households. It is clear from BHPS data that female single person households face significantly higher poverty rates than their male counterparts regardless of rurality.

Persistent poverty, those households below the poverty in the current year and in two of the previous three years, has also been shown to be consistently lower in rural Scotland. Conversely, in-work poverty, those households below the poverty line with at least one member in work, has been significantly higher, as has fuel poverty (households that spend more than 10% of their household income on household fuel). The Scottish Government policy on tackling in-work poverty appears to be centred on working with Scottish Business in the Community (SBC) to facilitate a programme of work to raise awareness of the effects of UK Government welfare reforms and what employers can do to help mitigate these impacts (Scottish Government 2015d). My results suggest that the task this collaboration faces is bigger

in rural rather than non-rural Scotland, and is perhaps not the most effective means of reducing in-work poverty in rural areas. Fuel poverty rates by year rose markedly from 2006, particularly in rural Scotland. Under the Scottish Government 8-fold urban rural classification, rural Scotland is made up of accessible rural, remote rural and very remote rural areas. It is possible that the rates in accessible rural areas will be bringing down this rural Scotland average fuel poverty rate, and households in the remote and very remote areas, with likely increased prices, limited fuel choice and poorer quality housing, are suffering even higher rates.

The rates of fuel poverty closely follow the price of household fuels and it is noticeable that the biggest rise in fuel poverty rates coincided with the jump in prices from 2005/6. It appears that the rise in fuel poverty rates from 2006 also coincide with the rise in proportion of low income households in rural Scotland, suggesting perhaps that fuel prices impact on household income among rural households much more than it does in the rest of the country. It is possible that this impact is more immediate in rural Scotland, but without data beyond 2008 it is not possible to test if the impact hits households in the rest of Scotland at a later time.

Data in BHPS suggested that expenditure on household fuels amounted to an average of £723 per year in non-rural Scotland, over the period 1999-2008. In rural Scotland over the same period the average was significantly higher, at £881 per year. Tellingly, rural households with income below the poverty line were on average spending more on their household fuel bills (£807 per year) than non-poor households in the rest of Scotland (£742 per year). Over 60% of income poor households in rural areas were also in fuel poverty. Among income poor households in the rest of Scotland the proportion in fuel poverty was just short of 45%. Assistance in the form of a winter fuel payment is provided to pensioner households by the UK Government. This is an age related payment (£200 per year, or £300 per year if over 80 years of age). Pensioner households in rural Scotland spend an average of £806 per year on household fuel compared to a much lower £638 per year in the rest of the country. While helpful to pensioner households the winter fuel payment is clearly of less benefit to rural households. Further financial assistance is provided by the UK Government in the form of the Cold Weather Payment scheme. Pensioner households and those on certain benefits are eligible to payments if certain local weather conditions are met. Again, these payments will be of less benefit to those households in rural Scotland that face high fuel costs through a combination of poor home insulation and being off the gas grid. A further issue is that the amount of benefit income

and the proportion of households receiving benefit is significantly lower in rural Scotland households.

Also coinciding with the increases in the proportion of households in poverty and in fuel poverty from 2006, is a reduction on expenditure on food, an increased proportion of workless households and a rise in benefit income in rural Scotland. It is possible that rising fuel prices make employment, perhaps in low paid work, less financially beneficial or attractive for a proportion of rural households.

Perhaps surprisingly, none of the variables linked to factors identified in the literature show association ($p<0.05$ in table 4.17) with a household being in poverty in rural Scotland **only** (when rural Scotland is as defined by the Scottish Government urban-rural classification). Those variables that do show association in rural Scotland also do so in the rest of the country. The variables that show association with a rural **and** a non-rural household being in poverty are: working household; head of household employment income; head of household female; household benefit amount; food poverty; fuel poverty; having access to own or company car; the SIMD geographic access domain score; single parent households; three or more children in household; head of household educational attainment; and pensioner age in household.

Some variables showed association with a household being in poverty **only** in non-rural Scotland. These were: household member had multiple jobs in previous year; second job in household.

The introduction of rurality interaction terms to my parsimonious models (that excluded non-significant variables) allowed the testing of the differences in the strength of association of each factor variable with a household being in poverty in rural and non-rural Scotland. Several of the factor variables did show such difference (and therefore suggesting separate poverty alleviating policies may be appropriate that target these factors in rural and non-rural areas). My analysis has shown different categories or values within each variable exhibit a significant difference in their association with a household being in poverty across the rurality domain. These variables, and their significantly varying values were: head of household employment income in the range £0-170 per week; household benefit income below £70; head of household male; household not in fuel poverty; no car available to household members; household types other than single parent; and head of household educational attainment (above low secondary).

Where the head of household income is less than £170 per week the likelihood of poverty among rural households is significantly lower than in non-rural households where the head of household also has a low employment income. Among this low paid group this suggests alternative household income contributions in rural areas, perhaps other members of the household contributing to the household income 'pot' to a greater extent than their non-rural counterparts, sufficient to bring the total income above the poverty line. Similarly, rural households receiving benefit income less than £70 have a lower likelihood of being in poverty than their non-rural counterparts claiming benefit in this range. The head of household educational attainment at or below low secondary shows no significant difference by rurality, but above this level it does, suggesting the level of association varies by rurality among the more educated head of households.

Repeating poverty rate analysis with different poverty lines (but with the definition of rural Scotland unchanged) suggests a higher proportion of rural households have income that is above but close to the official 60% of median poverty line than non-rural households. Analysis of poverty rates with rurality defined by a 10,000 rather than 3,000 settlement population (and poverty line at 60% of median) emphasises that fuel poverty is highest in the smallest settlements, those most likely to be off the gas grid network. Revising the rurality definition in this way also suggests that persistent poverty is higher in small towns with settlement size between 3,000 and 10,000 than in the previously defined rural Scotland.

