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FUEL POVERTY IN EUROPE: A CROSS-COUNTRY ANALYSIS USING A NEW COMPOSITE MEASUREMENT*

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ABSTRACT

Fuel poverty has generally been considered a British and Irish phenomenon, and the vast majority of research has emanated from those two countries. In measuring the magnitude of the problem, a standard definition has been used which defines fuel-poor households as those who spend more than 10% of their income on home-heating. However, this definition has a number of limitations, most notably for cross-country comparisons. An alternative methodology is proposed in this paper which employs a suite of 'consensual' indicators to derive a composite measurement of poverty. A comparative, quantitative analysis is undertaken for the first time using comparable, longitudinal data, which calculates the extent of fuel poverty in 14 European countries. Socio-economic analysis identifies the incidence among various social groups in each of the countries. Detailed multivariate Probit regression models are also employed to examine those factors that influence the probability of being fuel poor. Using this Consensual approach, lower levels of aggregate fuel poverty are reported in the British Isles (although low-income households, such as lone parents, suffer highly), however dramatic levels are found in southern Europe, where very little empirical research has been undertaken previously.

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1. INTRODUCTION

Fuel poverty, formally identified first in the early 1970s, has continued to exist as a significant social ill three decades on. The extensive debate surrounding fuel poverty in the 1980s and 1990s, where it had been argued that affordable warmth is a "right rather than a privilege", has become poignant once again in the light of unstable and rising worldwide fuel prices. Fuel poverty is different to poverty. Poverty can be eradicated through income support (as has been noted by Boardman, 1991), whereas the eradication of fuel poverty requires not just income subsidisation but also crucial investment in the capital stock (i.e. the household), as fuel poverty is caused by a complex interaction between low income and domestic energy inefficiency.

When fuel becomes more expensive (as it has done in Europe in particular over the past two to three years), households find it increasingly difficult to heat their homes adequately. Those living in energy inefficient dwellings and on low incomes often cannot afford to heat their homes adequately and suffer from fuel poverty. The problem is a serious political, environmental, social and public-health issue and the UK government, in particular, has invested considerably in assisting low-income groups upgrade their housing. However, recent research confirmed the persisting nature and considerable scale of the problem in the UK (DEFRA and DTI, 2001). In addition, fuel poverty has many attendant affects, most notably on human health (Clinch and Healy, 2000a; Rudge and Nicol, 2000). Yet, the net benefits to society (in terms of reduced energy consumption and environmental emissions and improvements in health and comfort) of eradicating fuel poverty through implementing domestic energy-efficiency programmes are very substantial (Clinch and Healy, 2001).

Furthermore, there has been virtually no comparative empirical analysis of fuel poverty undertaken hitherto. This research deficit has occurred, not because of a lack of interest in the area, but because of some major logistical reasons, most obviously the lack of comparable cross-country data. This has now been rectified with the availability of the European Community Household Panel. Data from this extensive, longitudinal survey relating to housing conditions and home heating have been analysed so as to quantify levels of fuel poverty across Europe using a Consensual approach; these data are mainly indicators of housing deprivation which are based, à la Townsend, on socially perceived necessities. As such, this study represents the first pan-European quantitative analysis of fuel poverty using comparable, longitudinal data over the years 1994-97 inclusive. A variety of objective and subjective indicators of fuel poverty are utilised and a composite (weighted) measurement is derived. Multivariate Probit regression analysis is conducted for each indicator to validate the cross-tabulation results and to examine those factors that influence the probability of being fuel poor. Sensitivity analysis is also conducted to test the effects of changing various methodological assumptions (including altering the respective weights assigned to each indicator of fuel poverty), and socio-economic and socio-demographic analysis conducted towards the end of the paper identifies precisely, for the first time, who is suffering from fuel poverty across Europe. First, the context of fuel poverty and energy inefficient housing in Europe is delineated using cross-country data on energy-efficiency standards and energy consumption in European housing.

2. THE EUROPEAN CONTEXT

The context for European fuel poverty is important for a number of reasons. From an architectural basis, energy-efficiency standards vary considerably across Europe. The British and Irish housing stocks appear to be among the most energy inefficient in northern Europe

when examined using multiple criteria, as has been hypothesised in the past (Boardman, 1991). However, the data presented here also indicate problems in the Austrian and Belgian stocks, both of which are relatively energy inefficient. From Table 1 it can be seen that levels of cavity-wall insulation are considerably below the EU-average in both the UK and Ireland. Ireland has the lowest level of double-glazing in northern Europe, with just one-third of all dwellings fitted with this measure; France, Austria and the UK are also below-par in this regard. The UK has the lowest level of floor insulation in northern Europe, with just 4% of dwellings equipped. The only energy-efficiency measure with which Irish and British households perform satisfactorily is roof insulation. Conversely, countries such as Denmark, Finland, Sweden and Norway demonstrate exemplary thermal-efficiency standards.

Table 1 about here

Of course, Scandinavian countries prioritise these measures in the design and construction of new housing, as it is essential protection to combat the relatively severe winters experienced in these colder climates where winter temperatures are often below freezing (Clinch and Healy, 1999). Nonetheless, Ireland and the UK have the highest rates of seasonal mortality in northern Europe, and it has been shown that such mortality rates result, in no small part, from the inadequately protected, thermally inefficient housing stocks in these countries (Clinch and Healy, 2000a; Eurowinter Group, 1997). There are also strong associations between inadequately heated homes and increased rates of morbidity; higher incidences of various cardiovascular and respiratory disorders have been associated with cold exposure from within the home (Collins, 1986 and Evans *et al*., 2000). Thus, when temperatures fall during a typical British or Irish winter, households need to increase their expenditure on fuel considerably to heat their home adequately, owing to the poor level of heat retention in their

homes. The problem of fuel poverty occurs, therefore, when a low-income household lacks adequate insulation levels and an efficient heating system to achieve affordable warmth.

Data on energy-efficiency standards in southern Europe are notoriously difficult to obtain, and their reliability is often questionable. Eurostat have provided robust data for Greece, but only scant data for Portugal and no data whatsoever for Italy or Spain. However, the data that is available, together with the analysis of general housing conditions conducted by Healy (2002), indicate that energy efficiency in southern-European housing is not a priority in their building regulations. It is an often-overlooked fact that many parts of southern Europe also face cold winter temperatures, yet their housing stocks appear to be highly energy inefficient, and they are also the poorest countries in Europe (using measures such as income poverty and inequality as well as macroeconomic indicators like GDP per capita[1]). Despite this, there has been virtually no published research on fuel poverty in southern Europe. This paper attempts to rectify this situation.

Many countries demonstrating poor levels of domestic energy efficiency are consuming greater amounts of energy than necessary, as people inhabiting inefficient dwellings must consume more fuel to heat their homes. As can be seen from Table 1, Irish energy consumption per household is the highest in northern Europe, at 102,000 Megajoules per annum, compared to an EU-13 average of 77,000 MJ. Consequently, environmental emissions, such as CO_2, SO_2, NO_x and particulate matter are also greater. This is of considerable importance given that many European countries – including Ireland – are having extreme difficulty in meeting their agreed targets for stabilisation of greenhouse-gas

[1] Italy being the exception here, with GDP per capita considerably above EU-average.

emissions under the Luxembourg Agreement and acidification precursors under the Gothenburg Agreement (Clinch and Healy, 2000c).

3. MEASURING FUEL POVERTY

Fuel poverty can be measured in a number of ways and three major approaches are now outlined.

TEMPERATURE

The earliest research on fuel poverty based its discussion on "adequate home heating" and "adequate warmth" (e.g. Lewis, 1982 and Boardman, 1986). The term 'adequate warmth', however, is problematic, as various researchers and disciplines regard varying temperatures as adequate for human health and comfort. The World Health Organisation, for instance, takes 20ºC as a benchmark temperature for those more vulnerable, such as the elderly and handicapped. Boardman generally advocates a temperature of 18ºC. Most medical literature favours a minimum temperature of 16ºC for able-bodied, healthy people, but recommends a minimum of 18ºC for sedentary activities and 21ºC for the more vulnerable. Using a definition based on temperature, fuel poverty may be calculated by quantifying those households which fail to achieve minimum 'adequate' levels of household warmth. Such an approach, though theoretically simple, is problematic for a number of reasons, chiefly because of the inadequacy and unreliability of data on household temperatures. Milne and Boardman (2000) have found, for example, that living-room temperature is not a good indicator of whole-house average temperature, as a warm living-room may be found in an otherwise cold house, especially in low-income households without central heating. In addition, occupancy plays an important role in household warmth. A partially heated home (with a low mean whole-house temperature) may be classified incorrectly as 'fuel-poor' if, say, only one person

inhabits the house and only part of the house is occupied and heated. Furthermore, intermittent occupancy (e.g. the house is only occupied for a few hours in the evening and at night) may also distort results using this approach.

EXPENDITURE

Another approach to measuring fuel poverty involves a more precise, quantitative method. Households spend varying proportions of their income on fuel; Clinch and Healy (1999) demonstrated that low-income households in Ireland spend three times more on energy in the home relative to their income than high-income households. As such, a 'fuel-poverty line' can be set – similar to that in poverty research – where households are considered fuel-poor if they spend more than X% of their income on home heating. Boardman (1991) has advocated a 10% threshold based on net household income; this definition has recently been changed so that the denominator excludes housing costs. This has been considered a standard definition of fuel poverty and has been employed by the UK government in much of its analysis on the subject (DETR, 1999). However, such an approach has a number of flaws. First, there does not appear to be any substantial rational behind setting the budget line at 10% of net income, and, therefore, this approach has been seen by some as lacking in any scientific basis. Second, it fails to capture the deprivation and social-exclusion elements of fuel poverty. Third, studies using this method to calculate fuel poverty (e.g. DETR, 1999) have reported levels far greater than those using a Consensual approach (Whyley and Callender, 1997), leading many to suggest that 10% is too low a threshold. Fourth, data on fuel expenditure as a proportion of household income on a micro level is not available in many European countries, and thus, an Expenditure approach cannot be employed in a cross-country analysis of fuel poverty. Fifth, an income-based analysis can also be misleading, as several definitions now exist, some with

housing costs *included* in net household income, while other calculations *exclude* housing costs in the denominator of the definition.

CONSENSUAL

This approach follows the method pioneered by leading poverty and deprivation researchers, Peter Townsend and David Gordon (Townsend, 1979, Gordon *et al.*, 2000). Certain goods and services are considered to be necessary, not just by academics and 'experts' but by society at large. Some of these necessities fall under the umbrella of fuel poverty; the absence of certain items regarded as essential household attributes (or socially perceived necessities) may be considered indicators of fuel poverty, as can the presence of certain unwanted household characteristics. For example, possession of central heating in the home is considered by the vast majority of the population in the UK and Ireland to be a necessity, as is a damp-free home (Callan *et al*., 1993, Gordon *et al*., 2000). The lack of central heating and the presence of damp act as indicators of fuel poverty using an approach founded on consensual social indicators. Such an approach attempts to capture the wider elements of fuel poverty, such as social exclusion and material deprivation, as opposed to approaches based solely on home-heating expenditure or household temperature. While the UK government has traditionally used the standard definition of fuel poverty in measuring levels across the UK, an alternative measurement of fuel poverty is now being evaluated using a Consensual approach in which a "suite of indicators" are employed to calculate the incidence of fuel poverty (DEFRA and DTI, 2001). Such an approach is developed and employed in this paper for the UK and 13 other EU countries.

4. FUEL POVERTY IN EUROPE: CROSS-COUNTRY RESULTS

DATA

The European Community Household Panel (ECHP) is a standardised, multi-purpose and longitudinal survey, providing comparable information across the Member States on income, work and employment, poverty and social exclusion, housing, health and other diverse social indicators regarding the living conditions of private households and persons. Initially, 12 Member States took part and this has increased to 14 with the inclusion of Austria and Finland. The crucial feature of the ECHP is the harmonisation of its methodology and results, through the creation of a centralised questionnaire. The data used in this paper come from the first four Waves of the ECHP, undertaken in 1994-97 respectively. More details of the survey can be found in Eurostat (1996).

METHODOLOGY

In this study fuel poverty is quantified for 14 European countries using six social indicators of fuel poverty. The indicators pertain to household finances (fuel and utility bills), the building fabric (presence of damp, rot, etc.) and the heating system fitted in the house. The six indicators are split into two sub-groups: subjective (self-reported) indicators based on householders' declarations, and objective indicators based on factual characteristics or conditions of the dwelling which are not skewed by potential subjective biases. The results of each fuel-poverty indicator is discussed in detail now, starting with the subjective indicators. Probit multivariate regression models are presented later.

