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Targeting Social Need: Why are Deprivation Levels in Northern Ireland Higher for Catholics than for Protestants?

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Abstract

This paper addresses two issues. First, using data, drawn from the Sample of Anonymised Records of the 1991 Northern Ireland Census, for over 13,000 individuals, it constructs a deprivation index and then, using this index, compares the deprivation levels of Catholics and Protestants. Second, it relates the level of deprivation of the individuals in the sample to their personal characteristics and circumstances. In particular, it examines the possibility that while higher deprivation levels among Catholics may have been partly due to the fact that they possessed, to a greater degree than Protestants, the attributes that were correlated with deprivation, it may also have been the result of Catholics being penalised more harshly than Protestants for possessing these attributes.

JEL classification: I32

1 Introduction

In an excellent overview of the state of social policy in Northern Ireland and the political imperatives that have underpinned its evolution since 1920, when the “contested state” of Northern Ireland was created, McLaughlin (1998) observes that, following the introduction in 1972 of Direct Rule, social policy initiatives in Northern Ireland differed “substantively and ideologically” from those in the rest of the UK by being “directed at the politics of conflict, inequality and community relations.” (p.216). A corollary of this focus on inequality and conflict between Catholics and Protestants was that responsibility for social policy in Northern Ireland was taken away from local councils, with their poor record of fair treatment of Catholics, and placed in the hands of specially created bodies like the Health and Social Services Board, the Northern Ireland Housing Executive and the Fair Employment Commission (FEC).

Of these bodies, the FEC was assigned the most prominent and contentious, role. Its prominence stemmed from the fact that social inequality in Northern Ireland was viewed as stemming largely from economic disparities between Catholics and Protestants and, in turn, these disparities were seen as being engendered by the substantially higher unemployment rates for Catholics¹. Since the relative lack of success of Catholics at finding jobs was seen as a product of Catholic job-seekers being unfairly denied jobs by Protestant employers, legislative measures, through the 1976 Fair Employment Act, were introduced to ensure fair employment and the FEC was created to enforce these measures.

Its contentiousness stemmed from arguments put forward in Unionist circles that the sorry unemployment record of Catholics had more to do with their attributes as workers than with the unfairness with which employers treated them. This argument reached its intellectual apotheosis in the work of Gudgin and Breen (1994) who claimed that it was not necessary to appeal to prejudice to explain the fact that Catholic males had a much higher unemployment rate than Protestants. This difference in unemployment rates could be explained by a constellation of “facts” about Catholic and Protestant job-seekers: (male) Catholic job applicants had, in the eyes of employers, less desirable worker characteristics than their Protestant counterparts; and Catholics and Protestants differed significantly in certain key labour-market attributes (for example: birth rates, migration rates, participation rates and quit rates). Although Gudgin and Breen (1994) professed agnosticism about whether, or not, prejudice against Catholic workers existed, others have interpreted their results to mean that, in the context of Northern Ireland, policies to promote fair employment were unnecessary. More recently, however, the Gudgin and Breen conclusions have been challenged by Borooah (1999) who argued, using data from the 1991 Census for Northern Ireland, that discrimination lay at the heart of any credible explanation for the over-representation of Catholics among the unemployed, and the under-representation of Catholics in professional and managerial occupations².

¹The ratio of Catholic-Protestant unemployment rates, in 1997, was 2.2:1 for men and 1.7:1 for women.

²See also Bradley (1998) and Breen (1998).

The realisation within the Northern Ireland Civil Service that, “on all major social and economic indicators, Catholics are worse off than Protestants” (see Quirk and McLaughlin(1996, p.154), buttressed by academic work by *inter alia* Cormack and Osborne (1991) and Smith and Chambers (1991), led to the view that it was essential to complement legislative measures for furthering fair employment with resource-based measures to combat deprivation in general, but Catholic deprivation in particular. Targeting Social Need (TSN) - by which is meant the targeting of resources at disadvantaged areas and people - was a child of this realisation and it has been a cornerstone of social policy in Northern Ireland since 1991, when Peter Brooke, the then Secretary of State, in launching TSN, described it as a “public expenditure priority”.