The likelihood of an individual entering poverty averaged around 8% regardless of rurality. The rates in both rural and non-rural Scotland showed a downward trend until they started rising again around 2006. A comparison of poverty entry rates among most of the various sub-populations proved inconclusive due to the low number of households defined as rural Scotland. The exceptions were entry into poverty by female single person households and individuals in households in fuel poverty. Entry into poverty by female single person households was significantly lower in rural compared to non-rural Scotland. Individuals in households in fuel poverty entered income poverty at a significantly lower rate in rural Scotland. The lack of sufficient households and individuals in rural Scotland on which to derive statistically robust conclusions is an issue that has repeatedly presented itself during this research and is an issue I discuss further in a later section.

My examination of individuals entering and exiting poverty required the creation of variables marking the change from one year to the next of the poverty related factors identified in the literature. The rates of transition for each of these variables were then compared across

the rurality domain. In the entering poverty model, perhaps unsurprisingly, the rate of transition in the variable identifying individuals in households entering fuel poverty is significantly higher in rural Scotland. Evidence suggests that household fuel price rises impact on rural households faster than they do on households in the rest of the country. Also in this entry into poverty model, someone in the household developing a subjective well-being score that suggests the presence of possible psychiatric disorder occurs significantly less frequently in rural Scotland. Households becoming lone parent with dependent children also occurred less frequently in rural Scotland.

In the entry into poverty probit regression model of table 5.15 none of the factor variables showed association with individuals entering poverty in rural Scotland only. Several of the variables showed association with an individual's entry into poverty in both rural and non-rural Scotland. These were: number in work in household decreased; Drop in head of household employment income; Second job in household; Household benefit income decreasing; Education level (on the ISCED scale); Owned or company car available to household; Presence of possible psychiatric morbidity in household; Three or more children in household; and Household pension income decreasing

All of these variables also associate with individuals entering poverty in non-rural Scotland. In addition, the variables household member had multiple jobs in previous year, care of disabled in household and single parent households were also associated with individuals in non-rural households entering poverty.

The addition to my entry into poverty model of interaction terms, to identify variables showing significantly different levels of association with entry into poverty across the rurality domain, identified two variables, a decrease in the number of household members in work and the presence of possible psychiatric morbidity in a household (identified by the change in individual's GHQ12 score). In both variables the probability of entering poverty is significantly lower among individuals living in rural compared to non-rural Scotland.

The proportion of individuals in households exiting poverty in any year, as a proportion of those in poverty in the previous year, is significantly higher in rural Scotland, averaging 39.6% throughout the study period compared to 33.1% in the rest of the country. Among the sub-populations, three groups have shown significantly different rates of exit from poverty by rurality. The rate of exit from poverty among individuals in households with children averages at 36% across Scotland, higher than the general population poverty exit rates. Among rural

households the average is 49%, a statistically significantly higher rate than non-rural Scotland (34%). There are also significant differences in the rates of exiting poverty among individuals in in-work households and households in fuel poverty. The rate of exit is significantly higher in rural Scotland in both variables, in the latter perhaps reflecting the higher levels of fuel poverty among rural households that are not income poor.

As with the entry into poverty analysis the rates that transition variables changed were compared across the rurality domain, this time with the transition variable reflecting the typical change commensurate with an individual exiting poverty. There are several transition variables that show statistically significant difference in their occurrence across the rurality domain. These were: number in work in household increased; a rise in head of household employment income; a change from non-work to in-work household; an increase in the amount of benefit a household receives; households exiting fuel poverty; a car newly available to household; a change from the possibility of there being someone in the household suffering possible psychiatric problems (GHQ12); households no longer being lone parent with dependent children; and an increase in household pension income. Household benefit increase occurs significantly less frequently among rural individuals, perhaps reflecting lower levels of fluctuation in benefit incomes among some households in rural Scotland or rural households are not applying for benefits when they could. A move to healthier GHQ health scores in the household and a change from a lone parent household with dependent children both occur significantly less frequently among rural individuals. These differences are probably explained by lower levels of poor GHQ scores and lone parent households in rural Scotland. Individuals cannot move from these states if they are not in them in the first place. All of the transition variables showing significant difference occur less frequently in rural Scotland, with the exception of individuals in households exiting fuel poverty.

Results from my parsimonious models of table 6.15, excluding non-significant variables, suggest none of the transition variables showed association with an individual exiting poverty in rural Scotland **only**. Eight variables are associated with an individual's exit from poverty in rural Scotland and all of these variables also show association with exit from poverty in non-rural Scotland too. These common variables are: an increase in the number in household who are working; an increase in head of household employment income; second job in household; a household member had multiple jobs in previous year; head of household female; education levels as measured on the ISCED scale; an increase in total household benefit; and household pension income increased. A further three variables show association with exit from poverty in

non-rural Scotland only. These are: owned or company car available to household; care of disabled in household; and three or more children in the household.

The addition of interaction terms to my exit from poverty models, to identify transition variables showing significantly different levels of association with exit from poverty across the rurality domain, has identified some variables that meet these criteria. These are: head of household employment income; head of household female; the level of highest education attainment on the ISCED scale; and care of disabled in household. An increase in head of household employment income appears to have less impact on rural individuals exiting poverty than among individuals living in non-rural Scotland. With regard to the educational attainment of the head of household, my marginal effect analysis suggests that it is at the upper end of educational attainment that rural individuals are significantly more likely to exit poverty than their non-rural counterparts. Individuals in rural households with care of disabled person responsibilities look to have a significantly lower likelihood of exiting poverty than their non-rural counterparts. Of some surprise in my results is that moving from a non-working to a working household shows no association with exiting poverty in rural and non-rural Scotland in the regression models of table 6.14. This perhaps suggests movement has been into low paid work and the household remains in poverty.