SUBJECTIVE INDICATORS

Households Unable to Afford to Heat Home Adequately

Fuel poverty can be defined as "the inability to afford adequate warmth in the home" (Lewis, 1982). Thus, this indicator is crucially important in estimating levels of fuel poverty, as it encompasses the standard qualitative definition of fuel-poor households. It is, therefore, the key indicator of fuel poverty and is given precedence in the composite measurement of fuel poverty, derived later. Table 2 illustrates the results of this key indicator of fuel poverty. Results show that an alarming 45.5% of households in Greece, 54.9% in Spain and 74.4% in Portugal declare this inability. The variation of results across countries is dramatic: households in Germany, the Netherlands, Austria, Luxembourg and Denmark have no problems heating their homes (all report incidences of 3% or less respectively), while relatively rich nations like Italy and France report substantial levels of fuel poverty (21.5% and 7.2% respectively). The average rate throughout all 14 EU countries analysed is 16.9%, A substantially different mean incidence of fuel poverty is found using this indicator across northern Europe: just 4.0%. In this instance, countries such as the UK (5.8%) and Ireland (6.4%) are identifiable as relatively high sufferers of this indicator of fuel poverty. Longitudinally, it is worthwhile to note that, while many countries are realising significant reductions in fuel poverty across the time series, the most notable aggregate decreases in the incidence of fuel poverty are by the UK (a reduction of 70%), Denmark (38%) and Ireland (36%). It is unlikely to be coincidental that these three countries have relatively aggressive State-funded fuel-poverty alleviation programmes in place.

Table 2 about here

Households Unable to Pay Utility Bills

A household which has been unable to pay on time a scheduled utility bill (gas or electric) over the previous 12 months is likely to be finding it difficult to keep the home adequately heated and, as such, this indicates the potential existence of fuel poverty. Those unable to keep up to date with utility bills may also have suffered disconnection from the supplier, compounding the experience of fuel poverty. The results demonstrate that Mediterranean nations do not appear to suffer as highly with this indicator. Indeed, Italy, Spain and Portugal rank among the best countries in this exercise, however this indicator exhibits the lowest incidence across all countries in the study. The highest level of late-payment of utility bills is found in Greece, where a remarkable 32% are affected. The UK (8.1%) and France (7.6%) also perform poorly. The mean (EU-14) proportion of households unable to heat their homes on time is 6.2%, while the corresponding statistic for the northern Europe is 4.4% (Table 3). The time-series shows that the UK has reduced the proportion of households unable to pay utility bills on time by a quarter, while Ireland has achieved an even larger reduction of 42%. Spain also reports positive longitudinal results: a reduction of 21% over four years. Other countries report less clear results, while some are showing increased difficulties in meeting the costs of utility bills.

Table 3 about here

Households Lacking Adequate Heating Facilities

Household declaring inadequate heating systems cannot, by definition, heat their home satisfactorily or efficiently; thus, this is a good subjective indicator of fuel poverty. The results show that households declaring inadequate heating facilities are found in high numbers in certain southern countries (Greece and Portugal) but also in wealthier, colder, northern

nations like France and the UK. An overall (EU-14) incidence of 11.5% is calculated for this indicator. The highest incidence of inadequate heating facilities is found among Portuguese households, where two-in-five such households (39.7%) declare this indicator, while Greece (34.3%) and Italy (17.9%) also fare badly. In northern Europe a rate of 6.7% is reported across all households, on average, while France performs poorest in this set of nations (one-in-nine households), with the UK (9.7%) a close second. The longitudinal pattern across Europe shows some substantial decreases in the incidence of this indicator, but also some increases (e.g. Portugal). The biggest downward trends are found in the UK (a 62% reduction between 1994 and 1997) and France (a 15% fall during the same period).

This indicator acts as an interesting comparative cross-check with the objective indicator of fuel poverty, 'Households Lacking Central Heating'. The disparity demonstrates the lack of awareness among householders regarding represents an 'adequate' heating system. If householders were fully informed, only centrally heated and electric-storage heating systems would be considered efficient, adequate means of home heating. The results, reported in Table 4, show that many households believe their system is adequate when, on an economic-efficiency basis, they are not. The widest disparities are found in Portugal, Spain and Greece[2].

Table 4 about here

[2] More on this disparity can be found in the proceeding section on 'objective' indicators.

OBJECTIVE INDICATORS

Presence of Damp Walls and/or Floors

The presence of damp indicates that the dwelling is not energy efficient. It may also be a manifestation of a continuously unheated or ineffectively heated home. In either case, it acts as a good objective indicator of fuel poverty. Some 12.7% of all European households contain damp patches. Again, Greece (18.8%), Spain (21.5%) and Portugal (33.4%) are suffering worst in this regard. In northern Europe an average incidence of 9.8% is found, and the UK (13%), Belgium (14.4%) and France (16.3%) all perform poorly with regard to the presence of damp. These results, tabulated in Table 5, are particularly important from a public-health perspective, as chronic exposure to damp is strongly associated with ill-health, mainly via increased respiratory and cardiovascular diseases (Williamson *et al*., 1997). There have been some dramatic reductions in the presence of damp throughout the 1990s. The UK has experienced a 53% fall in damp spores, while the level of household damp has fallen by 44% in Italy and by 28% in France between 1994 and 1997.

Table 5 about here

Lacking Central Heating

Households not possessing central heating or similar heating systems generally find it more difficult to efficiently heat the home. It was shown by Clinch and Healy (1999) that other heating systems, such as solid fuel and LPG, are dearer, dirtier and less efficient, and are generally possessed by low-income households. As such, they act as economically regressive generators of home heating. The lack of either central heating or electric-storage heating is a good objective indicator of fuel poverty. It is interesting to note that this indicator of fuel

poverty is reported at a repeatedly higher incidence than any other indicator across all countries in the study, yet the provision of central heating is one of the most effective measures in eradicating fuel poverty.

Some 91.7% of Portuguese households do not have central heating fitted in their homes, whilst the corresponding percentages for Spain and Greece are 67.2% and 45.7%[3]. In northern Europe the highest incidence of this fuel-poverty indicator are located in Belgium (23.9%) and Ireland (20.2%). An average rate in this group of ten countries of 12.5% is calculated, while across all Europe one-in-four households (25.0%) fail to possess central heating or electric storage heaters (Table 6). Across Europe, the penetration of central heating is increasing almost universally, but not at a similar rate of penetration. Countries formerly lacking in such measures are catching up; for instance, Ireland has increased its penetration of central heating by 31% over the four-year period, 1994-97, and a similar rate is found for the UK (32%). Elsewhere in northern Europe, Austria has reduced its proportion of households without central heating by almost a half (49%) during the four years, 1994-97. In southern Europe Spain has progressed, with a 13% reduction in households lacking central heating, though other southern countries have not made such advances.

These results are interesting when they are cross-checked with the corresponding subjective indicator of adequate heating facilities. The disparity between what the public believes constitutes an adequate heating system and what actually is adequate in energy-efficiency literature is interesting for another reason: it demonstrates one key cause of market failure –

[3]Yet, southern European countries suffer from cold winters which, though not as severe as in northern Europe, are still cold enough for fuel poverty and cold-related ill-health (Healy, 2001a).

the 'information gap' – in the market for domestic energy-efficiency measures[4]. The exceptions to the trend are Denmark, Finland and France, where households over-declare inadequate heating facilities.

Table 6 about here

Rotten Window Frames

Window frames which have become rotten are not energy efficient and can be considered a good (objective) indicator of fuel poverty. Rot is most commonly found in Portugal where a quarter (25.2%) of all households have rotten windows, compared with an EU-14 mean incidence of 8.6%. In northern Europe 12.7% of British households are suffering from this indicator of fuel poverty, and in France the corresponding percentage is 10.4% (Table 7). This compares to an northern-European mean of 7.2%. There have been very substantial decreases in the proportion of households with rotten windows over the four-year period. The reduction in the UK represents a 35% fall on 1994 levels, while in Ireland the corresponding fall is 25%. In southern Europe Greece has reduced its level of rotten windows by 37%.

Table 7 about here

COMPOSITE MEASUREMENT OF FUEL POVERTY

A variety of aggregate measurements of fuel poverty have been derived. These results are weighted (composite) estimates of fuel poverty. Each indicator is assigned a weight, and each weight varies in the sensitivity analysis in accordance with their relevance to the qualitative definition of fuel poverty. Thus, 'Inability to Afford Adequate Home Heating', as the key

[4] Clinch and Healy (2000b) outline the wide range of reasons for this market failure, and the information gap –

indicator of fuel poverty, may be given a higher weighting than the other indicators, and so forth. A variety of sensitivity analyses are conducted to test the sensitivity of the results to various assignments of weights. For economies of space and ease of reading, the indicators are denoted in the weighting equations as follows:

α = Unable to afford to heat home adequately

β = Unable to pay utility bills on time

π = Lack of adequate heating facilities

δ = Damp walls and/or floors

λ = Rotten window frames

μ = Lacking central heating

Scenario 1: Key Indicator Given Strong Preference

Here, the key indicator of fuel poverty, 'Households unable to afford to heat home adequately' (α), is given a weight of 0.5; each of the five subsequent indicators is assigned a weight of 0.1 respectively, i.e.

$$0.5\,\alpha + 0.1\,\beta + 0.1\,\pi + 0.1\,\delta + 0.1\,\lambda + 0.1\,\mu$$

Under this analysis, the highest incidences of composite fuel poverty in southern Europe include: Portugal (56.4%), Spain (37.8%), Greece (36%) and Italy (16.1%). In northern Europe, France (9.1%) the UK (8.4%) and Ireland (8.3%) appear to have the highest rates of

where households are not aware of the full benefits of energy-efficiency measures – is considered a major explanation for this phenomenon.

composite fuel poverty. The mean rate of fuel poverty across EU-14 is 14.8%, and in northern Europe a mean of 6% is found.

Scenario 2: Equal Weights

If it is thought that all indicators are of equal importance, then equal weights can be assigned to each of the six indicators. Under this scenario, all indicators are given a weighting of 0.17 respectively, i.e.

$$0.17\,\alpha + 0.17\,\beta + 0.17\,\pi + 0.17\,\delta + 0.17\,\lambda + 0.17\,\mu$$

Under this scenario, rates of composite fuel poverty in southern Europe are decidedly lower: Portugal (44.4%), Greece (29.7%), Spain (26.3%) and Italy (12.5%). In northern Europe relatively high rates are calculated for Belgium (11%), France (10.4%), the UK (10.2%) and Ireland (9.6%). The average EU-14 rate is calculated as 13.4%, while the northern-European rate is found to be 7.4%.

Scenario 3: Subjective Indicators Only

It may be useful to consider the subjective and objective indicators separately. Disaggregating in this manner, so that only subjective social indicators of fuel poverty are considered, implies giving a weighting of 0.33 to each of the three subjective indicators, i.e.

$$0.33\,\alpha + 0.33\,\beta + 0.33\,\pi$$

The four southern-European countries once more demonstrate the highest composite levels of fuel poverty. Under this scenario, Portugal has a rate of 38.7%, followed by Greece (34.7%);

both of these levels are lower than the previous two scenarios. However, Spain (20.6%) and Italy (14.5%) display slightly higher levels of composite fuel poverty under this scenario. In northern Europe the highest rates are found in France (8.6%), the UK (7.9%) and Ireland (6.9%). An EU-14 average of 11.3% is calculated, while in northern Europe the mean is found to be 5%. These results, being the lowest found in the sensitivity analysis, act as lower bound estimates of fuel poverty.

Scenario 4: Objective Indicators Only

Here, the indicators are disaggregated in the same manner as in Scenario 3, but in this case only objective social indicators of fuel poverty are analysed. Again, an equal weighting of 0.33 is assigned to each indicator, i.e.

$$0.33\,\delta + 0.33\,\lambda + 0.33\,\mu$$

These results fall in the upper bound tail of estimates of fuel poverty for northern Europe, but not for southern countries. High levels are reported in Portugal (50.1%), Spain (32.1%) and Greece (24.6%). In northern Europe, the highest levels are found in Belgium (15.8%), the UK (12.5%) and Ireland (12.4%). A relatively low EU-14 average of 15.4% is calculated, together with a relatively high EU-10 average (for northern Europe) of 9.8%.

Scenario 5: Key Indicator and Objective Indicators Given Preference

If it is felt that the key indicator and the objective indicators are more reliable than the subjective indicators, then weights may be distributed as follows:

$$0.5\,\alpha + 0.17\,\delta + 0.17\,\lambda + 0.17\,\mu$$

This leads to the very highest results in southern Europe, with composite levels of fuel poverty of 62.8% in Portugal, 43.8% in Spain, 35.3% in Greece and 16.1% in Italy. Rates of 9.9% in Belgium, 9.8% in France and 9.5% in Ireland are also relatively high. An average rate of 16.3% of all households in EU-14 is calculated, while in northern Europe a rate of 7.0% is found under this scenario.