TSN was conceived as a spatial programme³ and, to facilitate its implementation, spatially-based indicators of deprivation for Northern Ireland, based on information in the 1991 Census, were constructed by Robson *et. al.* (1994). These indicators were produced at three levels: District Council; Electoral Ward; and Enumeration District and are, hereafter, referred to, collectively, as the “Robson index”. However, from the perspective of inter-community differences in deprivation levels - which, after all, was an important reason for launching the TSN policy - the Robson index suffers from two disadvantages. First, being based on geography, it offers only indirect evidence of levels of deprivation in the two communities: indeed, in evidence to the Committee on the Administration of Justice, it was argued by the West Belfast Economic Forum that the Robson indices underestimated the extent of Catholic deprivation. Second, the Robson index simply measures the level of deprivation. It does not address - and, of course, it was not the brief of Robson *et. al.* (1994) to do so - the question of what were the determinants of deprivation. For example: were retired persons more likely to be deprived? How much more likely were unemployed persons to be deprived, compared to those who were employed?

Nor has there been much interest among policy-makers in Northern Ireland in commissioning research into these issues. McLaughlin (1998) provides several reasons for this lack of interest. It partly stems from the view taken by the Northern Ireland government that, given the exigencies of public funds, equity issues have to take their place alongside other policy imperatives. Partly it is due to the shadow that inter-community competition for funds casts over social policy in Northern Ireland: TSN policies, if properly targeted, could disproportionately benefit Catholics and take resources away from Protestants. Another explanation may lie in an atavistic fear of fuelling, through over-generous benefits, the “natural” proclivities of Catholics to outbreed Protestants. Whatever the mix of reasons, policy makers in Northern Ireland have found it convenient (or, depending on your point of view, necessary) to draw a veil of ignorance over matters relating to inter-community differences in deprivation levels. They have preferred, instead, to target social needs through the instrument of geography rather than through that of community.

³This was justified on the ground that there was a great deal of residential segregation in NI: for example, 90% of the residents in 35 of the 51 electoral wards in Belfast were of the same community.

This paper attempts to pierce this veil. First, using data drawn from the Sample of Anonymised Records (SARs) of the 1991 Northern Ireland Census for over 13,000 individuals, it constructs a deprivation index and then, using this index, directly compares the deprivation levels of Catholics and Protestants. It then relates, by means of econometric equations, the level of deprivation of the individuals in the sample to their personal characteristics and circumstances. In particular, it examines the possibility that while higher deprivation levels among Catholics may have been partly due to the fact that they possessed, to a greater degree than Protestants, the attributes that were correlated with deprivation, it may also have been the result of Catholics being penalised more harshly than Protestants for possessing these attributes. It estimates how much of the relatively greater deprivation of Catholics was due to having the wrong attributes and how much was due to these attributes being penalised more severely. This paper should, therefore, be seen as complementing the existing, spatially-based, analysis of deprivation that underpins the TSN policies of the Northern Ireland government.

Against this background, the organisation of the paper is as follows: sections 2 and 3 set out, respectively, the analytical and empirical framework for the study; section 4 presents the estimation results; section 5 evaluates the extent to which inter-community differences in deprivation levels are the result of differences, between the communities, in the factors that generate deprivation; section 6 concludes the paper.

2 The Analytical Framework

The analytical framework essentially consists of constructing a deprivation index and then embedding this index into an econometric framework. The construction of a deprivation index, described in subsection 2.1 below, allows every individual in the sample to be classified as being: “not-deprived”; “mildly-deprived”; “strongly-deprived”⁴, that is to be assigned to a *deprivation level*. The probability of a person being at a particular deprivation level can be related to the personal characteristics and circumstances of that person. Estimating this relationship separately for Catholics and for Protestants, using the methodology of an *ordered logit* model, described in subsection 2.2 below, allows the probability of being at each of the three deprivation levels to be computed for every person in the sample. For each individual, these three probabilities must sum to 1, though their values will differ across the individuals. For some persons (employed, well-educated, living in households with other earners), the probability of being not-deprived will be very high; other, less fortunate, persons will have a high probability of being deprived, with the least fortunate having a high probability of being strongly-deprived.