Again, the apparent mismatch in what rural Scotland meant in the literature and in the official Scottish government definition has shown itself in the number of transition variables showing association with an individual's exit from poverty when examined in BHPS data. Only a small number of the eighteen variables tested showed association with exiting poverty in rural Scotland, and all of those that did also showed association with household exit from poverty in non-rural Scotland too.

Reflections

Previous Research on Rural Poverty in Scotland

During my research it has become evident that some of the previous research identifying factors linked to rural poverty in Scotland has used a definition of rural Scotland different to the current definition used by the Scottish Government. This could have important ramifications if poverty alleviating policies were put in place that addressed factors erroneously associated with poverty, be that nationally or by rurality. In chapter two I highlighted the comments of Lord Smith who talks of 'astonishing poverty' in rural areas such as Peebles and Galashiels.

Neither of these towns are considered rural under the present Scottish Government urban-rural classification. Peebles, with a population in 2011 of 8,376 is considered a 'remote small town', while Galashiels with a population of 14,994 is classified as 'other urban area'. An examination of the population counts for several other settlements around Scotland perhaps illustrates this problem. Lerwick for example had a population of around 7,500 in 2011, which under the Scottish Government urban-rural classification is regarded as a remote small town, i.e. not classified as rural. Yet in some of the research discussed in my review chapter, the Shetland Islands are considered as rural Scotland. Similarly, other small towns that fall into the 3,000 to 10,000 classification, such as Oban (population 9,974 at 2011 census), Thurso (7,933) and Dingwall (5,491), were considered as rural in some of the earlier research that was reviewed in Chapter 2.

It has also become evident that not all of the factors identified in previous research have actually been tested empirically for their association with rural poverty, regardless of the definition of rural Scotland used. Such testing needs to take account of all other factors, not simply be a comparison of rates of prevalence across the rural non-rural divide. In this thesis I have attempted to do both, compare rates of occurrence of each factor and test more robustly through regression analysis, any association these factors exhibit with rural poverty.

Is Poverty in Remote Scotland being ignored?

The research in this thesis has highlighted how some of the factors associated with a household being in poverty can exhibit large rural/non-rural differences. However, what could be obscured are even larger differences within each classification rather than between them. Such an issue can lead to results that 'feel wrong' (Pateman 2011). An issue then is how rural is defined. Another relates to whose poverty should we really be looking at. Many problems with a classification such as used here are discussed in Beynon et al. (2015) for example. The testing of the hypotheses described above has been carried out by applying the current Scottish Government definition of rural Scotland, i.e. all settlements and areas with a population of less than 3,000 inhabitants. In this thesis I argue that such a simple definition of rural Scotland is deficient when used to examine and compare poverty levels generally and among vulnerable sub-populations across Scotland. My results also suggest that poverty analysis in Scotland should compare and contrast a different urban rural typology, perhaps one based on remoteness rather than rurality.

A closer examination of the categories that make up the settlements with a population of less than 3,000 may offer some explanation as to why my results have been so inconclusive. The 8-fold Scottish Government Urban/Rural Classification includes three categories with populations of less than 3,000 people: accessible rural within 30 minute drive of a settlement of 10,000 or more; remote rural with a drive time of 30 to 60 minutes to a settlement of 10,000 or more; and very remote rural with a drive time of over 60 minutes to a settlement of 10,000 or more.

An analysis of the 1999-2000 Scottish Household Survey (SEERD 2003) shows accessible rural areas having household income distribution markedly different to other areas of Scotland. In particular, a smaller proportion of accessible rural households have income in the two lowest income ranges than any of the other urban-rural categories, plus a higher proportion than anywhere else in the highest income band. In contrast remote rural Scotland income distribution is very similar to Scotland as a whole. This study of data from the Scottish Household Survey estimated that just over a quarter of households in Scotland had an annual net income of over £20,000, while in accessible rural areas this rose to 35% (SEERD 2003). In 2005, the average household income in accessible rural areas was £22,010, 14% higher than the national average (OECD 2008). The OECD report goes on to highlight the significant divide between remote and accessible rural areas in terms of ageing, out migration, poor economic performance and access to modern services.

The Scottish Executive report (SEERD 2003) also notes that employment rates were highest in accessible rural areas of Scotland. A possible impact of these issues is that the inclusion of accessible rural settlements in the rural Scotland classification could effectively be hiding poverty and impacting on the regression models, perhaps indicating that an alternative breakdown of the urban-rural classification may be a better option. In England and Wales for example, under their urban-rural classification system all settlements under 10,000 population are classed as rural (Bibby & Brindley 2013; Pateman 2011). Under this classification system remote small towns, discussed in the previous section, would be included. Another alternative may be to re-classify the urban-rural typology to one based on remoteness from settlements larger than 10,000 population. BHPS data suggests poverty in remote small towns is higher than elsewhere in Scotland, perhaps supporting the assertion of Lord Smith discussed in the previous section. The caveat to this of course is the very small number of households in this classification, an issue discussed further in the next section. A more radical approach may be to

come up with an entirely different classification, perhaps one based on the constellation method (Beynon et al. 2015) or that employed by the OECD (OECD 2008).