Scenario 6: Key Indicator Given Moderate Preference

While it seems wise to weight the key indicator of fuel poverty higher than other indicators, a weight of 0.5 may seem too generous. Hence, in this case, the first scenario is altered so that a weight of one-third is given to the key indicator and all other five indicators are assigned equal weights of 0.134, i.e.

$$0.33\,\alpha + 0.134\,\beta + 0.134\,\pi + 0.134\,\delta + 0.134\,\lambda + 0.134\,\mu$$

Under this final scenario, middle bound estimates are derived for both northern and southern Europe. Portugal reports a composite rate of 50.3%, while the respective rates in Greece (32.8%), Spain (31.9%) and Italy (14.3%) demonstrate a centralised estimate of the range produced under the sensitivity analysis. In northern Europe France is calculated to have the highest level of fuel poverty using this scenario, with 9.8% affected. However, Belgium (9.5%), the UK (9.3%) and Ireland (9.0%) are all showing very similar rates. The average incidence of fuel poverty in northern Europe is 6.7%, while the corresponding incidence for all 14 countries in this analysis is 14.0%. These results appear to be robust and are used as good middle-bound estimates of fuel poverty (Table 8)

Table 8 about here

5. SOCIO-DEMOGRAPHIC & SOCIO-ECONOMIC ANALYSIS

A socio-demographic and socio-economic profile of those households unable to afford adequate heat in their home – the key indicator of fuel poverty – now follows. This isolates those groups in society most vulnerable and at risk of suffering fuel poverty.

SOCIOLOGICAL TYPE

Some households need more fuel than other's because their circumstances dictate that the home must be heated for longer intervals or because they require higher temperatures (e.g. households occupied by the elderly or those with very young children). For some households, heating costs may be disproportionately high because these costs may fall on one person (e.g. single-adult households). Furthermore, there are some households that are known – through poverty and deprivation research – to face severe financial hardship (e.g. single-parent households). All of these factors affect the probability of certain household groups enduring fuel poverty. The socio-economic and socio-demographic analysis in this section examines a variety of household types based on demographic (e.g. marital status, sociological type, house type) and economic (e.g. main income source, housing tenure) variables For economy of space, the mean results (over the four-year time series) are presented henceforth. Table 9 presents the incidence of fuel poverty across Europe by social group using an amalgamation of Eurostat's taxonomies for Sociological and Economic typologies; this allows for maximum disaggregation of the results across EU-14 whilst retaining statistical robustness.

Table 9 about here

Single Parents

The results show that, across Europe, the group most at risk of suffering from persistent fuel poverty is single parents, especially those whose children are all under 16 years of age, where an average (EU-14) incidence of 21.8% is found. In northern Europe an average (EU-10) incidence of fuel poverty of 10.3% is calculated for this household group. The highest incidence is calculated in Portugal, where some 71.4% of single parents are declaring fuel poverty. Spain fares particularly poorly also, with 62.7% of this category of single parents affected. The proportion in Greece is also high, at 48.5%. The Irish rate of fuel poverty for single parents (for all children under 16) is 19.3%, making this the highest level in northern Europe. Elsewhere in northern Europe, single parents exhibit high levels of fuel poverty in the UK (18.6%) and France (15%). Single parents with at least one child over 16 generally demonstrate lower levels of fuel poverty. This is probably because of their improving financial situation as their children grow up and become less dependent. However, the results demonstrate only slightly reduced incidences among this household group. The problem of fuel poverty among lone-parent households is acute for two causal reasons: first, they generally suffer from low incomes and will therefore find it difficult to make ends meet regarding fuel bills; second, their financial circumstances entail that they are more likely to live in poor (energy inefficient) housing which makes home heating even less affordable.

Lone Pensioners

Both male and female pensioners exhibit high levels of fuel poverty. However, there is a gender bias towards females, with 22.1% of female lone pensioners suffering from fuel poverty across Europe, compared with 20.4% for male lone pensioners; the gender-gap becomes insignificant in northern Europe, with many countries demonstrating higher levels of fuel poverty amongst male lone-pensioner households. A remarkable 85.3% of male

Portuguese lone pensioners and 88.9% of female lone pensioners are unable to afford adequate home heating, while Spanish and Greek lone pensioners face similar difficulties. Ireland appears to have the highest fuel poverty among lone pensioner households in northern Europe, with 11.8% for males and 7.8% for females. The UK fares badly in this respect. Corresponding statistics are 8.3% (male) and 7.3% (female) respectively, as does France (6% and 8.1% respectively). A key reason for many lone pensioners suffering fuel poverty is likely to be related to their financial situation, with many subsisting on very modest State pensions. Others may be living in older, less well-insulated dwellings and, thus, find it hard to heat the home even on less-modest pensions. It is likely that a combination of both factors is at play with this social group.

HOUSE TYPE

It is useful to identify the type of accommodation where fuel poverty is highest. It might be expected that terraced and semi-detached houses would be, generally, better protected from the cold because the adjoining walls on either or both sides of the dwelling act as an insulator of heat. The results of this analysis do not necessarily corroborate such a hypothesis. In fact, the incidence of fuel poverty across Europe is highest in flat complexes (or multi-family dwellings), which indicates the existence of housing deprivation. Detached houses have a generally lower incidence of fuel poverty, especially in northern Europe where just 2.8% of such homes are declaring an ability to adequately heat the home.

Table 10 about here

Table 10 illustrates the results of fuel poverty across Europe by house type. Southern countries demonstrate the highest levels of fuel poverty across all house types. Portugal has

the highest incidence of fuel poverty among detached, semi-detached and terraced households (with 79.2% and 81.5% affected). Spanish households living in small and large multi-family dwellings exhibit the highest incidence of fuel poverty, with 57.8% of households living in small apartment complexes and 43.8% of households living in large apartment complexes declaring fuel poverty. Detached, semi-detached and terraced houses are less susceptible to fuel poverty in northern Europe. However, the incidence of fuel poverty in large and small flat complexes in northern Europe is substantial. For apartment blocks with less than 10 dwellings, Ireland declares the highest levels of fuel poverty, with 14.1% affected, followed by the UK (11.2%) and France (9.2%). For large multi-family dwellings (apartment blocks with 10 or more units), Ireland, again, demonstrates the highest incidence of fuel poverty, with 17.4% affected – higher than the equivalent proportion of Italian dwellings of this type. The UK also has a relatively high incidence of fuel poverty for this dwelling type, with 9.2% declaring an inability to adequately heat their home. 'Other' households are also affected by fuel poverty, although this house type accounts for a substantially small proportion of all households in the survey. It is likely that the high levels of fuel poverty in northern Europe among householders inhabiting apartments may be due to an income effect. Households in apartment blocks are more likely to be living on more modest incomes than those living in detached dwellings. As such, they may have limited disposable income available for home-heating purposes.

MARITAL STATUS

Marital status is a most interesting variable against which to analyse fuel poverty. As with poverty and deprivation research, it is likely that levels of fuel poverty may be highest among persons whose marital status is known to be associated with financial hardship. The separated and divorced, for example, are more likely to suffer from poverty than the married (Duncan *et*

al., 1993), and this is generally because such households are more likely to subsisting on a sole income. In addition, they may be lone-parent families raising children, compounding a potential (fuel-) poverty trap. The results show a marked pattern of fuel poverty across Europe, with the highest levels found among separated households. An EU-14 mean incidence of fuel poverty of some 33.9% is calculated for this household type, followed by 21% of widowed households. If the analysis is shifted to EU-10 (non-Mediterranean countries), an average incidence of fuel poverty of 13.1% of separated households is reported. Widowed persons suffer to a far less extent in northern Europe, however divorced households appear to suffer from fuel poverty, with 7.1% such households in northern Europe declaring an inability to afford adequate household warmth. Conversely, married households suffer proportionately less than other households, with incidences in EU-14 and EU-10 of 15.6% and 2.9% respectively.

Table 11 about here

Separated, Divorced and Widowed

It is clear that fuel poverty is strongly related to poverty, and, as such, it is no surprise that low-income households declare the highest levels of fuel poverty across Europe. While sample sizes for separated, divorced and widowed households were too small to calculate reliable estimates for certain countries, it is clear that separated households in southern Europe demonstrate alarming levels of fuel poverty, with a remarkable 81.9% affected in Portugal. Spanish separated households do not fare well either, with an incidence of 66.9%, while the proportions of separated households in Greece (48.5%) and Italy (21.4%) are higher than any levels found in northern Europe. There are, however, some notably high incidences among separated households in EU-10, most especially in Ireland where 18.3% are suffering.

Second, divorced households in southern Europe demonstrate very high levels of fuel poverty, with Portugal most affected (81.9%), followed by Spain (66.9%) and Greece (48.5%). Italy's level of fuel poverty among divorced households (12.7%) is less than the UK's level of 13.7% which appears to be the highest in northern Europe. Third, widowed households are suffering from fuel poverty, though not, it appears, in northern Europe where low incidences are calculated. Some 83.9% of widowed households in Portugal, 63.6% of those in Spain and 55.9% of those in Greece are declaring fuel poverty. Taken as a whole, these results indicate that marital status strongly affects the likelihood of fuel poverty. Married households are found to have mostly negligible levels of fuel poverty outside southern Europe.

HIGHEST EDUCATIONAL ATTAINMENT

Educational attainment is, in general, a good indicator of household income and social class and poverty research has consistently shown a strong association between low education levels and high levels of poverty and deprivation. This study tests this hypothesis with fuel poverty. The results demonstrate a linear relationship between educational attainment and fuel poverty both in northern Europe and across EU-14. Average incidences of fuel poverty of 7.4% are found across Europe for those with third-level qualifications. This increases to 12% among those who completed their secondary schooling, and 19.2% among those households who did not complete their second-level education. In northern Europe, a similar pattern is found, although the incidences are far lower. A negligible level of fuel poverty of just 2.2% is reported amongst households with third-level qualifications, followed by 3% among those who completed secondary school, while an incidence of fuel poverty of 4.7% of households is found for households that finished their formal education before completion of secondary school.

Table 12 about here

Low Educational Attainment

Comparatively, the results show some interesting patterns across Europe. In northern Europe incidences of fuel poverty among households with low levels of educational attainment are relatively high in Ireland, the UK and France, with levels of 8.4%, 8.3% and 8.2% respectively. Levels in southern Europe are dramatic, with some 79% affected in Portugal, 62.5% in Spain and 54.9% in Greece (Table 12). Conversely, households with a third-level qualification in northern Europe appear to suffer negligible rates of fuel poverty. However, moderate to high incidences are found in some southern countries. Spain reports an incidence of some 29.6% among households with high levels of educational attainment, while Portugal and Greece perform similarly poorly in this regard (21.9% and 21.4% respectively). The results again point to a strong relationship between fuel poverty and household income.

MAIN INCOME SOURCE

It is very useful to examine fuel poverty by households' income sources, as they are a good indication of income level. Dependence on unemployment assistance, state pension or other social transfers implies that such households live on a modest level of household income. Such income may preclude households from heating their home adequately in a direct sense through not being able to afford fuel bills, or indirectly through being unable to invest in household energy-efficiency improvements. The unemployed and those on other forms of social-welfare payments demonstrate the highest incidences of fuel poverty in Europe. Some 27.7% of those on social welfare and 26.3% of those unemployed are demonstrating fuel poverty overall, while in northern Europe the respective proportions are 10.2% and 12.1%.

Self-employed and waged households generally display low or negligible levels of fuel poverty across Europe.

Table 13 about here

The Unemployed and Social-Welfare Recipients

The overall highest incidence of fuel poverty in the unemployed category is demonstrated in Portugal, where 81.1% are considered fuel-poor, as is shown in Table 13. Elsewhere in southern Europe, Spain (79.2%) and Italy (46.6%) also show high levels. In northern Europe 23.3% of Irish unemployed households are suffering from fuel poverty. Likewise, there are high incidences in France amongst the unemployed (21.3%) and the UK (17.7%) (Table 13). For those whose main income source is other forms of social welfare, high levels are found, again, in southern Europe. Portugal (84.5%), Spain (73.9%), Greece (65.5%) and Italy (44.0%) all demonstrate high incidences of fuel poverty. In northern Europe, the highest incidence of fuel poverty among this group of social-welfare recipients is found in France (19.6%), followed by Ireland (17.4%0 and the UK (16.3%).

HOUSING TENURE

Housing tenure is an important dynamic of fuel poverty, as has been noted by Whyley and Callender (1997). This is because it gives households varying levels of control over their home, heating systems and their energy consumption. Owner-occupiers may be considered as fully autonomous, while tenants may be more limited as regards what they feel they can afford to do to improve their housing or even what they are authorised to do to improve their housing (Clinch and Healy, 2000b).

Table 14 about here

Tenants

Table 14 illustrates the results for this section. Owner-occupiers suffer least from fuel poverty, while tenants suffer most. Those whose accommodation is provided free of charge by the State suffer above average. The mean incidence of fuel poverty for tenant households across all of Europe is found to be 21.5%, while in northern Europe the corresponding proportion is 7.6%. In southern Europe rates of fuel poverty among tenant households are very high, with levels of 77.8% in Portugal, 67.3% in Spain, 52.8% in Greece and 27.3% in Italy are all above the average (EU-14) level. In northern Europe, the highest incidence among tenants are found in Ireland, where a remarkable 20.9% of tenant households declare fuel poverty. The UK (11.9%) and France (9.6%) also suffer relatively highly in this regard (Table 14).