From these individual probabilities the *average* probabilities of Catholics and Protestants of being not-deprived, mildly-deprived and strongly-deprived can be computed. The basic question that the subsequent analysis attempts

⁴These are mutually exclusive, and collectively exhaustive, categories

to answer is this: how much of the difference in average probabilities between Catholics and Protestants, of being at the three deprivation levels, is due to differences in attributes between the two communities and how much is due to the fact that the same attributes are evaluated using different coefficients for Catholics and for Protestants?

2.1 Defining the Deprivation Index

There are N persons, indexed, $i = 1..N$. A condition is defined as a “deprivation-inducing condition” (DIC) if the presence of that condition causes an individual to experience “deprivation”. Suppose there are K DICs, indexed $k = 1..K$ and let I_{ik} be a *categorical* variable with respect to DIC k and person i , such that $I_{ik} = 1$, if the DIC is present for person i , and $I_{ik} = 0$, if it is absent. Then the deprivation levels of person i , denoted D_i^* , is defined as:

$$D_i^* = \sum_{k=1}^K \alpha_k^* I_{ik} \quad (1)$$

where: $\alpha_k^* > 0$ is the weight attached to the k^{th} DIC and is independent of the person being considered. If the weights relevant to the personal DICs are defined as $\alpha_k^* = 1 - p_k$, where p_k represents the frequency with which condition k occurs, then the α_k^* embody the notion of “relative deprivation”: the *smaller* the frequency with which a particular DIC is experienced, the *greater* the weight attached to it when it is experienced. The use of such weights echoes the work of Desai and Shah (1988) who, in a re-examination of Townsend’s (1979) original data, essentially argued that to be deprived of something that almost everyone has is more important than to be deprived of something that few people possess.

It is only by accident that the weights, α_k^* will sum to unity. They may, however be normalised by defining: $\alpha_k = \alpha_k^* / \Omega$ where $\Omega = \sum_{k=1}^K \alpha_k^*$. Under this normalisation, the deprivation level of person i may be defined as:

$$D_i = D_i^* \Omega^{-1} = \left(\sum_{k=1}^K \alpha_k^* I_{ik} \right) \Omega^{-1} = \sum_{k=1}^K \alpha_k I_{ik} \quad (2)$$

Since D_i is simply a scalar transform of D_i^* , the same ranking of individuals, in terms of their deprivation levels, will be obtained using D_i , as using D_i^* . However, in terms of their normalised weights, the deprivation index D_i offers advantages of interpretation over D_i^* and the subsequent analysis will, therefore, be conducted in terms of this measure. Since, by definition, $\sum_{k=1}^K \alpha_k = 1$, equation (2) implies that $0 \leq D_i \leq 1$: $D_i = 0$ when none of the DICs are present, that is when $I_{ik} = 0$ for all $k = 1..K$ and $D_i = 1$ when all the DICs are present, that is when $I_{ik} = 1$ for all $k = 1..K$.

2.2 The Ordered Logit Model

Suppose that there are $J > 2$ mutually exclusive, and collectively exhaustive, outcomes, indexed $j = 0..J$, of a particular event, relating to each individ-

ual i ($i = 1 \dots N$) in the sample. Sometimes these outcomes are inherently ordered. For example, as in this paper, the outcomes relating to deprivation (no-deprivation, mild-deprivation and severe-deprivation) are *ordered* outcomes. In this case, although the outcome is discrete, the multinomial logit or probit models would, as Greene (1993) points out, fail to account of the ordered nature of this data. The appropriate methods for estimating discrete-outcome models with more than two outcomes, when the outcomes are ordered, are those of *ordered* logit and probit.

The underlying logic of these models is that the latent variable, in this case the deprivation index D_i , is a linear function of K determining variables, whose values, for individual i , are X_{ik} , $k = 1 \dots K$. This yields:

$$D_i = \sum_{k=1}^K \beta_k X_{ik} + \varepsilon_i = Z_i + \varepsilon_i \quad (3)$$

where ε_i is an error term. As usual, D_i is unobserved, or difficult to observe. Instead, assuming without loss of generality that $J = 3$, what is observed is a categorisation of the persons in the sample such that:

$$\begin{aligned} Y_i &= 0, \text{ if } D_i \leq 0 \\ Y_i &= 1, \text{ if } 0 < D_i \leq \delta \\ Y_i &= 2, \text{ if } D_i > \delta \end{aligned} \quad (4)$$