Data Issues

My analysis of poverty rates and the rate of entry into and out of poverty for various sub-populations has highlighted that the BHPS dataset needs to include more households in rural Scotland. Also, for a better understanding of poverty in **remote** areas of Scotland, datasets such as BHPS also needs to include more households in these areas. To illustrate the lack of households in BHPS in remote areas, of the 1624 households across Scotland that made up the total in this study in 1999, 32 are in remote rural and 37 in very remote rural Scotland. The numbers in the remote and very remote small town classifications are even lower. I would have liked to have carried out analysis for each of these classifications but the numbers in each make robust analysis questionable. One extra household in poverty would have a relatively large impact on the poverty rate in any one of these urban-rural classifications. Even with the larger numbers in the rural Scotland classification I would be more comfortable with some of the results of my analyses of chapters four, five and six, particularly among the sub-populations such as children and the elderly, had there been a higher number of households in these groups.

High rural transport cost was identified in the literature as an important factor of life in rural Scotland. Unfortunately, the coverage of transport related issues such as cost and availability in BHPS is poor. Data is collected on household fuel expenditure but as far as I am aware similar data on transport costs is not asked of respondents. If such data was available then an indicator such as Car Related Economic Stress (CRES) could be used to identify households spending a disproportionate amount of their income on car related travel (Mattioli et al. 2016). BHPS data have shown that almost two thirds of rural Scotland households with income below the poverty line own a car, compared to less than a third of poor households in the rest of Scotland. The typical costs associated with running a car will be likely therefore, to take up a portion of the low income of poorer households in many more instances in rural households than in households in the rest of Scotland.

The break in available BHPS data for 2009, prior to the survey's amalgamation into the Understanding Society study, meant that the impact of the events that happened around that time could not be examined. Had the BHPS continued without the break then two years of data would probably have been available for my study, and events such as the banking crisis may

have been reflected in my analysis. It may have proved beneficial to include what was at the outset of my study the one year of available data (for 2010) from the Understanding Society dataset but as explained in an earlier chapter its inclusion would have posed considerable data management issues and following supervisor advice was not included.

Methodology Issues

In this short section I reflect on some of the methodology issues that have come to mind during this research. The first relates to when current household income is measured and just how stable that income is throughout the year. The income measure is a snapshot in time, in the month prior to interview. In that particular month the household income could have hit a year peak (or trough), or been a one-off amount completely unlike the income in the other 11 months of the year. Such fluctuations will impact on a household's poverty status. My results plus those of previous longitudinal analysis on household incomes has shown households move into and out of poverty much more frequently than suggested in cross-sectional data. Fluctuating household income throughout the year would suggest even more movement into and out of poverty than is suggested in snapshot measures such as those used in BHPS. Also, when considering the durational element of poverty there is no way of knowing just how long ago a change in income initially took place resulting in crossing the poverty line. It could have been the month prior to the interview, or indeed at the end of month of the interview on the previous wave, i.e. almost 12 months earlier. Similarly, factors that impact on the equivalising scale could have occurred at any time throughout the year.

A further issue is that it is possible that an aggregated household measure of income obscures possible unequal distribution of resources within the family unit. Implicitly, all members within poor households experience equally the deprivation caused by poverty but evidence suggests this is not the case with most of the burden falling on women (Graham 1987). Given this, it may be appropriate to consider estimating separate models for men and women in any future research of the type employed in this thesis.

Another issue is that a broad household income poverty measure, as defined as 60% of median household income, does not account for households that face living expenditures outside of the norm. Poverty is not just about low income. Income measures fail to take account of differences in the cost of living or differences in expenditure preferences. It is also about living costs and purchasing power. A recent study suggests remote rural populations in Scotland face household grocery bills that are considerably higher than their urban

counterparts (Dumfries & Galloway CAS 2008). I have shown with data from BHPS that households in rural Scotland incur higher household fuel costs than their urban counterparts and consequently such households, perhaps with an income just above the poverty line, can be financially worse off than some urban households with income below the poverty line, after these cost of living items have been accounted for. Incorporating living costs and differences in expenditure patterns is a possible area for future research. Some ideas on how this could be achieved are discussed in the next section.

One of the reasons often cited for a drop in population in rural areas is households moving to find employment. If this was happening among BHPS households then this would likely be reflected in the number of households moving between the rural and non-rural Scotland classifications. In the section on attrition (in chapter 3), I showed that the number of households with a classification change was very small. The total number actually included those households whose classification changed through their settlement population increase/decrease or through improved commuter times from centres of population of 10,000 or more, so the number migrating for employment looks to be small indeed. Of course, attrition among the low paid would impact on these numbers. However, as described in chapter 3, the magnitude of the impact of attrition has been found to be small (but not ignorable). In chapter 3 I described how longitudinal weights have been designed in BHPS to help adjust for the attrition issue. In an effort to identify if attrition was an issue for my analysis I tested the early hypotheses of chapter 4 with and without weights and noted that my conclusions across all of these hypotheses was the same regardless of weighting used.

Ideas for Further Research

Few of the factors identified in the literature actually show association with a household being in poverty in rural Scotland when the Scottish Government definition of rural Scotland is applied to BHPS data, and most of those that do also show similar association in the rest of the country. When applying household income as a measure of poverty there looks to be little difference across the rurality divide in the factors that associate with poverty when rural Scotland is defined as settlements with less than 3,000 population. This perhaps suggests that it is not poverty in rural Scotland that needs comparing with that in the rest of the country but some other urban/rural divide. In the reflections section above I noted that BHPS data suggests poverty in remote small towns is higher than elsewhere in Scotland. I suggest that attempts be made to identify how factors associate with poverty in remote areas of Scotland, including the small town category. To do that with BHPS data would require considerable enlargement of the

number of households in remote Scotland. It is possible that the various datasets and possible linkages within the Understanding Society Longitudinal Study may offer more scope to undertake such a study.