6. MULTIVARIATE ANALYSIS

In this section, Probit regression analysis is used to examine those factors that influence the probability of being fuel poor. A number of indicators of fuel poverty are regressed against socio-economic and other characteristics of households. A Probit analysis allows us to examine the household characteristics that are significantly associated with each indicator of fuel poverty. The added value over the bivariate analysis presented in the cross tabulations is that we can examine the effect of each variable holding all else equal. The results for the earlier waves of the survey are generally more robust. This is most likely because of the larger sample size. Overall, the predictive power of the models is good and it is reassuring that, in general, the same variables remain significant across the four waves.

The results of the Probit model for the household's ability to heat the home adequately, the main indicator of fuel poverty, are set out in Tables 15 and 16. The results suggest that, *inter alia*, being younger, the number of children, marital status, income source, housing tenure, being in receipt of a housing allowance, having poor health status and being less well-educated are significantly associated with being unable to heat the home adequately. The marginal effects suggest that age, marital status, health, education and being in receipt of a housing allowance are most strongly related to the inability to heat the home adequately.

Tables 15 and 16 about here

The results of a Probit model for the household's inability to pay utility bills in the last twelve months are set out in Tables 17 and 18. The results suggest that, *inter alia*, being younger the number of children, marital status, being unemployed or on benefit, living in rental or local authority accommodation, having poor health status and being less well educated are significantly associated with being unable to pay bills in the last twelve months. Interestingly, those households in receipt of a housing allowance are significantly less likely to be unable to pay their bills. The marginal effects suggest that age, income source and education are most strongly related to being unable to pay bills in the last twelve months.

Tables 17 and 18 about here

Results showing those factors that influence the probability of a household having inadequate heating facilities are set out in Tables 19 and 20. The results suggest that, *inter alia*, being younger, household composition, marital status, tenure, accommodation type, having poor health status and being less well-educated are significantly associated with the respondents

perception of the lack of adequate heating facilities. The marginal effects suggest that health status and education are most strongly related with the respondent's perception of the lack of adequate heating facilities.

Tables 19 and 20 about here

The results of a Probit model examining the probability of the presence of central heating in the household are set out in Tables 21 and 22. The results suggest that, *inter alia*, being younger, household composition, marital status, being unemployed or on benefit, living in rental or local authority accommodation, having poor health status, being less well-educated and being in receipt of a housing allowance are significantly associated with a lack of central heating in the accommodation. The marginal effects suggest that marital status, income source, housing tenure, health status and education are most strongly related with the absence of central heating in the accommodation.

Tables 21 and 22 about here

Results showing those factors that influence the probability of the presence of damp in a household are presented in Tables 23 and 24. The results suggest that, *inter alia*, being younger, the number of children, marital status, being unemployed or on benefit, living in rental or local authority accommodation, accommodation type, having poor health status and being less well-educated are significantly associated with the presence of damp in the respondent's accommodation. The marginal effects suggest that health status, tenure, accommodation type and education are most strongly related to the presence of damp.

Tables 23 and 24 about here

Finally, the results of a Probit model for the presence of rot are presented in Tables 25 and 26. The results suggest that, *inter alia*, the number of children, marital status, being unemployed or on benefit, living in rental or local authority accommodation, having poor health status and being less well educated are significantly associated with the presence of rot in the respondent's accommodation. The marginal effects suggest that health status, tenure and education are most strongly related to the presence of rot.

Insert Tables 25 and 26 about here

7. CONCLUSIONS

This paper is the first cross-country analysis of fuel poverty using comparable data. A new methodology for measuring fuel poverty has been proposed which attempts to identify the fuel-poor using a number of social indicators of deprivation and a composite measurement. The data employed are longitudinal and taken from the first four waves of the European Community Household Panel (ECHP). It is argued that the proposed new methodology for measuring fuel poverty is superior to the problematic and unscientific Expenditure approach for measuring fuel poverty (households spending more than 10% of income on home heating), especially in cross-country comparisons where such a measurement may be rendered meaningless. These results compare favourably with those reported by Whyley and Callender (1997) in their provisional analysis of fuel poverty using social indicators[5]. Using six objective and subjective indicators in a weighted composite index, fuel poverty is calculated to be highest in southern Europe. Portugal, Greece, Spain and Italy demonstrate the highest

[5] A composite index was not constructed by Whyley and Callender.

levels of fuel poverty, regardless of sensitivity analysis. In northern Europe rates of fuel poverty are lower, however France, Belgium, the UK and Ireland exhibit relatively high incidences. Using an Expenditure approach, it has been calculated that 16.4% of British households are fuel-poor (DEFRA and DTI, 2001). This is somewhat higher than the results based on social indicators in this research, and it is argued that the Expenditure approach may over-estimate actual levels of fuel poverty because the arbitrary 10% income threshold may be too low. As the quantitative literature on fuel poverty is undesirably thin, there has been little theoretical debate about the appropriate income threshold. It is suggested that this matter be given attention in future research so that both approaches may be consolidated.

Single-parent households are shown to have the highest incidence of fuel poverty across Europe, especially in southern countries where as much as three-quarters are fuel-poor. In northern Europe the highest incidence is found in Ireland and the UK where about one-fifth of lone-parent households are suffering fuel poverty; such results are very high relative to most northern countries. Lone pensioner households are also identifiable as a risk group, especially in southern Europe where up to 88.9% of such households are declaring fuel poverty. In northern countries Ireland and the UK, again, display the highest levels in this social group. Households living in apartment complexes also exhibit high incidences of fuel poverty, especially in Ireland, the UK and southern countries. The unemployed are a key risk group, with 81.1% affected in Portugal. In northern Europe the unemployed in Ireland, France and the UK suffer highest, with 23.3%, 21.3% and 17.7% affected respectively. Tenants are at a far greater risk of fuel poverty than owner-occupiers across Europe, as are those with low educational attainment. Finally, the divorced, separated and widowed display persistently high incidences of fuel poverty in Europe. All of these results are highly significant in the multivariate Probit model.

In the context of recent and ongoing fuel crises, fuel poverty is an issue which, despite some government intervention, has not disappeared. However, the longitudinal results in this paper show some improvements for certain countries affected by fuel poverty, including the UK and Ireland. Perhaps the key result of interest in this analysis is the astonishingly high rates of fuel poverty found in southern Europe, especially in Portugal, Spain and Greece. It is clear from the socio-economic analysis that, throughout Europe, fuel poverty is confined to very specific, discrete social groups. These groups should be targeted for subvention to upgrade their housing and retrofit energy-saving technologies so that such hardship may be alleviated, or at least reduced. In northern Europe, where incomes are substantially higher, it is clear that there remains a significant information gap regarding the benefits of energy-efficiency measures, and high-income households need to be persuaded to retrofit using their own funds, while the unemployed and households comprised of pensioners and lone parents should be targeted for large State-subsidised energy-efficiency retrofit programmes. Similar recommendations were made in a previous analysis of fuel poverty in Ireland (Clinch and Healy, 2000b). It is clear from some of the longitudinal results presented in this paper, including those relating to the UK and Ireland, that such a policy mix can reduce fuel poverty substantially.

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Table 1
% of Households with Various Energy-Efficiency Measures & Energy Consumption per Household ('000 Megajoules) across Europe (1996)[6]

	A	B	DK	FIN	F	D	EL	IRL	NL	NOR	P	S	UK	Mean
Cavity-wall insulation	26	42	65	100	68	24	12	42	47	85	-	100	25	53
Double-glazing	53	62	91	100	52	88	8	33	78	98	3	100	61	64
Floor insulation	11	12	63	100	24	15	6	22	27	88	-	100	4	39
Roof insulation	37	43	76	100	71	42	16	72	53	77	-	100	90	65
Energy use ('000 MJ)	87	92	81	87	77	73	56	102	70	82	37	86	72	77

Source: Eurostat (1999).

[6] Data on energy-efficiency levels and energy use per household in Italy and Spain are unavailable from this survey.

Table 2

Households Unable to Heat Home Adequately (% of Households per Country)

	1994	1995	1996	1997	Mean
Germany	2.0	1.5	1.4	-	1.6
Denmark	4.2	2.9	2.8	2.6	3.1
Netherlands	2.0	1.8	2.0	2.2	2.0
Belgium	4.6	4.1	2.8	3.0	3.6
Luxembourg	2.6	3.1	3.5	-	3.1
France	8.5	7.3	7.0	5.8	7.2
UK	8.9	6.2	5.3	2.7	5.8
Ireland	8.0	5.9	6.5	5.1	6.4
Italy	22.4	22.7	20.6	20.3	21.5
Greece	46.8	45.5	46.8	42.9	45.5
Spain	58.7	57.7	53.3	49.7	54.9
Portugal	75.8	74.9	73.8	72.9	74.4
Austria	-	2.5	1.9	1.8	2.1
Finland	-	-	4.7	4.7	4.7

Table 3

Households Unable to Pay Scheduled Utility Bills (% of Households per Country)

	1994	1995	1996	1997	Mean
Germany	2.2	1.6	1.5	-	1.8
Denmark	3.2	2.6	2.4	2.6	2.7
Netherlands	1.4	1.1	1.2	1.4	1.3
Belgium	7.7	6.1	6.9	6.7	6.9
Luxembourg	3.1	2.2	2.8		2.7
France	8.8	7.2	7.3	7.0	7.6
UK	9.4	7.8	7.0	-	8.1
Ireland	8.4	6.3	6.1	4.9	6.4
Italy	3.8	3.8	4.5	4.1	4.1
Greece	36.5	30.1	-	29.3	32.0
Spain	5.2	4.3	3.7	4.1	4.3
Portugal	3.1	1.7	1.7	1.8	2.1
Austria	-	1.1	1.1	1.2	1.1
Finland	-	-	11.4	0	5.7

Table 4

Households Declaring a Lack of Adequate Heating Facilities (% of Households per Country)

	1994	1995	1996	1997	Mean
Germany	6.1	4.6	3.7	-	4.8
Denmark	4.0	3.5	4.1	3.4	3.8
Netherlands	6.6	5.9	6.9	6.0	6.4
Belgium	8.7	7.3	8.1	7.6	7.9
Luxembourg	5.2	5.2	5.6		5.3
France	12.4	10.8	10.3	10.5	11.0
UK	14.3	10.0	9.1	5.5	9.7
Ireland	9.6	7.4	7.6	7.0	7.9
Italy	21.1	17.7	16.1	16.5	17.9
Greece	39.1	36.0	30.8	31.3	34.3
Spain	5.0	1.2	1.3	2.5	2.5
Portugal	39.2	39.3	40.1	40.3	39.7
Austria	-	7.2	6.7	4.8	6.2
Finland	-	-	3.0	2.8	2.9

Table 5

Households with Damp Spores (% of Households per Country)

	1994	1995	1996	1997	Mean
Germany	9.5	7.8	6.4	-	7.9
Denmark	6.6	6.2	6.5	5.6	6.2
Netherlands	12.0	12.0	9.8	9.5	10.8
Belgium	15.8	16.7	12.3	12.8	14.4
Luxembourg	7.2	8.2	7.2	-	7.5
France	19.5	17.1	14.6	14.0	16.3
UK	17.2	14.3	12.2	8.1	13.0
Ireland	10.5	9.4	8.9	9.4	9.6
Italy	7.2	5.4	4.8	4.1	5.4
Greece	20.8	17.7	18.5	18.2	18.8
Spain	25.6	19.2	20.4	20.8	21.5
Portugal	32.7	32.3	33.5	35.2	33.4
Austria	-	10.1	8.3	8.1	8.8
Finland	-	-	3.9	3.7	3.8

Table 6

Households without Central or Electric Storage Heating (% of Households per Country)

	1994	1995	1996	1997	Mean
Germany	12.4	10.3	8.6	15.3	11.7
Denmark	3.2	1.8	1.0	1.0	1.8
Netherlands	14.4	13.2	12.7	11.4	12.9
Belgium	25.8	24.3	24.0	21.4	23.9
Luxembourg	7.6	6.9	5.4	-	6.6
France	10.6	10.1	9.8	8.9	9.9
UK	14.8	12.1	10.7	10.0	11.9
Ireland	23.8	20.8	19.8	16.4	20.2
Italy	26.6	18.6	17.3	17.7	20.1
Greece	44.7	46.9	46.4	44.7	45.7
Spain	71.6	69.9	65.2	62.2	67.2
Portugal	92.5	92.1	92.2	89.9	91.7
Austria	-	19.8	17.9	10.0	15.9
Finland	-	-	3.4	16.3	9.9

Table 7
Households with Rotten Window Frames (% of Households per Country)