The δ of equation (4) are unknown parameters to be estimated along with the β of equation (3). The probabilities of Y_i taking values 0, 1 and 2 are given by:

$$\begin{aligned} \Pr(Z_i + \varepsilon_i \leq 0) &\text{ or, equivalently, } \Pr(\varepsilon_i \leq -Z_i) \\ \Pr(Z_i + \varepsilon_i \leq \delta) &\text{ or, equivalently, } \Pr(-Z_i < \varepsilon_i \leq \delta - Z_i) \\ \Pr(Z_i + \varepsilon_i > \delta) &\text{ or, equivalently, } \Pr(\varepsilon_i > \delta - Z_i) \end{aligned} \quad (5)$$

where $\delta > 0$. The difference between the ordered logit and the ordered probit models lies in the distribution of, ε_i , the error term in equation (3): an ordered logit model is the result of assuming that ε_i is logistically distributed, while an ordered probit model is the result of assuming that ε_i is normally distributed. The specific model used in this paper is that of ordered logit⁵. Under a logistic distribution, $\Lambda(x) = 1/[1 + \exp(-x)] = \Pr(X \leq x)$ is the cumulative distribution function of the random variable, X . Consequently:

$$\begin{aligned} \Pr(Y_i = 0) &= \Pr(\varepsilon_i \leq -Z_i) = \Lambda(-Z_i) \\ \Pr(Y_i = 1) &= \Pr(-Z_i < \varepsilon_i \leq \delta - Z_i) = \Lambda(\delta - Z_i) - \Lambda(-Z_i) \\ \Pr(Y_i = 2) &= \Pr(\varepsilon_i > \delta - Z_i) = 1 - \Lambda(\delta - Z_i) \end{aligned} \quad (6)$$

The estimates of β (and, therefore, of Z_i) and δ , when applied to equation (6), allow, *for each individual in the sample*, the following probabilities to be

⁵Though the results were very similar when ordered probit was used.

computed: $\Pr(Y_i = 0)$; $\Pr(Y_i = 1)$; $\Pr(Y_i = 2)$. Hereafter, these probabilities are denoted, respectively, as: p_{ij} , $j = 0, 1, 2$.

Equation (3), under a logistic error term, can be interpreted in terms of odds-ratios since:

$$\begin{aligned} \log \left[\frac{\Pr(D_i > \delta)}{\Pr(D_i < \delta)} \right] &= \log \left[\frac{\Pr(\varepsilon_i > \delta - Z_i)}{\Pr(\varepsilon_i < \delta - Z_i)} \right] = \log \left[\frac{1 - \Lambda(\delta - Z_i)}{\Lambda(\delta - Z_i)} \right] \\ &= \log [\exp(Z_i - \delta)] = Z_i - \delta = \sum_{k=1}^K \beta_k X_{ik} - \delta \quad (7) \end{aligned}$$

so that, for *any* cut-off point δ , a coefficient $\beta_k > 0$ in equation (3) implies that the odds-ratio of being “deprived” to being “not-deprived” rises, and a coefficient $\beta_k < 0$ implies that it falls, for an increase in the value, X_k , of the k^{th} deprivation-determining variable. Hereafter, the odds-ratio in equation (7) are referred to (loosely, but graphically) as the *probability of being deprived*.

3 The Empirical Framework

3.1 Constructing the Deprivation Index

A major problem in constructing a deprivation index lies in deciding on the DICs that should enter its construction. Reviewing the literature on the construction of deprivation indices, Nolan and Whelan (1996) pointed out that the role of tastes presented a major problem. If observed differences in living patterns could largely be ascribed to preferences rather than to resources⁶ then the absence of particular items could not be taken as an indicator of want⁷. For example, Piachaud (1987) has highlighted the considerable variation in the deprivation scores of households at similar income levels. Even if one could separate preferences from needs, the importance of the researcher in choosing the items that enter the deprivation index is seen as a further problem⁸. Then there is the question of whether deprivation should be measured solely by reference to an individual’s own circumstance or, also, by reference to his/her wider social and geographical environment⁹. Borooah and Carcach (1997), for example, drew attention to the importance of neighbourhood-quality in determining the degree to which people were afraid of crime. Lastly, if one could arrive at a satisfactory set of indicators, there is the issue of how these are to be weighted in the construction of the overall index. Over-arching these problems are the

⁶Most famously, in Townsend’s (1979) pioneering study of deprivation in Britain, having a cooked breakfast.