In my reflections section above, I also noted that an income based poverty measure does not account for the higher living expenses in rural Scotland. One possible way of assessing the poverty impact of these increased living expenditures for rural households is to artificially adjust the poverty line for these rural areas. An assumption in doing so is that all rural households have made these same expenditures which in reality is unlikely. An interesting side effect of doing this is observing the sensitivity in poverty rates as the poverty line is altered. Do more rural households have incomes that are very close to the poverty line? Would a small change in the poverty line impact on a higher proportion of households in rural Scotland? The sensitivity analysis I carried out in chapter 4 suggests a positive response to both of these questions.

An alternative to artificially altering the poverty line is to calculate the household income that remain after the known major expenses have been deducted. To an extent this has already been done in the supplementary BHPS household income data. Here deductions were made for tax, national insurance, pension contributions and local taxes. In the bulk of my analyses I have used the before housing costs household income. I have also examined the impact on poverty rates of using the after housing cost (AHC) household income data but suggest that future research could be carried out in more detail on AHC household income, also deducting from this any major household costs that are gathered in BHPS. An example of this extra deduction could be the sum of the various household fuel expenditures. Doing so would effectively be an After Fuel Costs (AFC) income measure. The typical poverty analysis could then be performed on this available income measure rather than on an income measure of which a sizeable proportion is already 'spent'.

In earlier chapters of this thesis I suggested some areas for possible future research. Some have been covered here already but the inclusion in future work of Hills' fuel poverty measure (Hills 2012), further analysis of the impact three or more children has on poverty, and the inclusion of tax and the benefit system may prove revealing. The latter could be particularly beneficial if Scotland eventually gains independence from the United Kingdom.

An analysis of structural changes in any industry and how such changes directly impact on poverty levels was beyond the scope of this thesis. Such data is anyway not available within

BHPS. However, the knock-on effect of such changes will have been felt at the household level, particularly in terms of overall household employment & income, and such information is captured in the BHPS dataset. It would perhaps be revealing to examine any structural changes in agriculture, and in particularly their impact on rural poverty in Scotland. This looks to be an area worthy of further research. Further areas for future research are examining the impact on poverty in rural Scotland of the recent powers devolved to the Scottish Government, following the recommendations of the Smith Commission, and the UK exit from the European Union.

Concluding Remarks

In my opening chapter I used the title of a report by McKendrick et al. (2011) to illustrate just how little research and policy had been applied to rural poverty in Scotland; our rural numbers really are 'not enough'. The report highlighted: an absence of a rural focus in publications and reports; the limitation of only providing aggregate data on 'rural Scotland'; the limitation of Scottish rural samples in UK national surveys; the inadequacy of current indicators and indicator sets; the inappropriate use of data; and the under-utilisation of what we already have. During my thesis I have also encountered many of these issues. It is not all doom and gloom though. Since I started this study the PSE and MIS studies have both been extended to include more households in rural Scotland and results have been published by both organisations that centred on the plight of households in rural and remote Scotland.

In terms of factors thought to be associated with poverty in rural Scotland the results of my thesis perhaps say more by what they do not reveal than by what they do. Very few factors uniquely associate with rural poverty, which perhaps reflects the picture of similarity and continuity across the urban rural spectrum that emerged from the most recent PSE study of poverty and social exclusion in rural and urban Scotland (Bailey et al. 2016). In my analyses, the lack of factors that uniquely associate with poverty in rural Scotland could also suggest that such poverty analysis has had the wrong emphasis, that it is not rurality (as currently defined) that makes poverty different to that in the rest of the country, perhaps remoteness is the key. Results could also suggest that actually, many of the factors associated with poverty are the same wherever you are in Scotland, and similar to the results of Bailey et al. (2016). To rule that out, further analysis needs to be carried out examining factors associated with poverty in remote areas of Scotland, including small towns with populations up to 10,000 people. To do that though requires considerable investment in the gathering of more survey data from households in these areas.

What my results have shown is that there is considerable movement into and out of poverty. It would appear that for a large proportion of the population, be that rural or non-rural, household incomes are not far from adhering to Adam Smith's assertion that wages fluctuate around the subsistence level (Smith 1776). Poverty rates, based on a percentage of median household income, as they have been measured throughout this thesis, are a result of income inequality. The UK and Scottish Governments make great play at striving for economic growth (Department for Business Innovation & Skills 2011; Scottish Government 2015c) but there are various different theoretical frameworks that point to different factors explaining why inequality can hinder economic growth (Bourguignon 2004; Ehrhart 2009). One is that there are issues particular to countries and regions through which inequality slows down the pace of growth (Guidetti & Rehbein 2014). An examination of the issues contributing to inequality in Scotland as a whole and in rural Scotland in particular would be an interesting area for further research.

Given the results of many of the analyses in this thesis it would be quite possible for the issue of rural poverty to slip back under the radar among researchers & policy makers, and perhaps unsurprisingly the absence of a rural focus is still evident in very recent publications. In the Joseph Rowntree Foundation publication 'A Scotland without Poverty' (McCormick 2016) there was just one reference to rural Scotland in the whole document, and this was in reference to the paucity of affordable housing in some areas. To slip back under the radar would be a huge mistake. Even with the 'aggregated rural Scotland' data, BHPS data suggests that in-work poverty and fuel poverty are both significantly higher in rural Scotland and how shocks in household fuel prices appear to impact on fuel poverty levels, household worklessness, and the resulting increase in benefit income much more quickly and to a greater extent in rural Scotland. These findings relate to a definition of rural Scotland as settlements of less than 3,000 people. This is a definition of rurality that is unique in the United Kingdom, and as such does not allow for easy comparison across the home countries. My analysis suggests that such a definition is also not the most appropriate for meaningful poverty analysis in the wider 'rural' Scotland. In particular, my results suggest that among some sub-populations, poverty rates vary considerably among the Scottish Government urban-rural classifications, suggesting a more targeted approach to poverty reduction could be beneficial. Tentative examples suggested from my results are pensioner households in small towns and fuel poverty among remote households. To be able to back up ideas such as these with analysis resulting from BHPS data would require an enlarged dataset boosted by additional sample members in remote rural, very remote rural and remote small town Scotland.