	1994	1995	1996	1997	Mean
Germany	6.4	5.4	4.2	-	5.3
Denmark	6.1	5.2	5.8	5.2	5.6
Netherlands	9.8	10.2	9.8	8.8	9.7
Belgium	9.2	10.3	8.7	8.3	9.1
Luxembourg	4.8	5.2	4.4	-	4.8
France	11.2	10.7	9.7	10.0	10.4
UK	15.3	14.1	11.6	9.9	12.7
Ireland	8.9	6.4	7.0	6.7	7.3
Italy	8.0	6.2	5.2	5.3	6.2
Greece	11.8	9.6	8.5	7.4	9.3
Spain	9.7	7.7	6.4	6.6	7.6
Portugal	24.2	26.1	25.0	25.3	25.2
Austria	-	5.5	4.4	3.8	4.6
Finland	-	-	2.5	2.6	2.6

Table 8

Sensitivity Analysis of Fuel Poverty Results (% of Households, 1994-97)

Scenario	1	2	3	4	5	6
Germany	4.0	5.5	2.7	8.3	5.0	4.7
Denmark	3.6	3.9	3.2	4.5	3.9	3.7
Netherlands	5.1	7.2	3.2	11.1	6.7	6.2
Belgium	8.0	11.0	6.1	15.8	9.9	9.5
Luxembourg	4.2	5.0	3.7	6.3	4.8	4.6
France	9.1	10.4	8.6	12.2	9.8	9.8
UK	8.4	10.2	7.9	12.5	9.3	9.3
Ireland	8.3	9.6	6.9	12.4	9.5	9.0
Italy	16.1	12.5	14.5	10.6	16.1	14.3
Greece	36.0	29.7	34.7	24.6	35.3	32.8
Spain	37.8	26.3	20.6	32.1	43.8	31.9
Portugal	56.4	44.4	38.7	50.1	62.8	50.3
Austria	4.7	6.5	3.1	9.8	6.0	5.6
Finland	4.8	4.9	4.4	5.4	5.1	4.9

Table 9

Fuel Poverty in Europe by Socio-Demographic Type (Mean % of Households, 1994-97)

	D	DK	NL	B	L	F	UK	IRL	I	EL	E	P	A	FIN
1 male aged –30	1.8	3.4	2.5	3.9	7.8	8.8	7.5	6.0	20.5	22.4	50.2	52.9	3.4	7.0
1 male aged 30-64	2.1	4.5	2.2	5.7	6.2	13.1	9.6	11.4	14.3	40.6	52.9	78.2	3.1	7.9
1 male aged 65+	1.4	3.6	2.9	3.6	2.0	6.0	8.3	11.8	25.6	62.6	67.7	85.3	0.7	3.6
1 female aged –30	2.6	4.1	1.7	3.3	4.9	9.8	6.6	9.7	20.6	29.7	50.9	56.3	3.9	10.5
1 female aged 30-64	3.9	6.8	4.6	7.5	3.4	12.3	10.2	9.8	20.3	52.6	54.4	79.4	2.8	7.2
1 female aged 65+	2.4	3.0	4.8	4.1	1.8	8.1	7.3	7.8	30.1	68.0	74.2	88.9	4.1	4.9
Single parent (All children <16)	2.4	3.9	12.0	6.9	9.3	15.0	18.6	19.3	22.9	48.5	62.7	71.4	3.3	8.8
Single parent (≥1 child 16+)	3.2	3.3	5.8	4.6	4.3	13.5	10.2	11.8	24.9	50.5	60.1	77.7	2.5	7.0
Couple without children (≥1 person 65+)	0.9	1.4	1.5	2.7	2.4	4.3	5.3	4.5	21.0	58.4	61.5	74.4	0.9	4.5
Couple without children (both <65)	1.6	1.9	0.9	3.1	2.2	6.0	4.4	3.9	14.8	41.1	45.6	64.7	1.4	3.8
Couple with 1 child	0.9	1.6	1.6	2.9	4.2	5.0	5.6	5.1	18.0	31.6	46.9	63.9	1.8	3.0
Couple with 2 children	1.1	1.3	0.9	3.9	1.0	4.8	3.7	3.8	18.4	33.9	46.0	63.1	1.9	3.6
Couple with 3+ children	1.6	2.2	0.3	3.6	6.0	6.4	9.5	8.3	32.0	41.2	58.5	84.2	4.4	2.8
Couple with 1+ child (≥1 child 16+)	2.3	1.7	1.1	3.2	1.7	7.6	5.1	4.0	22.2	42.7	51.2	68.8	1.4	3.9
Other households	2.1	2.7	5.0	5.0	0.4	6.9	9.2	7.0	23.3	47.4	58.2	79.0	1.3	2.9

Table 10

Fuel Poverty in Europe by Housing Type (Mean % of Households, 1994-97)

	D	DK	NL	B	L	F	UK	IRL	I	EL	E	P	A	FIN
Detached	1.0	2.8	1.0	2.9	2.1	6.3	2.4	4.7	26.3	56.5	59.2	79.2	1.4	3.5
Semi-Detached/Terraced	1.1	4.1	1.6	4.0	2.4	8.1	6.3	7.4	11.1	55.0	73.0	81.5	0.9	4.2
Small MFDs	1.8	3.6	3.4	4.1	4.1	9.2	11.2	14.1	25.4	36.2	57.8	57.2	3.0	4.4
Large MFDs	2.3	2.9	3.0	4.1	7.2	6.6	9.2	17.4	13.9	28.1	43.8	38.9	2.9	6.8
Other	2.8	4.5	2.0	6.0	-	5.8	5.6	18.0	35.9	47.8	70.3	95.4	2.4	6.2

Table 11

Fuel Poverty in Europe by Marital Status (Mean % of Households, 1994-97)

	D	DK	NL	B	L	F	UK	IRL	I	EL	E	P	A	FIN
Married	1.2	2.1	1.0	2.9	2.5	5.0	4.5	4.7	20.7	45.5	52.4	71.6	1.4	3.6
Separated	-	-	-	8.8	-	14.0	11.2	18.3	21.4	48.5	66.9	81.9	-	-
Divorced	3.5	5.1	5.7	6.1	-	12.4	13.7	-	12.7	49.1	58.0	67.7	3.2	6.4
Widowed	2.1	3.5	4.4	4.0	-	7.5	8.2	7.0	25.8	55.9	63.6	83.9	2.5	4.8
Never married	1.6	3.1	1.3	3.8	4.2	8.7	6.3	6.2	24.6	43.3	53.9	74.7	2.1	4.9

Table 12

Fuel Poverty by Educational Attainment (Mean % of Households, 1994-97)

	D	DK	NL	B	L	F	UK	IRL	I	EL	E	P	A	FIN
Owner	0.8	2.0	0.7	2.6	3.7	3.9	2.4	1.8	7.9	21.4	29.6	21.9	1.7	2.8
Tenant	1.4	2.4	1.2	3.4	2.3	5.9	4.6	3.2	14.7	32.7	40.9	49.7	1.4	4.5
Rent-Free	1.9	3.8	2.7	4.0	2.8	8.2	8.3	8.4	25.5	54.9	62.5	79.0	2.2	5.0

Table 13

Fuel Poverty in Europe by Main Income Source (Mean % of Households, 1994-97)

	D	DK	NL	B	L	F	UK	IRL	I	EL	E	P	A	FIN
Wages (employee)	1.3	2.1	0.7	2.8	3.3	6.0	3.2	3.4	18.4	36.5	47.6	71.6	1.7	4.1
Self-employed/Farming	1.0	2.5	0.6	3.7	1.8	6.1	3.0	2.9	17.2	41.5	44.6	64.6	1.1	2.9
Pensions	1.8	3.4	3.1	3.2	1.9	6.1	5.9	7.5	24.9	58.3	65.3	81.8	2.2	5.0
Unemployed	4.9	10.3	5.0	9.5	-	21.3	17.7	23.3	46.6	-	79.2	81.1	9.9	6.6
Other social transfers	4.6	6.5	7.4	8.2	-	19.5	16.3	17.4	44.0	65.5	73.9	84.5	3.7	8.3
Private	0.8	1.5	1.4	5.4	-	8.9	3.5	6.8	28.8	37.5	52.6	56.0	6.5	7.6

Table 14

Fuel Poverty in Europe by Housing Tenure (Mean % of Households, 1994-97)

	D	DK	NL	B	L	F	UK	IRL	I	EL	E	P	A	FIN
Owner	0.8	2.2	0.5	2.9	2.3	5.6	3.1	4.1	19.9	49.3	52.0	71.8	1.1	3.8
Tenant	2.3	4.8	3.7	5.4	5.0	9.6	11.9	20.9	27.3	52.8	67.3	77.8	3.5	8.6
Rent-Free	0.7	4.5	1.9	2.7	-	7.1	5.6	9.2	22.8	51.3	67.2	83.4	3.0	6.0

Table 15

Ability to heat home adequately: results of a Probit Model for 1994 and 1995

Dependent Variable: HEAT HOME		1994				1995			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		2.512	80.83	-	-	2.261	72.71	-	-
Age Group	16-34	-.328	-17.43	[.000]***	-9.1%	-.359	-19.21	[.000]***	-9.7%
	35-44	-.184	-9.94	[.000]***	-5.1%	-.181	-9.70	[.000]***	-4.9%
	45-54	-.026	-1.53	[.124]	-0.7%	-.018	-1.04	[.296]	-0.5%
	55-64	-.078	-5.01	[.000]***	-2.1%	-.044	-2.81	[.005]**	-1.2%
Household Composition	Number of Adults	-.145	-40.93	[.000]***	-4%	-.115	-33.21	[.000]***	-3.1%
	Number of Children	-.054	-10.78	[.000]***	-1.5%	-.031	-6.17	[.000]***	-0.8%
Marital Status	Separated	-.298	-8.32	[.000]***	-8.3%	-.306	-8.37	[.000]***	-8.3%
	Divorced	-.025	-.96	[.333]	-0.7%	.068	2.57	[.010]**	1.8%
	Widowed	-.149	-9.07	[.000]***	-4.1%	-.128	-7.77	[.000]***	-3.4%
	Single	-.106	-8.34	[.000]***	-2.9%	-.040	-3.14	[.002]**	-1%
Income	Self employed	-.094	-7.23	[.000]***	-2.6%	-.167	-12.94	[.000]***	-4.5%
	Pension	-.183	-13.62	[.000]***	-5.1%	-.178	-13.24	[.000]***	-4.8%
	Unemployed	-.267	-10.66	[.000]***	-7.5%	-.231	-8.29	[.000]***	-6.2%
	Other benefit	-.249	-13.47	[.000]***	-6.9%	-.188	-9.81	[.000]***	-5.1%
	Private Income	-.147	-4.99	[.000]***	-4.1%	-.291	-9.47	[.000]***	-7.9%
Tenure	Tenant	.024	2.34	[.019]**	0.6%	-.040	-3.90	[.000]***	-1.1%
	Rent free	-.499	-26.45	[.000]***	-13.9%	-.099	-4.76	[.000]***	-2.7%
Accommodation type	Semi-detached Terraced	.074	6.98	[.000]***	2%	.128	11.53	[.000]***	3.4%
	Apartment Small	-.150	-12.58	[.000]***	-4.2%	.278	21.32	[.000]***	7.5%
	Apartment Large	-.091	-7.50	[.000]***	-2.5%	.023	2.02	[.043]**	0.6%
	Other Accommodation	.066	2.13	[.033]**	1.8%	.118	5.26	[.000]***	3.2%
Health Status	Good	-.124	-11.54	[.000]***	-3.4%	-.076	-7.02	[.000]***	-2%
	Fair	-.281	-22.08	[.000]***	-7.8%	-.264	-20.57	[.000]***	-7.1%
	Bad	-.793	-46.44	[.000]***	-22.2%	-.738	-42.60	[.000]***	-20.1%
	Very Bad	-.740	-29.12	[.000]***	-20.7%	-.683	-25.13	[.000]***	-18.6%
Education	Secondary finished	-.077	-5.59	[.000]***	-2.1%	.016	1.16	[.242]	0.4%
	Secondary not finished	-.850	-68.20	[.000]***	-23.8%	-.768	-60.63	[.000]***	-20.9%
Housing allowance		-.399	-19.93	[.000]***	-11.1%	-.396	-19.05	[.000]***	-10.7%
Number of Observations				128045				127912	
Log Likelihood				-63773.5				-61995.9	
Mean of Dependent Variable				.740708				.761336	
Percentage Correct Prediction				75.7%				77%	
Pseudo R^2				.147070				.128931	