⁷Townsend (1979) distinguished twelve separate dimensions of deprivation: dietary; clothing; fuel and light; household facilities; housing conditions; work conditions; health; education; environment; family activities; recreational; and social relations.

⁸See Veit-Wilson (1987).

⁹A study which sets deprivation in the context of the wider social environment is that by Mack and Lansley (1985) who defined deprivation as “an enforced lack of socially-perceived necessities”.

constraints imposed by the data: one can only construct a deprivation index from the data that is available, not from data that one might wish had been available. The deprivation index constructed for this study was based upon data from the 1991 Census and the variables used to construct the deprivation index were:

- $CARS_i = 1$, if the person lived in a household none of whose members normally had the use of a car or a van; $CAR_i = 0$, otherwise.
- $HEAT_i = 1$, if the person lived in a house without any central heating; $HEAT_i = 0$, otherwise..
- $WC_i = 1$, if the person lived in a household whose members did not have exclusive use of an inside toilet; $WC_i = 0$, otherwise.
- $WATER_i = 1$, if the person lived in a house without a public supply of water piped into the house; $WATER_i = 0$, otherwise.
- $SEW_i = 1$, if the person lived in a house not connected to a public sewer; $SEW_i = 0$, otherwise.
- $HTYPE_i = 1$, if the person lived in a dwelling that represented non-permanent accommodation; $HTYPE_i = 0$, otherwise.
- $DENSITY_i = 1$, if the person lived in a house for which the ratio of the number of residents to the number of rooms was greater than 1; $DENSITY_i = 0$, otherwise.
- $LLTI_i = 1$, if the person suffered from a long-term illness, health problem or handicap which limited his/her daily activities or the work he/she could do; $LLTI_i = 0$, otherwise.
- $EARN_i = 1$, if the person lived in a household none of whose members were earners; $EARN_i = 0$, otherwise.

Separate deprivation indices were constructed for retired and non-retired persons. Both indices were built around the same set of DICs, set out above, but the weights attached to these DICs differed according to whether the person concerned was retired or not. As mentioned above, the weight associated with a DIC reflected the frequency with which the relevant DIC was experienced: the lower the frequency, the greater the weight. The frequencies with which several of the DICs were experienced were, however, considerably different for the retired and non-retired parts of the sample and the use of different weights, in constructing deprivation indices for retired and non-retired persons, reflected this difference.

The variables describing the DICs that entered the deprivation index reflected the work of Robson *et. al.* (1994) in constructing a deprivation index for Northern Ireland. This is not because the Robson index was regarded as the most appropriate index for measuring deprivation, but rather because this index

provides the basis for the design of TSN programmes in Northern Ireland. It seemed sensible that in pursuing research aimed at complementing, and better informing, existing TSN policies, the deprivation index chosen should conform in its composition, as far as was practicable¹⁰, to the index that guided existing policy. It should, however, be emphasised that different investigators could, depending on the purpose of their research, construct different deprivation indices from the same set of data. Sloggett and Joshi (1998), for example, in predicting “life events” (mortality; long-term illness; still-birth; underweight birth; sole registered birth) constructed a measure of deprivation, based on Census data, *for the ward of residence*, that had just four components: the proportion of the labour force unemployed; the proportion of households with no car access; the proportion of households that were not owner-occupiers; and the proportion of employed men and women in Social Class 4 or 5.

The DICs that comprise the deprivation index used in this study reflect both material want and also, albeit indirectly, social exclusion. Indeed, as Atkinson (1998) has pointed out, although the terms poverty (meaning a lack of material possessions) and social exclusion (“shut out from society”¹¹) are often used synonymously they are in concept very different. A feature of social exclusion is that there is no unique criteria by which a person may be excluded from society. Unemployment may exclude a person from the world of work. Poverty (often, but not always, a consequence of unemployment) may exclude a person from the world of consumption. For example, being poor may mean that two items that most people regard as essential for their normal functioning may be impossible to obtain: bank accounts may be inaccessible and telephones may not be affordable. Social exclusion may be aggravated by the state of one’s physical and emotional well-being: illness could restrict mobility and limit employment opportunities. Lastly, the different facets of social exclusion may sometimes conflict with each other: single mothers who work only because they are threatened with a loss of benefits may feel themselves (and their children) to be excluded from the world of normal family life¹².