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Appendices

Appendix A: Summary of Datasets Containing Data Covering Scotland

Listed below are brief descriptions of the datasets that hold survey data relating to Scotland. All of these datasets had been considered as possible sources of data for this thesis. Most of the information relating to the existence and holdings of these datasets has been drawn from (Williamson & King-Hele 2010).

Annual Population Survey (APS) and Labour Force Survey (LFS) - The Labour Force Survey collects information on the UK labour market and is the primary source for unemployment estimates. The survey publishes results monthly and the combined annual sample is known as the Annual Population Survey. In 2008 these datasets were incorporated into the Integrated Household Survey (IHS) and in 2011 four questions on subjective well-being were added to the questionnaires and these were used by me in an initial analysis of well-being by geography and income (not included in the final thesis).

British Household Panel Survey/Understanding Society (BHPS/UKHLS) - Understanding Society captures important information every year about the social and economic circumstances and attitudes of people living in 40,000 UK households (nearly 4000 in Scotland). It also collects additional health information from around 20,000 of the people who take part. The sample is made up of everyone living at selected addresses, even if they move home to another part of the UK. Information is also collected on all new household members. Interviews began in 2009 with all eligible members of the selected households. The British Household Panel Survey (BHPS) was incorporated into UKHLS from the second wave of interviews. It had been launched in 1991 and had 18 waves of data, the last wave in 2008. BHPS and UKHLS both include questions from other surveys (such as FES below) to increase cross-comparability.

Growing Up in Scotland (GUS) - Growing Up in Scotland is a study that follows the lives of a sample of Scotland's children from infancy through to their teens. This is one of the largest longitudinal studies ever done in Scotland and will provide information that will help develop policies affecting children and their families in Scotland. GUS started in 2005 with around 8000 recruits while a second cohort of around 6000 babies was planned for 2011.

General Lifestyle Survey (GLS) - The General Lifestyle Survey covers the whole of Great Britain and collects data on five core topics - education, employment, health, housing, and population & family information. Other areas such as leisure, household burglary, smoking and drinking are covered periodically. The Scottish sample includes nearly 900 households and more than 1600 individuals. This was up until recently called the General Household Survey (GHS) and is now a module of the Integrated Household Survey (IHS). The GLS is used to inform the PSE2012 study.

Scottish Continuous Recording System (SCORE) – This dataset contains details of all lettings by Registered Social Landlords in Scotland. The data is longitudinal at the level of the RSL or neighbourhood but data on the address and identity of the tenant is not recorded. Recorded are the demographic characteristics of tenant households; the pathway by which a household has become a RSL tenant; the financial profile of tenant households; the type and condition of the property being let; the financial aspects of the let being made, including rent and affordability. In particular, SCORE allows for the analysis of low demand for social housing in an area.

Millennium Cohort Study (MCS) - The Millennium Cohort Study was launched in 2000 with a sample drawn from all live births over 12 months from September 2000. The initial cohort included 2370 babies in Scotland. The study holds information on household characteristics, child development, service use and environmental situations. The data from this cohort study can be used in conjunction with early cohorts from 1946 (NSHD), 1958 (NCDS) and 1970 (BCS).

Wealth and Assets Survey (WAS) - The Wealth and Assets Survey is a longitudinal survey that started in 2006 collecting information about the economic well-being of households and individuals in Great Britain. In particular the survey asks people about their assets and liabilities in order to estimate household and personal wealth. The initial sample in Scotland was 4867 households but was restricted to the Scottish lowlands which is a disadvantage given that the Highlands and Islands, which together amount to a huge swathe of rural Scotland, are not included.

Annual Survey of Hours and Earnings (ASHE) - formerly the New Earnings Survey (NES), this provides information about the levels, distribution and make-up of earnings and hours paid for employees within industries, occupations and regions. The total Scottish sample is around 12,500 every year.

Families and Children Study (FACS) – this was initially called the Survey of Low Income Families (SOLIF) and although the sample size in Scotland is small (around 700) the dataset includes some of the groups vulnerable to poverty described in chapter two, e.g. lone parents.

Life Opportunities Survey (LOS) - The Life Opportunities Survey is a longitudinal survey that aims to measure people's use of local facilities, including public transport and health services, and their participation in leisure activities and employment opportunities. This began in 2009 with a Scottish sample size of 3375 households and while useful in any analysis on social isolation or exclusion has not been used in this thesis.

Scottish Household Survey (SHS) - The survey, which started in 1999, gathers information about the characteristics, attitudes and behaviour of Scottish households and individuals on a range of issues. A geographically representative sample of around 31,000 is interviewed over a two year period. While on an internship with the Scottish Government during the second year of this studentship I analysed the SHS and helped publish a topic report on Mental Health in Scotland (Wilson et al. 2015).

Scottish House Condition Survey (SHCS) - This is the largest single housing research project in Scotland, and the only national survey to look at the physical condition of Scotland's homes as well as the experiences of householders. This is a good source of fuel poverty estimates and some results from this survey have been discussed in this thesis. Since 2012 the SHCS has become an integrated component of the Scottish Household Survey.

Census 2011 - The Census collects information every ten years about the characteristics of people and households in Scotland.