***significant at 1% level; **significant at 5% level.

Table 16

Ability to heat home adequately: results of a Probit Model for 1996 and 1997

Dependent Variable: HEAT HOME		1996				1997			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		2.151	68.04	-	-	.844	33.60	-	-
Age Group	16-34	-.348	-18.22	[.000]***	-8.9%	-.197	-11.60	[.000]***	-6.8%
	35-44	-.180	-9.49	[.000]***	-4.6%	-.060	-3.57	[.000]***	-2.1%
	45-54	-.889	-.49	[.618]	-0.2%	-.035	-2.25	[.024]**	-1.2%
	55-64	-.010	-.62	[.532]	-0.2%	-.077	-5.38	[.000]***	-2.7%
Household	Number of Adults	-.121	-34.08	[.000]***	-3.1%	-.012	-3.86	[.000]***	-0.4%
Composition	Number of Children	-.027	-5.21	[.000]***	-0.7%	-.017	-3.83	[.000]***	-0.5%
Marital Status	Separated	-.246	-6.30	[.000]***	-6.3%	-.068	-2.07	[.038]**	-2.3%
	Divorced	.048	1.86	[.062]**	1.2%	.088	4.57	[.000]***	3%
	Widowed	-.149	-8.93	[.000]***	-3.8%	.050	3.29	[.001]***	1.7%
	Single	.729	.56	[.573]	0.1%	.125	11.56	[.000]***	4.3%
Income	Self employed	-.128	-9.71	[.000]***	-3.3%	.189	15.12	[.000]***	6.5%
	Pension	-.191	-14.09	[.000]***	-4.9%	-.059	-4.79	[.000]***	-2%
	Unemployed	-.239	-8.19	[.000]***	-6.1%	-.169	-6.83	[.000]***	-5.9%
	Other benefit	-.206	-10.66	[.000]***	-5.3%	.111	6.53	[.000]***	3.8%
	Private Income	-.084	-2.49	[.013]**	-2.1%	.195	7.03	[.000]***	6.8%
Tenure	Tenant	.106	9.88	[.000]***	2.7%	-.336	-36.17	[.000]***	-11.6%
	Rent free	-.094	-4.46	[.000]***	-2.4%	-.176	-9.69	[.000]***	-6.1%
Accommodation type	Semi-detached Terraced	.359	31.50	[.000]***	9.2%	.273	28.72	[.000]***	9.5%
	Apartment Small	.422	31.79	[.000]***	10.8%	-.039	-3.59	[.000]***	-1.3%
	Apartment Large	.045	3.93	[.000]***	1.1%	.149	13.90	[.000]***	5.1%
	Other Accommodation	.613	23.43	[.000]***	15.8%	-.661	-34.72	[.000]***	-23%
Health Status	Good	-.034	-3.13	[.002]**	-0.8%	.132	14.71	[.000]***	4.6%
	Fair	-.181	-13.87	[.000]***	-4.6%	-.058	-5.49	[.000]***	-2%
	Bad	-.658	-37.36	[.000]***	-16.9%	-.456	-29.65	[.000]***	-15.8%
	Very Bad	-.653	-23.38	[.000]***	-16.8%	-.452	-17.84	[.000]***	-15.7%
Education	Secondary finished	-.028	-1.99	[.046]**	-0.7%	-.065	-6.48	[.000]***	-2.2%
	Secondary not finished	-.786	-60.65	[.000]***	-20.2%	-.298	-30.89	[.000]***	-10.3%
Housing allowance		-.385	-18.35	[.000]***	-9.9%	-.159	-9.81	[.000]***	-5.5%
Number of Observations				130639				138130	
Log Likelihood				-60067.0				-84430.0	
Mean of Dependent Variable				.778542				.655578	
Percentage Correct Prediction				78.8%				67.4%	
Pseudo R^2				.137743				.064895	

***significant at 1% level; **significant at 5% level.

Table 17

Being unable to pay bills in the last twelve months: results of a Probit Model for 1994 & 1995

Dependent Variable: BILLS		1994				1995			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		-2.09	-57.48	-	-	-1.761	-45.79	-	-
Age Group	16-34	.333	13.33	[.000]***	4.8%	.299	11.20	[.000]***	3.5%
	35-44	.224	9.06	[.000]***	3.2%	.209	7.94	[.000]***	2.5%
	45-54	.228	9.70	[.000]***	3.3%	.186	7.32	[.000]***	2.2%
	55-64	.172	8.04	[.000]***	2.5%	.060	2.57	[.010]**	0.7%2
Household Composition	Number of Adults	.080	18.06	[.000]***	1.1%	.047	9.91	[.000]***	0.5%
	Number of Children	.121	20.78	[.000]***	1.7%	.104	16.87	[.000]***	1.2%
Marital Status	Separated	.345	8.54	[.000]***	5%	.392	9.073	[.000]***	4.6%
	Divorced	.234	8.23	[.000]***	3.4%	.220	7.23	[.000]***	2.6%
	Widowed	.142	6.38	[.000]***	2%	.101	4.17	[.000]***	1.2%
	Single	.048	3.01	[.003]**	0.7%	.038	2.21	[.027]**	0.4%
Income	Self employed	.256	15.79	[.000]***	3.7%	.248	14.56	[.000]***	2.9%
	Pension	.197	10.91	[.000]***	2.8%	.133	6.78	[.000]***	1.5%
	Unemployed	.381	13.31	[.000]***	5.5%	.529	16.69	[.000]***	6.3%
	Other benefit	.296	13.80	[.000]***	4.3%	.308	13.10	[.000]***	36%
	Private Income	.357	10.24	[.000]***	5.2%	.452	12.11	[.000]***	5.3%
Tenure	Tenant	.186	14.28	[.000]***	2.7%	-.107	-7.14	[.000]***	-1.2%
	Rent free	.115	4.53	[.000]***	1.6%	.376	15.37	[.000]***	4.4%
Accommodation type	Semi-detached Terraced	.096	6.89	[.000]***	1.4%	.034	2.33	[.020]**	0.4%
	Apartment Small	.208	13.40	[.000]***	3%	-.029	-1.7	[.081]*	-0.3%
	Apartment Large	.144	9.07	[.000]***	2.1%	-.167	-9.70	[.000]***	-1.9%
	Other Accommodation	-.137	-3.07	[.002]**	-2%	-.425	-10.89	[.000]***	-5%
Health Status	Good	-.170	-12.73	[.000]***	-2.4%	-.198	-13.80	[.000]***	-2.3%
	Fair	-.021	-1.34	[.179]	-0.3%	-.045	-2.67	[.008]**	-0.5%
	Bad	.140	6.42	[.000]***	2%	.109	4.55607	[.000]***	1.3%
	Very Bad	.298	9.65	[.000]***	4.3%	.293	8.40	[.000]***	3.5%
Education	Secondary finished	.090	5.35	[.000]***	1.3%	.037	2.00	[.045]**	0.4%
	Secondary not finished	.327	20.65	[.000]***	4.7%	.284	16.57	[.000]***	3.3%
Housing allowance		-.289	-14.21	[.000]***	-4.2%	-.365	-16.87	[.000]***	-4.3%
Number of Observations				128045				127912	
Log Likelihood				-34807.6				-28796.8	
Mean of Dependent Variable				.084267				.064685	
Percentage Correct Prediction				91.5%				93.5%	
Pseudo R^2				.034908				.029552	

***significant at 1% level; **significant at 5% level.

Table 18

Being unable to pay bills in the last twelve months: results of a Probit Model for 1996 & 1997

Dependent Variable: BILLS		1996				1997			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		-2.219	-48.89	-	-	-2.189	-55.85	-	-
Age Group	16-34	.577	16.85	[.000]***	4.7%	.236	8.42	[.000]***	2.4%
	35-44	.478	14.20	[.000]***	3.9%	.207	7.53	[.000]***	2.1%
	45-54	.4450	13.61	[.000]***	3.6%	.167	6.38	[.000]***	1.7%
	55-64	.216	6.82	[.000]***	1.7%	.091	3.72	[.010]**	0.9%
Household Composition	Number of Adults	.042	7.89	[.000]***	0.3%	.084	16.92	[.000]***	0.8%
	Number of Children	.1341	20.17	[.000]***	1.1%	.118	18.78	[.000]***	1.2%
Marital Status	Separated	.411	8.26	[.000]***	3.3%	.208	4.35	[.000]***	2.1%
	Divorced	.336	10.82	[.000]***	2.7%	.156	5.18	[.000]***	1.6%
	Widowed	.127	3.93	[.000]***	1%	.162	6.48	[.000]***	1.6%
	Single	.119	6.21	[.000]***	0.9%	.047	2.71	[.027]**	0.4%
Income	Self employed	-.020	-.91	[.360]	-0.1%	.277	15.63	[.000]***	2.8%
	Pension	.039	1.62	[.104]	0.3%	.146	7.23	[.000]***	1.5%
	Unemployed	.638	19.32	[.000]***	5.2%	.445	13.54	[.000]***	4.6%
	Other benefit	.365	15.15	[.000]***	3%	.221	9.18	[.000]***	2.3%
	Private Income	-.056	-.94	[.343]	-0.4%	.286	7.10	[.000]***	2.9%
Tenure	Tenant	-.053	-3.25	[.001]**	-0.4%	.075	5.08	[.000]***	0.7%
	Rent free	.023	.68	[.495]	0.1%	-.093	-2.95	[.000]***	-0.9%
Accommodation type	Semi-detached Terraced	-.016	-.89	[.373]	-0.1%	.811	.52	[.020]**	0.0%
	Apartment Small	.126	6.44	[.000]***	1%	.214	12.68	[.081]*	2.2%
	Apartment Large	.071	3.77	[.000]***	0.5%	.121	7.06	[.000]***	1.2%
	Other Accommodation	.170	5.20	[.000]***	1.4%	-.255	-6.42	[.000]***	-2.6%
Health Status	Good	.042	2.48	[.013]**	0.3%	-.174	-12.05	[.000]***	-1.8%
	Fair	.277	13.80	[.000]***	2.2%	-.044	-2.60	[.008]**	-0.4%
	Bad	.392	13.55	[.000]***	3.2%	.039	1.60	[.000]***	0.4%
	Very Bad	.491	11.13	[.000]***	4%	.209	5.71	[.000]***	2.1%
Education	Secondary finished	.034	1.66	[.095]*	0.2%	.055	3.07	[.045]**	0.5%
	Secondary not finished	.163	8.50	[.000]***	1.3%	.346	21.22	[.000]***	3.6%
Housing allowance		-.566	-26.37	[.000]***	-4.6%	-.244	-10.86	[.000]***	-2.5%
Number of Observations				130639				138130	
Log Likelihood				-20753.7				-27432.9	
Mean of Dependent Variable				.042198				.053993	
Percentage Correct Prediction				95.7%				94.5%	
Pseudo R^2				.033154				.023387	

***significant at 1% level; **significant at 5% level.

Table 19

Respondents perception of the lack of adequate heating facilities: results of a Probit Model for 1994 & 1995

Dependent Variable: FACILITY		1994				1995			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		-1.73	-54.57	-	-	-1.73	-53.12	-	-
Age Group	16-34	.156	7.69	[.000]***	3.4%	.196	9.49	[.000]***	4%
	35-44	.080	3.99	[.000]***	1.8%	.056	2.75	[.006]**	1.1%
	45-54	-.014	-.76	[.445]	-0.3%	-.036	-1.84	[.066]*	-0.7%
	55-64	.058	3.42	[.001]**	1.2%	.546	.31	[.754]	0.1%
Household	Number of Adults	.058	15.18	[.000]***	1.2%	.028	7.25	[.000]***	0.5%
Composition	Number of Children	.015	2.86	[.004]**	0.3%	.021	3.81	[.000]***	0.4%
Marital Status	Separated	.136	3.55	[.000]***	3%	.134	3.30	[.001]**	2.7%
	Divorced	.046	1.76	[.078]*	1%	.059	2.17	[.029]**	1.2%
	Widowed	.048	2.68	[.007]**	1%	.055	3.05	[.002]**	1.1%
	Single	.122	8.96	[.000]***	2.7%	.100	7.25	[.000]***	2%
Income	Self employed	.213	15.27	[.000]***	4.7%	.197	13.97	[.000]***	4%
	Pension	.095	6.44	[.000]***	2.1%	.037	2.48	[.013]**	0.7%
	Unemployed	.028	1.00	[.317]	0.6%	-.495	-.15	[.878]	-0.1%
	Other benefit	.112	5.75	[.000]***	2.5%	.100	4.80	[.000]***	2%
	Private Income	.141	4.47	[.000]***	3.1%	.042	1.18	[.234]	0.8%
Tenure	Tenant	.411	36.87	[.000]***	9.1%	-.031	-2.70	[.007]**	-0.6%
	Rent free	.466	23.60	[.000]***	10%	.160	7.16	[.000]***	3.2%
Accommodation type	Semi-detached Terraced	-.192	-16.79	[.000]***	-4.3%	-.326	-.26	[.791]	0%
	Apartment Small	-.093	-7.22	[.000]***	-2%	.013	.96	[.334]	0.2%
	Apartment Large	-.421	-29.57	[.000]***	-9.4%	.767	.58	[.558]	0.1%
	Other Accommodation	.188	6.31	[.000]***	4.2%	-.091	-3.57	[.000]***	-1.8%
Health Status	Good	-.029	-2.55	[.011]**	-0.6%	-.518	-.43	[.667]	-0.1%
	Fair	.168	12.29	[.000]***	3.7%	.198	14.03	[.000]***	4%
	Bad	.442	24.31	[.000]***	9.8%	.503	26.78	[.000]***	10.3%
	Very Bad	.491	18.47	[.000]***	10.9%	.554	19.24	[.000]***	11.4%
Education	Secondary finished	.820	.567	[.571]	0.1%	.020	1.32	[.184]	0.4%
	Secondary not finished	.414	31.37	[.000]***	9.2%	.449	32.16	[.000]***	9.2%
Housing allowance		.056	2.86	[.004]**	1.2 %	.018	.87	[.383]	0.3 %
Number of Observations				128045				127912	
Log Likelihood				-51706.4				-47941.7	
Mean of Dependent Variable				.155766				.133506	
Percentage Correct Prediction				84.4%				86.6%	
Pseudo R^2				.057798				.0.36574	