Two of the DICs used in this study’s deprivation index reflect deprivation which is the consequence of social exclusion as well as of material want. These are: living in a household without any earners; and suffering from a long-term limiting illness. Arguably, the first DIC, by depriving persons of contact with workers, excludes them from the labour market; the second, by limiting the range of activities that can be performed, restricts contact with society, in general, and with the labour market, in particular.

<Table 1>

¹⁰Although this study, like that of Robson *et. al.* (1994), is based on data from the 1991 Census, they had more data available to them and at a finer level of geographical disaggregation.

¹¹Tony Blair, 23 November 1997.

¹²See Dex and Rowthorn (1997) and Hacker (1997) for a discussion of the effects of work on the quality of parenting.

Table 1, above, shows the incidence of these DICs (that is, the proportion of persons who experienced the relevant DIC), in the Sample of Anonymised Records (SARs) from the 1991 Northern Ireland Census for: the entire sample of 13,164 persons¹³; the segments of the sample that were Catholic and Protestant¹⁴ (respectively, 4,364 and 8,800 persons); the segments of the Catholic population that were retired and non-retired (respectively, 204 and 4,160 persons); and the segments of the Protestant population that were retired and non-retired (respectively, 667 and 8,133 persons). This Table shows that the incidence, for every DIC, was greater for Catholics than it was for Protestants and this was true for both the retired and the non-retired parts of the sample¹⁵.

3.2 Estimating the Ordered Logit Model

Equations (3) and (4) were estimated on data from the SARs of the 1991 Northern Ireland Census. The composition of the total sample of 13,164 persons, in terms of Catholics and Protestants and retired and non-retired persons was noted in the previous subsection. If μ denotes the mean value of D_i , computed over all persons for whom $D_i > 0$, then the deprivation level variable, Y_i , in equation (4), was defined as:

- $Y_i = 0$ if $D_i = 0$: such persons were defined as being “not-deprived”
- $Y_i = 1$ if $0 < D_i \leq \mu$: such persons were defined as being “mildly-deprived”
- $Y_i = 2$ if $D_i > \mu$: such persons were defined as being “strongly-deprived”

The determining variables used in the ordered logit equation (3) were:

- AGE_i in years, normalised by setting $AGE_i = 0$ for persons who were 16 years old¹⁶
- $HIGHED_i = 1$, if the person had first, or higher, degree qualifications of UK standard; $HIGHED_i = 0$, otherwise
- $MIDDED_i = 1$, if the person had post-A level, but less than degree, qualifications¹⁷; $MIDDED_i = 0$, otherwise
- $RC_i = 1$, if the person was Roman Catholic; $RC_i = 0$, otherwise

¹³Arrived at by dropping, from the total of persons in the NI SARs all: non-residents; persons living in institutions; persons in the armed forces; those born outside NI; and students.

¹⁴All non-(Roman) Catholics are identified as “Protestants”, although this latter group contained persons who either did not state a religion (7.2% of Northern Ireland residents) or declared that they had no religion (3.8% of Northern Ireland residents).

¹⁵The sole exception being the proportion of retired persons living in 0-earner households: this was 72% for Catholics and 75% for Protestants.

¹⁶After normalisation, $AGE_i = 1$, for those who were 17 years old; $AGE_i = 2$, for those who were 18 years old and so on.

¹⁷These are qualifications generally obtained at 18+.

- $SEX_i = 1$, if the person was female, $SEX_i = 0$; otherwise
- $RET_i = 1$, if the person was retired; $RET_i = 0$, otherwise
- $INAC_i = 1$, if the person was economically inactive; $INAC_i = 0$, otherwise
- $UE_i = 1$, if the person was unemployed; $UE_i = 0$, otherwise
- $HNUM_i = 1$, if the number of persons in the household were six or more; $HNUM_i = 0$, otherwise
- $SNPAR_i = 1$, if the person was a single parent; $SNPAR_i = 0$, otherwise
- $AREA_{ai} = 1$, if person was resident in area a of Northern Ireland; $AREA_{ai} = 0$, otherwise. There were 10 such areas¹⁸ identified in the 1991 Census for Northern Ireland.