Scottish Social Attitudes Survey (SSAS) - The Scottish Social Attitudes Survey was launched by the Scottish Centre for Social Research (ScotCen) in 1999, following the advent of devolution. Its aims are to facilitate the study of public opinion and inform the development of public policy in Scotland. Between 1,200 and 1,500 people are interviewed each year on a range of topics.

Family Resources Survey (FRS) - The Family Resources Survey has been running since 1992, covers the whole of the United Kingdom and collects information on the income and circumstances of private households. The survey is a primary source for poverty estimates.

Living Costs and Food Survey (LCFS) - This survey has gone through a few name changes and amalgamations. In April 2001 the Family Expenditure Survey, which had data for the years 1961-2001, and the National Food Survey (1974-2000) were combined to form the Expenditure and Food Survey (EFS). From January 2008 the EFS became the Living Costs and Food Survey and a module of the Integrated Household Survey (IHS). The LCFS covers the whole of the United Kingdom and primarily collects information on household expenditure on goods and services and household income.

Scottish Neighbourhood Statistics (SNS) – this is the Scottish Government's programme to provide small area statistics in Scotland. As such it is able to provide information on poverty and deprivation in remote and accessible rural areas. The SNS website allows users to select areas and the information required. An interactive map of the Scottish Index of Multiple Deprivation is also available at www.sns.gov.uk website.

Poverty and Social Exclusion Surveys[46]: The PSE:UK research project was funded by the Economic and Social Research Council (ESRC) and is a major collaboration between the University of Bristol (lead), Heriot-Watt University, The Open University, Queen's University Belfast, University of Glasgow and the University of York. Launched in May 2010, two major surveys into the public's perceptions of necessities and into living standards were carried out in 2012/13. These were an attitudinal survey into the public's perceptions of necessities and attitudes to services, and a large-scale survey of living standards to examine the nature, extent and causes of deprivation and social exclusion. In addition, two qualitative research studies have been undertaken. An investigation into the experiences of living on low income during recession in Gloucestershire, the West Midlands and Strathclyde, and an exploration of the role of the family when coping with poverty in Northern Ireland. The PSE:UK research uses relative deprivation to examine poverty and, in particular, the concept of necessities as set out in the consensual method. It develops and improves on the methodology of the 'Poverty and Social Exclusion Survey in Britain in 1999' (funded by the Joseph Rowntree Foundation) which, in turn, followed the 'Breadline Britain in the 1990s' and 'Breadline Britain 1983' surveys. This method was also used in the PSE Northern Ireland survey in 2002/3. The result is therefore the fourth in a series of nationally representative surveys in Britain, and the second in Northern Ireland, that use a consensual measure of minimum necessary living standards and direct measures of material and social deprivation rather than solely relying on proxy income data.

[46] Description of survey taken from http://www.poverty.ac.uk/pse-research.

Appendix B: Results of Testing for Presence of Initial Conditions

The testing of the presence of an initial condition issue has been completed using the methodology of Fotouhi (2005), by comparing coefficients of the full pooled model of chapter four, i.e. years 1999 to 2008, with coefficients of the model with the first three years of observations dropped, i.e. 2002-2008 (table App0.1). The same factors show statistical significance in both models but a more formal test of coefficient comparisons, using the Stata command *parmtest*, suggests that three factors show statistically different coefficients in each model, and therefore some initial condition issue exists. These are head of household employment income, household in fuel poverty and head of household GHQ score.

Table App0.1: Testing for initial condition by comparing coefficients of pooled full model (1998-2008) of being in poverty (before housing costs) with coefficients from model with first three years of observations dropped (2002-2008)

	1999-2008		2002-2008	
Working household	-1.118***	(0.056)	-1.205***	(0.082)
HoH employment income (£/wk)	-0.005***	(0.000)	-0.004***	(0.000)
HoH female	0.175***	(0.039)	0.129**	(0.055)
HH member in a temporary job	0.011	(0.082)	0.062	(0.122)
HH member had multiple jobs in previous year	-0.185***	(0.065)	-0.203**	(0.093)
2nd job in HH	-0.318***	(0.083)	-0.364***	(0.123)
HH benefit (£/wk)	-0.008***	(0.000)	-0.008***	(0.000)
HH receives any benefit	0.207***	(0.058)	0.181**	(0.082)
HH in food poverty	0.940***	(0.058)	0.845***	(0.080)
HH in fuel poverty	1.212***	(0.043)	1.130***	(0.059)
Owned or company car in HH	-0.434***	(0.039)	-0.434***	(0.055)
Care of disabled in HH	-0.138*	(0.071)	-0.191*	(0.102)
SIMD Geographic Access domain score	-0.005***	(0.001)	-0.006***	(0.001)
HoH GHQ	-0.001	(0.004)	0.008	(0.006)
Any HH member GHQ12>=4	0.033	(0.051)	-0.024	(0.073)
Single parent HH	0.356***	(0.070)	0.421***	(0.101)
3 or more children in HH	0.461***	(0.090)	0.453***	(0.132)
HoH aged 65 or over	0.228***	(0.078)	0.184*	(0.109)
HoH education level	-0.137***	(0.011)	-0.144***	(0.015)
Pensionable age in HH	-0.620***	(0.082)	-0.629***	(0.115)
Constant	1.122***	(0.088)	1.187***	(0.125)
Observations	13107		6867	
McFadden's Pseudo R^2	0.452		0.444	
ll	-3680		-1858	

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$

An alternative test is to identify pre-sample variables that impact on a household's likelihood of entering poverty. The results of a simple example of this are shown in table App0.2. A full explanation of results is included in the initial conditions section in chapter 3.