***significant at 1% level; **significant at 5% level.

Table 20

Respondents perception of the lack of adequate heating facilities: results of a Probit Model for 1996 and 1997

Dependent Variable: FACILITY		1996				1997			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		-1.74	-52.09	-	-	-2.14	-62.31	-	-
Age Group	16-34	.177	8.30	[.000]***	3.3%	.176	8.02	[.000]***	2.9%
	35-44	.057	2.73	[.006]**	1.1%	.085	3.87	[.000]***	1.4%
	45-54	-.016	-.84	[.400]	-0.3%	-.027	-1.31	[.190]	-0.4%
	55-64	-.028	-1.57	[.115]	-0.5%	.125	.06	[.946]	0%
Household Composition	Number of Adults	.024	6.10	[.000]***	0.4%	.077	18.59	[.000]***	1.3%
	Number of Children	.034	6.16	[.000]***	0.6%	.032	5.70	[.000]***	0.5%
Marital Status	Separated	.154	3.54	[.000]***	2.9%	.174	4.19	[.000]***	2.9%
	Divorced	.115	4.29	[.000]***	2.1%	.025	.94	[.345]	0.4%
	Widowed	.089	4.78	[.000]***	1.6%	.100	5.27	[.000]***	1.7%
	Single	.117	8.28	[.000]***	2.2%	.086	5.94	[.000]***	1.4%
Income	Self employed	.168	11.56	[.000]***	3.2%	.219	14.33	[.000]***	3.7%
	Pension	.031	2.07	[.038]**	0.6%	.141	8.90	[.000]***	2.3%
	Unemployed	.126	3.89	[.000]***	2.3%	.017	.51	[.608]	0.2%
	Other benefit	.076	3.60	[.000]***	1.4%	.043	2.01	[.044]**	0.7%
	Private Income	-.015	-.39	[.689]	-0.2%	.052	1.42	[.155]	0.8%
Tenure	Tenant	-.102	-8.61	[.000]***	-1.9%	.324	26.40	[.000]***	5.4%
	Rent free	.090	3.85	[.000]***	1.7%	.433	20.62	[.000]***	7.3%
Accommodation type	Semi-detached Terraced	-.092	-7.21	[.000]***	-1.7%	-.122	-9.96	[.000]***	-2%
	Apartment Small	-.035	-2.43	[.015]**	-0.6%	-.099	-7.07	[.000]***	-1.6%
	Apartment Large	.162	12.55	[.000]***	3%	-.432	-27.34	[.000]***	-7.3%
	Other Accommodation	-.408	-13.22	[.000]***	7.7%	-.248	-9.23	[.000]***	-4.2%
Health Status	Good	.035	2.80	[.005]**	0.6%	.056	4.42	[.000]***	0.9%
	Fair	.241	16.25	[.000]***	4.5%	.251	17.03	[.000]***	4.2%
	Bad	.557	28.84	[.000]***	10.6%	.522	27.17	[.000]***	8.8%
	Very Bad	.575	19.10	[.000]***	10.9%	.559	18.80	[.000]***	9.4%
Education	Secondary finished	-.035	-2.25	[.024]**	-0.6%	-.049	-3.21	[.000]**	-0.8%
	Secondary not finished	.411	29.27	[.000]***	7.8%	.485	35.94	[.000]***	8.1%
Housing allowance		-.415	-.19	[.843]	0%	.108	4.88	[.000]***	1.8%
Number of Observations				130639				138130	
Log Likelihood				-45534.8				-42951.1	
Mean of Dependent Variable				.120840				.106277	
Percentage Correct Prediction				87.9%				89.3%	
Pseudo R^2				.040669				.056184	

***significant at 1% level; **significant at 5% level.

Table 21

Presence of Central Heating: results of a Probit Model for 1994 & 1995

Dependent Variable: CRLHEAT		1994				1995			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		2.32	77.78	-	-	2.04	68.11	-	-
Age Group	16-34	-.133	-7.46	[.000]***	-4.2%	-.145	-8.22	[.000]***	-4.5%
	35-44	-.886	-.50	[.616]	-0.2%	-.020	-1.14	[.252]	-0.6%
	45-54	.122	7.36	[.000]***	3.9%	.137	8.24	[.000]***	4.2%
	55-64	.067	4.53	[.000]***	2.1%	.075	5.05	[.000]***	2.3%
Household	Number of Adults	-.109	-32.01	[.000]***	-3.4%	-.093	-27.83	[.000]***	-2.9%
Composition	Number of Children	-.034	-7.13	[.000]***	-1.1%	-.865	-1.77	[.076]*	-0.2%
Marital Status	Separated	-.260	-7.51	[.000]***	-8.3%	-.293	-8.27	[.000]***	-9.1%
	Divorced	.086	3.52	[.000]***	2.7%	.035	1.46	[.144]	1.1%
	Widowed	-.086	-5.44	[.000]***	-2.7%	-.103	-6.54	[.000]***	-3.2%
	Single	-.150	-12.56	[.000]***	-4.8%	-.107	-8.96	[.000]***	-3.3%
Income	Self employed	-.134	-10.80	[.000]***	-4.3%	-.196	-15.96	[.000]***	-6.1%
	Pension	-.134	-10.39	[.000]***	-4.3%	-.156	-12.16	[.000]***	-4.8%
	Unemployed	-.372	-15.25	[.000]***	-11.9%	-.372	-13.97	[.000]***	-11.6%
	Other benefit	-.235	-13.00	[.000]***	-7.5%	-.168	-8.95	[.000]***	-5.2%
	Private Income	-.038	-1.37	[.169]	-1.2%	-.090	-3.01	[.003]**	-2.8%
Tenure	Tenant	-.078	-7.90	[.000]***	-2.5%	-.168	-17.25	[.000]***	-5.2%
	Rent free	-.499	-26.70	[.000]***	-16%	.037	1.84	[.065]*	1.1%
Accommodation type	Semi-detached Terraced	.011	1.15	[.246]	-0.3%	.328	30.98	[.000]***	10.2%
	Apartment Small	-.091	-8.00	[.000]***	-2.9%	.381	31.20	[.000]***	11.9%
	Apartment Large	.026	2.26	[.024]**	0.8%	.165	14.92	[.000]***	5.1%
	Other Accommodation	-.019	-.667	[.504]	-0.6%	.135	6.49	[.000]***	4.2%
Health Status	Good	-.197	-19.58	[.000]***	-6.3%	-.151	-14.91	[.000]***	-4.7%
	Fair	-.282	-23.52	[.000]***	-9%	-.246	-20.29	[.000]***	-7.6%
	Bad	-.695	-41.64	[.000]***	-22.2%	-.629	-37.09	[.000]***	-19.6%
	Very Bad	-.564	-22.39	[.000]***	-18%	-.493	-18.22	[.000]***	-15.4%
Education	Secondary finished	-.076	-6.21	[.000]***	-2.4%	-.053	-4.18	[.000]***	-1.6%
	Secondary not finished	-.805	-70.94	[.000]***	-25.8%	-.774	-66.11	[.000]***	-24.1%
Housing allowance		-.745	-37.27	[.000]***	-23.8 %	-.678	-32.61	[.000]***	-21.1 %
Number of Observations				128045				127912	
Log Likelihood				-54516.4				-70449.8	
Mean of Dependent Variable				.167941				.686042	
Percentage Correct Prediction				83.2%				71.5%	
Pseudo R^2				.053848				.140859	

***significant at 1% level; **significant at 5% level.

Table 22

Presence of Central Heating - results of a Probit Model for 1996 & 1997

Dependent Variable: CRLHEAT		1996				1997			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		2.06	67.42	-	-	.760	30.10	-	-
Age Group	16-34	-.126	-7.05	[.000]***	-3.7%	-.564	-.33	[.739]	-0.1%
	35-44	.283	-.15	[.874]	0%	.070	4.17	[.000]***	2.4%
	45-54	.150	8.95	[.000]***	4.4%	.100	6.34	[.000]***	3.4%
	55-64	.107	7.16	[.000]***	3.2%	.074	5.20	[.000]***	2.5%
Household	Number of Adults	-.093	-27.57	[.000]***	-2.7%	-.028	-8.51	[.000]***	-0.9%
Composition	Number of Children	-.015	-3.02	[.002]**	-0.4%	.013	2.97	[.003]**	0.4%
Marital Status	Separated	-.271	-7.28	[.000]***	-8.1%	-.073	-2.20	[.027]**	-2.5%
	Divorced	.025	1.06	[.288]	0.7%	.076	3.84	[.000]***	2.6%
	Widowed	-.127	-7.99	[.000]***	-3.8%	.013	.91	[.361]	0.4%
	Single	-.075	-6.30	[.000]***	-2.2%	.041	3.76	[.000]***	1.4%
Income	Self employed	-.154	-12.38	[.000]***	-4.6%	.048	3.89	[.000]***	1.6%
	Pension	-.127	-9.91	[.000]***	-3.8%	-.140	-11.31	[.000]***	-4.8%
	Unemployed	-.399	-14.48	[.000]***	-11.9%	-.241	-9.70	[.000]***	-8.2%
	Other benefit	-.154	-8.20	[.000]***	-4.5%	-.039	-2.34	[.019]**	-1.3%
	Private Income	-.020	-.63	[.528]	-0.6%	.220	7.65	[.000]***	7.5%
Tenure	Tenant	.017	1.71	[.087]*	0.5%	-.082	-8.70	[.000]***	-2.8%
	Rent free	-.076	-3.77	[.000]***	-2.2%	-.304	-16.86	[.000]***	-10.4%
Accommodation type	Semi-detached Terraced	.358	33.62	[.000]***	10.7%	.160	16.99	[.000]***	5.5%
	Apartment Small	.401	32.57	[.000]***	11.9%	.143	12.88	[.000]***	4.9%
	Apartment Large	.083	7.47	[.000]***	2.4%	.123	11.46	[.000]***	4.2%
	Other Accommodation	.442	19.75	[.000]***	13.1%	.027	1.43	[.150]	0.9%
Health Status	Good	-.161	-15.57	[.000]***	-4.8%	.209	23.14	[.000]***	7.1%
	Fair	-.238	-19.23	[.000]***	-7.1%	.169	15.55	[.000]***	5.7%
	Bad	-.617	-35.98	[.000]***	-18.4%	-.107	-6.94	[.000]***	-3.6%
	Very Bad	-.539	-19.46	[.000]***	-16%	-.045	-1.77	[.077]*	-1.5%
Education	Secondary finished	-.070	-5.45	[.000]***	-2.1%	-.117	-11.17	[.000]***	-4%
	Secondary not finished	-.780	-65.85	[.000]***	-23.2%	-.602	-61.11	[.000]***	-20.6%
Housing allowance		-.680	-32.17	[.000]***	-20.3 %	-.115	-7.00	[.000]***	-3.9 %
Number of Observations				130639				138130	
Log Likelihood				-68958.1				-83135.2	
Mean of Dependent Variable				.713359				.668892	
Percentage Correct Prediction				73.5%				67.8%	
Pseudo R^2				.141218				.065727	