On the basis of these variables, the two equations (3) and (4), were estimated *separately for Catholics and Protestants*. For the Catholic subsample (4,354 observations), the relevant coefficients were β_k^C and for the Protestant subsample (8,800 observations), the relevant coefficients were β_k^P . The term Z_i in equation (3), in the light of the above discussion, was:

$$\begin{aligned}
Z_i^r = & \beta_1^r + \beta_2^r * AGE_i + \beta_3^r * AGE_i^2 \\
& + \beta_4^r * HIGHED_i + \beta_5^r * MIDEED_i + \beta_6^r * SEX_i \\
& + \beta_7^r * RET_i + \beta_8^r * INAC_i + \beta_9^r * UE_i \\
& + \beta_{10}^r * HNUM_i + \beta_{11}^r * SNPAR_i \\
& + \beta_{12}^r * AREA_{2i} \dots\dots + \beta_{20}^r * AREA_{10i}
\end{aligned} \tag{8}$$

where in equation (8) when $r = C$ the coefficients β_k^C relate to Catholics (4,354 observations) and when $r = P$ the coefficients β_k^P relate to Protestants (8,800 observations). There is, of course, no necessity for the two sets of coefficients to be equal. The fact that an explicit cut-off point, μ , was used on the D_i to construct the deprivation level variable, Y_i meant that the average predicted probability, for persons from a particular community of being at a particular deprivation level, was equal to the corresponding sample proportion of persons from that community at that deprivation level¹⁹.

¹⁸These were: Belfast (Area1); Ards, Castlereagh, North Down (Area 2); Down, Lisburn (Area 3); Carrickfergus, Larne, Newtownabbey (Area 4); Antrim, Ballymena and Ballymoney (Area 5); Armagh, Newry & Mourne (Area 7); Coleraine, Cookstown, Maghrafelt, Moyle (Area 6); Banbridge, Craigavon, Dungannon (Area 8); Derry, Limavady (Area 9); and Fermanagh, Omagh, Strabane (Area 10). Because of multicollinearity, all 10 areas cannot be included in equation (8). $AREA_1$ (Belfast) is the area that was dropped (aliased) from the equation.

¹⁹This is because the model estimates of δ mimicked the underlying model.

4 Estimation and Inference Results

Tables 2 and 3 set out the results from estimating the ordered logit model embodied in equations (3) and (4), using the variables as discussed earlier, for, respectively, Catholics and Protestants²⁰. The estimation was carried out in two stages. The first set of results were *unrestricted* estimates, obtained without imposing any restrictions on the specification in equation (8). The second set of results were *restricted* estimates obtained by setting some of the coefficients in the equations (8) to zero. A total of 3 and 2 coefficients were set to zero in, respectively, the Catholic and Protestant equations and likelihood-ratio (LR) tests, with $\chi^2(3) = 1.26$ and $\chi^2(2) = 0.18$ did not reject the validity of these restrictions. It is these restricted estimates, shown in Tables 2 and 3, which form the basis for the discussion below.

<Tables 2 & 3>

The χ^2 values at the head of the tables (respectively, 1527.75 and 874.58) are defined as $2(L_1 - L_0)$ where L_0 is the value of the log-likelihood function when the only explanatory variable was the constant term and L_1 is the value of the log-likelihood function when all the explanatory variables were included: the degrees of freedom equal the number of slope coefficients estimated. These χ^2 values decisively reject the null hypothesis that the model did not have greater explanatory power than a “constant term only” model. The value of L_1 is the log-likelihood value shown at the head of the tables. The “pseudo- R^2 ” is defined as $1 - L_1/L_0$. This is bounded from below by 0 and, from above, by 1: a 0 value corresponds to all the slope coefficients being zero and a value of 1 corresponds to perfect prediction²¹.