Table App0.2: Testing initial condition effects on the probability of being in poverty (before housing costs) by comparing output from panel and redprob models

	Panel		Redprob	
Working household	-2.003***	(0.131)	-2.093***	(0.116)
HoH employment income (£/wk)	-0.007***	(0.000)	-0.007***	(0.000)
HoH female	0.127	(0.084)	0.051	(0.087)
HH member in a temporary job	-0.090	(0.126)	-0.169	(0.137)
HH member had multiple jobs in previous yr	-0.339***	(0.091)	-0.286***	(0.103)
2nd job in HH	-0.440***	(0.148)	-0.355***	(0.133)
HH benefit (£/wk)	-0.014***	(0.001)	-0.015***	(0.001)
HH receives any benefit	0.300***	(0.099)	0.424***	(0.106)
HH in food poverty	1.294***	(0.102)	1.269***	(0.104)
HH in fuel poverty	1.432***	(0.070)	1.353***	(0.073)
Owned or company car in HH	-0.434***	(0.083)	-0.297***	(0.082)
Care of disabled in HH	0.034	(0.131)	0.068	(0.129)
HoH GHQ	-0.002	(0.007)	0.004	(0.007)
Any HH member GHQ12>=4	0.087	(0.080)	0.093	(0.083)
Single parent HH	0.501***	(0.146)	0.610***	(0.136)
3 or more children in HH	0.767***	(0.201)	0.722***	(0.166)
Age of head of HH	-0.007**	(0.003)	-0.004	(0.004)
HoH education level	-0.141***	(0.023)	-0.129***	(0.024)
Pensionable age in HH	0.134	(0.132)	0.100	(0.131)
Pension income (£/wk)	-0.020***	(0.001)	-0.019***	(0.001)
HH in Poverty at t-1			0.428***	(0.062)
Constant	2.315***	(0.238)	1.926***	(0.254)
Pre-sample and model variables				
Original Sample Member			-0.136	(0.120)
Working household			-1.547***	(0.160)
HoH employment income (£/wk)			-0.007***	(0.001)
HoH female			0.198*	(0.110)
HH member in a temporary job			0.144	(0.183)
HH member had multiple jobs in previous yr			-0.332**	(0.154)
2nd job in HH			-0.789***	(0.241)
HH benefit (£/wk)			-0.012***	(0.001)
HH receives any benefit			0.052	(0.147)
HH in food poverty			1.203***	(0.153)
HH in fuel poverty			1.486***	(0.138)
Owned or company car in HH			-0.562***	(0.109)
Care of disabled in HH			0.083	(0.204)
HoH GHQ			-0.017	(0.011)
Any HH member GHQ12>=4			0.042	(0.137)
Single parent HH			0.345*	(0.181)
3 or more children in HH			0.742***	(0.235)
Age of head of HH			-0.015***	(0.005)
HoH education level			-0.152***	(0.033)
Pensionable age in HH			0.326*	(0.194)
Pension income (£/wk)			-0.023***	(0.003)
Constant			2.600***	(0.317)
Observations	13107		13107	
McFadden's Pseudo R^2	0.572		0.582	
ll	-2871		-2807	
bic	5950		6050	

Standard errors in parentheses.
* $p < 0.10$, ** $p < .05$, *** $p < .01$.

Appendix C: Results following inclusion of social stratification variable to models testing the association of factors with a household being in poverty in non-rural and rural Scotland

Table App0.3 illustrates the impact of including the social stratification variable CAMSIS in the regression models. The male CAMSIS scale shows association with a household being in poverty in the non-rural model only. When these results are compared with the model output without the CAMSIS measure (table 4.10) we see some changes in the significant variables. In both the non-rural and rural models the variables Head of household education level and three or more children in household are no longer significantly associated with being in poverty

Table App0.3: Probit coefficients from model testing factors for their association with a household being in poverty (before housing costs) in Scotland (including the Cambridge Scale social stratification variable)

	Non-rural Scotland		Rural Scotland	
Working household	-0.948***	(0.232)	-0.025	(0.552)
HoH employment income (£/wk)	-0.007***	(0.001)	-0.007***	(0.001)
HoH female	0.107	(0.147)	0.705**	(0.321)
HH member in a temporary job	0.148	(0.150)	-0.014	(0.281)
HH member had multiple jobs in previous yr	-0.216*	(0.113)	-0.479*	(0.281)
2nd job in HH	-0.537***	(0.187)	-0.184	(0.355)
HH benefit (£/wk)	-0.007***	(0.001)	-0.007***	(0.003)
HH receives any benefit	-0.298**	(0.143)	-0.034	(0.308)
HH in food poverty	1.236***	(0.167)	1.800***	(0.259)
HH in fuel poverty	1.666***	(0.143)	1.510***	(0.270)
Owned or company car in HH	-0.637***	(0.137)	-0.805*	(0.421)
Care of disabled in HH	-0.530	(0.342)	-0.231	(0.495)
HoH GHQ	0.019*	(0.011)	-0.023	(0.025)
Any HH member GHQ12>=4	-0.113	(0.129)	0.075	(0.283)
Single parent HH	0.351*	(0.201)	0.368	(0.474)
3 or more children in HH	0.362	(0.248)	0.713	(0.444)
Age of head of HH	-0.016***	(0.005)	-0.023*	(0.014)
HoH education level	-0.032	(0.042)	-0.020	(0.090)
Pensionable age in HH	0.295	(0.308)	1.229**	(0.508)
Pension income (£/wk)	-0.013***	(0.003)	-0.010***	(0.003)
Cambridge scale males: present job	-0.010**	(0.004)	-0.006	(0.007)
Constant	1.248***	(0.417)	0.544	(1.050)
Observations	5672		1315	
McFadden's Pseudo R^2	.5334		.5779	
ll	-675		-161	

Standard errors in parentheses.
* $p < 0.10$, ** $p < .05$, *** $p < .01$.