***significant at 1% level; **significant at 5% level.

Table 23

Presence of Damp - results of a Probit Model for 1994 & 1995

Dependent Variable: DAMP		1994				1995			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		-1.689	-55.03	-	-	-1.482	-47.52	-	-
Age Group	16-34	.185	9.25	[.000]***	4.3%	.172	8.50	[.000]***	3.7%
	35-44	.068	3.40	[.001]**	1.6%	.048	2.40	[.016]**	1%
	45-54	.016	.84	[.396]	0.3%	-.017	-.92	[.356]	-0.3%
	55-64	.031	1.86	[.062]*	0.7%	-.109	-.62	[.995]	0%
Household	Number of Adults	.065	17.36	[.000]***	1.5%	.034	9.10	[.000]***	0.7%
Composition	Number of Children	.055	10.69	[.000]***	1.3%	.062	11.92	[.000]***	1.3%
Marital Status	Separated	.192	5.20	[.000]***	4.5%	.206	5.31	[.000]***	4.5%
	Divorced	.127	5.11	[.000]***	3%	.212	8.52	[.000]***	4.6%
	Widowed	.026	1.49	[.135]	0.6%	.079	4.39	[.000]***	1.7%
	Single	.117	8.94	[.000]***	2.7%	.111	8.25	[.000]***	2.4%
Income	Self employed	.014	1.03	[.301]	0.3%	-.011	-.81	[.413]	-0.2%
	Pension	.044	3.03	[.002]**	1%	.133	.08	[.929]	0%
	Unemployed	.145	5.52	[.000]***	3.4%	.164	5.61	[.000]***	3.6%
	Other benefit	.068	3.57	[.000]***	1.6%	.125	6.29	[.000]***	2.7%
	Private Income	.018	.58	[.560]	0.4%	.039	1.15	[.248]	0.8%
Tenure	Tenant	.453	41.82	[.000]***	10.7%	.094	8.52	[.000]***	2%
	Rent free	.503	25.84	[.000]***	11.8%	.030	1.30	[.191]	0.6%
Accommodation type	Semi-detached Terraced	.044	4.08	[.000]***	1%	-.132	-11.04	[.000]***	-2.8%
	Apartment Small	-.212	-16.05	[.000]***	-5%	-.154	-11.15	[.000]***	-3.3%
	Apartment Large	-.366	-26.49	[.000]***	-8.6%	-.164	-12.64	[.000]***	-3.5%
	Other Accommodation	-.098	-3.05	[.002]**	-2.3%	-.055	-2.34	[.019]**	-1.2%
Health Status	Good	.108	9.47	[.000]***	2.5%	.130	11.01	[.000]***	2.8%
	Fair	.280	20.78	[.179]	6.6%	.312	22.42	[.000]***	6.8%
	Bad	.556	30.7	[.000]***	13.1%	.577	30.81	[.000]***	12.6%
	Very Bad	.606	22.89	[.000]***	14.3%	.635	22.14	[.000]***	13.8%
Education	Secondary finished	-.016	-1.24	[.213]	-0.4%	-.041	-2.93	[.003]**	-0.9%
	Secondary not finished	.280	22.13	[.000]***	6.6%	.250	19.06	[.000]***	5.4%
Housing allowance		-.027	-1.46	[.143]	-0.6 %	-.108	-5.61	[.000]***	-2.3%
Number of Observations				128045				127912	
Log Likelihood				-54516.4				-50777.9	
Mean of Dependent Variable				.167941				.143614	
Percentage Correct Prediction				83.2%				85.6%	
Pseudo R^2				.053848				.029082	

***significant at 1% level; **significant at 5% level.

Table 24

Presence of Damp - results of a Probit Model for 1996 & 1997

Dependent Variable: DAMP		1996				1997			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		-1.67	-51.99	-	-	-2.25	-66.84	-	-
Age Group	16-34	.166	7.93	[.000]***	3.3%	.133	6.10	[.000]***	2.3%
	35-44	.067	3.24	[.001]**	1.3%	.100	4.62	[.000]***	1.7%
	45-54	-.016	-.81	[.413]	-0.3%	.010	.496	[.620]	0.1%
	55-64	-.017	-.95	[.339]	-0.3%	.897	.481	[.630]	0.1%
Household	Number of Adults	.051	13.34	[.000]***	1%	.107	26.31	[.000]***	1.8%
Composition	Number of Children	.071	13.29	[.000]***	1.4%	.059	10.74	[.000]***	1%
Marital Status	Separated	.179	4.25	[.000]***	3.6%	.259	6.51	[.000]***	4.5%
	Divorced	.138	5.42	[.000]***	2.8%	.073	2.81	[.005]**	1.2%
	Widowed	.100	5.43	[.000]***	2%	.156	8.24	[.000]***	2.7%
	Single	.112	8.14	[.000]***	2.2%	.146	10.29	[.000]***	2.5%
Income	Self employed	.120	.08	[.936]	0%	.045	2.86	[.004]**	0.8%
	Pension	.035	2.34	[.019]**	0.7%	.125	7.91	[.000]***	2.2%
	Unemployed	.302	10.16	[.000]***	6.1%	.184	6.03	[.000]***	3.2%
	Other benefit	.163	8.16	[.000]***	3.3%	.138	6.79	[.000]***	2.4%
	Private Income	-.023	-.615	[.538]	-0.4%	.132	3.74	[.000]***	2.3%
Tenure	Tenant	.050	4.39	[.000]***	1%	.358	29.82	[.000]***	6.3%
	Rent free	.065	2.77	[.005]**	1.3%	.465	22.36	[.000]***	8.1%
Accommodation type	Semi-detached Terraced	-.133	-10.91	[.000]***	-2.6%	.115	9.95	[.000]***	2%
	Apartment Small	-.215	-14.94	[.000]***	-4.3%	-.221	-15.00	[.000]***	-3.8%
	Apartment Large	-.068	-5.27	[.000]***	-1.3%	-.382	-24.85	[.000]***	-6.7%
	Other Accommodation	-.254	-9.73	[.000]***	-5.1%	-.356	-12.69	[.000]***	-6.2%
Health Status	Good	.101	8.32	[.000]***	2%	.180	14.17	[.000]***	3.1%
	Fair	.274	19.11	[.000]***	5.5%	.312	21.15	[.000]***	5.5%
	Bad	.571	29.83	[.000]***	11.5%	.608	31.65	[.000]***	10.7%
	Very Bad	.654	22.14	[.000]***	13.2%	.643	21.70	[.000]***	11.3%
Education	Secondary finished	-.319	-.21	[.828]	0%	-.051	-3.52	[.000]***	-0.8%
	Secondary not finished	.329	24.32	[.000]***	6.6%	.345	26.63	[.000]***	6%
Housing allowance		-.065	-3.31	[.001]**	-1.3%	.098	4.60	[.000]***	1.7%
Number of Observations				130639				138130	
Log Likelihood				-48208.4				-44812.9	
Mean of Dependent Variable				.129747				.111909	
Percentage Correct Prediction				87%				88.8%	
Pseudo R^2				.034251				.055268	

***significant at 1% level; **significant at 5% level.

Table 25

Presence of Rot - results of a Probit Model for 1994 & 1995

Dependent Variable: ROT		1994				1995			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		-1.88	-54.56	-	-	-1.66	-48.03	-	-
Age Group	16-34	.071	3.18	[.001]**	1.2%	.130	5.74	[.000]***	2.1%
	35-44	.015	.708	[.479]	0.2%	.031	1.40	[.160]	0.5%
	45-54	-.365	-.01	[.986]	0%	.679	.31	[.753]	0.1%
	55-64	.030	1.57	[.116]	0.5%	.010	.55	[.577]	0.1%
Household	Number of Adults	.025	5.90	[.000]***	0.4%	.146	.34	[.731]	0%
Composition	Number of Children	.058	10.19	[.000]***	1%	.059	10.19	[.000]***	0.9%
Marital Status	Separated	.214	5.32	[.000]***	3.7%	.247	5.90	[.000]***	4%
	Divorced	.191	7.15	[.000]***	3.3%	.224	8.28	[.000]***	3.6%
	Widowed	.067	3.39	[.001]**	1.1%	.121	6.15	[.000]***	2%
	Single	.193	13.17	[.000]***	3.3%	.172	11.58	[.000]***	2.8%
Income	Self employed	-.725	-.43	[.663]	-0.1%	-.057	-3.45	[.001]**	-0.9%
	Pension	.012	.76	[.441]	0.2%	-.021	-1.26	[.205]	-0.3%
	Unemployed	.100	3.44	[.001]**	1.7%	.073	2.20	[.027]**	1.2%
	Other benefit	.099	4.78	[.000]***	1.7%	.128	5.91	[.000]***	2.1%
	Private Income	-.209	-5.17	[.000]***	-3.6%	-.164	-3.93	[.000]***	-2.7%
Tenure	Tenant	.546	45.55	[.000]***	9.4%	.034	2.76	[.006]**	0.5%
	Rent free	.460	21.41	[.000]***	7.9%	-.038	-1.44	[.149]	-0.6%
Accommodation type	Semi-detached Terraced	.019	1.54	[.122]	0.3%	-.071	-5.31	[.000]***	-1.1%
	Apartment Small	-.205	-13.71	[.000]***	-3.5%	-.038	-2.54	[.011]**	-0.6%
	Apartment Large	-.378	-23.59	[.000]***	-6.5%	-.040	-2.81	[.005]**	-0.6%
	Other Accommodation	.137	4.19	[.000]***	2.3%	-.874	-.33	[.741]	-0.1%
Health Status	Good	.056	4.28	[.000]***	0.9%	.138	10.26	[.000]***	2.2%
	Fair	.244	16.07	[.000]***	4.2%	.310	19.76	[.000]***	5.1%
	Bad	.512	25.63	[.000]***	8.8%	.591	28.74	[.000]***	9.7%
	Very Bad	.523	17.97	[.000]***	9%	.634	20.49	[.000]***	10.4%
Education	Secondary finished	.628	.405	[.685]	0.1%	-.035	-2.19	[.028]**	-0.5%
	Secondary not finished	.220	15.29	[.000]***	3.8%	.235	15.94	[.000]***	3.8%
Housing allowance		.061	2.96	[.003]**	1%	-.109	-5.21	[.000]***	-1.8%
Number of Observations				128045				127912	
Log Likelihood				-40874.9				-38996.7	
Mean of Dependent Variable				.107095				.095753	
Percentage Correct Prediction				89.2%				90.4%	
Pseudo R^2				.042783				.021697	

***significant at 1% level; **significant at 5% level.

Table 26

Presence of Rot - results of a Probit Model for 1996 & 1997

Dependent Variable: ROT		1996				1997			
Explanatory Variables		Coeff	t Stat	P-Value	Marginal Effects	Coeff	t Stat	P-Value	Marginal Effects
Constant		-1.76	-48.36	-	-	-2.27	-59.69	-	-
Age Group	16-34	.124	5.19	[.000]***	1.8%	.496	.01	[.984]	0%
	35-44	.050	2.12	[.033]**	0.7%	.033	1.34	[.179]	0.4%
	45-54	.043	-1.93	[.053]*	0.6%	-.016	-.69	[.489]	-0.2%
	55-64	-.206	-.10	[.920]	0%	-.798	-.37	[.709]	0%
Household Composition	Number of Adults	-0.12	-2.82	[.005]**	-0.1%	.053	11.24	[.000]***	0.6%
	Number of Children	.062	10.41	[.000]***	0.9%	.069	11.07	[.000]***	0.8%
Marital Status	Separated	.259	5.75	[.000]***	3.7%	.313	7.28	[.000]***	3.9%
	Divorced	.208	7.58	[.000]***	3%	.162	5.84	[.000]***	2%
	Widowed	.132	6.39	[.000]***	1.9%	.155	7.29	[.000]***	1.9%
	Single	.197	12.81	[.000]***	2.8%	.248	15.41	[.000]***	3%
Income	Self employed	-.084	-4.71	[.000]***	-1.2%	-.013	-.712	[.476]	-0.1%
	Pension	-.026	-1.55	[.121]	-0.3%	.066	3.63	[.000]***	0.8%
	Unemployed	.222	6.68	[.000]***	3.2%	.097	2.81	[.005]**	1.2%
	Other benefit	.150	6.82	[.000]***	2.1%	.098	4.35	[.000]***	1.2%
	Private Income	-.088	-2.02	[.043]**	-1.2%	-.041	-.95	[.341]	-0.5%
Tenure	Tenant	.016	1.25	[.210]	0.2%	.476	35.44	[.000]***	5.9%
	Rent free	-.043	-1.53	[.125]	-0.6%	.515	22.54	[.000]***	6.4%
Accommodation type	Semi-detached Terraced	-.094	-6.74	[.000]***	-1.3%	.108	8.20	[.000]***	1.3%
	Apartment Small	-.138	-8.44	[.000]***	-2%	-.233	-13.67	[.000]***	-2.9%
	Apartment Large	.018	1.26	[.206]	0.2%	-.417	-22.82	[.000]***	-5.2%
	Other Accommodation	-.228	-7.46	[.000]***	-3.3%	-.291	-9.36	[.000]***	-3.6%
Health Status	Good	.118	8.37	[.000]***	1.7%	.198	13.16	[.000]***	2.4%
	Fair	.276	16.77	[.000]***	4%	.336	19.61	[.000]***	4.2%
	Bad	.548	25.42	[.000]***	7.9%	.589	26.90	[.000]***	7.3%
	Very Bad	.632	19.40	[.000]***	9.1%	.677	20.84	[.000]***	8.4%
Education	Secondary finished	-.016	-.99	[.318]	-0.2%	-.091	-5.46	[.000]**	-1.1%
	Secondary not finished	.260	16.95	[.000]***	3.7%	.257	17.48	[.000]***	3.2%
Housing allowance		-.060	-2.75	[.006]**	-0.8 %	.050	2.17	[.029]***	0.6%
Number of Observations				130639				138130	
Log Likelihood				-35432.2				-32360.9	
Mean of Dependent Variable				.081144				.070318	
Percentage Correct Prediction				91.8%				92.9%	
Pseudo R^2				.021062				.041182	

***significant at 1% level; **significant at 5% level.