Two general questions were sought to answered from the estimation results. First, what were the attributes that made a significant contribution to the probability of a person being deprived? Second, given a set of attributes, would the probability of being deprived have been different if the person with these attributes had been Catholic rather than Protestant? The answer to the first question is set out in this section, the answer to the second question being reserved for the next section.

The probability of being deprived fell with age, for both Catholics and Protestants ($\beta_2^r < 0$) though the magnitude of this fall decreased with age ($\beta_3^r > 0$). Having (post-18) educational qualifications reduced this probability ($\beta_4^r < 0$ and $\beta_5^r < 0$), regardless of whether the person concerned was Catholic or Protestant, and the strength of this effect increased, for persons from both communities, as the level of qualification was raised ($|\beta_4^r| > |\beta_5^r|$).

The attributes of a person that increased his/her probability of being deprived were: sex; non-employment; the size of the household; and whether, or not, the person was a single parent. Protestant women had a lower probability of being deprived than Protestant men ($\beta_6^P < 0$) but for Catholics there was no

²⁰The estimation and inference was carried out using the econometric package STATA v5.0.

²¹That is, to $L_1 = 0$.

gender difference associated with this probability ($\beta_6^C = 0$). Not being in work, whether due to retirement, inactivity, or unemployment, significantly increased the probability ($\beta_7^r, \beta_8^r, \beta_9^r > 0$) of being deprived. Living in a large household also increased this probability ($\beta_{10}^r > 0$) as, indeed, did being a single parent ($\beta_{11}^r > 0$) though, in the case of single parents, the effect on the probability was considerably greater for Protestants than for Catholics ($\beta_{11}^P > \beta_{11}^C$).

Most of the areas that were included in the equations had associated with them coefficient estimates that were positive. A positive area coefficient in equation (8) implied that the probability of being deprived, for a person living in that area, was higher than for an equivalent person living in Belfast. The two areas with negative coefficient estimates were Ards & North Down (area 2) and Carrickfergus, Larne and Newtownabbey (area 4): compared to Belfast, living in these areas offered a lower probability of being deprived.

5 Attributes *versus* Coefficients

This section provides an answer to the question posed earlier: after controlling for non-religion attributes, were Catholics more (or less) likely to be deprived than Protestants? Table 4, below, shows that: 50% and 38%, respectively, of the Protestant and Catholic samples were not-deprived; 34% and 37%, respectively, of the Protestant and Catholic samples were mildly-deprived; and 16% and 25%, respectively, of the Protestant and Catholic samples were strongly-deprived. The fact that a smaller proportion of Catholics, compared to Protestants, were not-deprived and that a higher proportion were both mildly and strongly-deprived could be due to two reasons. First, those attributes which increased the probability of being deprived were disproportionately concentrated among Catholics and/or those attributes which decreased the probability of being deprived were disproportionately concentrated among Protestants²². Second, a particular attribute was penalised more harshly (if it was deprivation-increasing: for example, being unemployed) and/or was rewarded less generously (if it was deprivation-reducing: for example, having educational qualifications) if the person possessing the attribute was Catholic rather than Protestant.

<Table 4>

In order to determine how much of the Catholic-Protestant *deprivation gap* - defined as the difference in the proportions of Catholics and Protestants at different deprivation levels - was due to each of these two factors²³, the following questions were addressed. What would have been the proportion of Protestants, at different levels of deprivation, if the attributes possessed by Protestants had been penalised/rewarded at ‘‘Catholic’’ rates? how do these *synthetic* proportions (denoted q_j^P) compare to the proportions of Catholics, and of Protestants,

²²For example, nearly 16% of Catholics, compared to 8% of Protestants, in the sample were single parents.

²³That is, differences in attributes versus differences in coefficients.

at these deprivation levels, when the attributes of each community was evaluated using its *own* coefficients (denoted, respectively, p_j^C and p_j^P ?²⁴ The values of these three probabilities - p_j^P , q_j^P and p_j^C - are shown in Table 5.

<Table 5>

Table 5 shows that, calculated over all the persons in the sample, the average *own-coefficient*²⁵ probabilities of Protestants being, respectively, not-deprived, mildly-deprived and strongly-deprived were: 50%, 34% and 16%. When Protestant attributes were evaluated at Catholic coefficients, the probability of being not-deprived *fell* to 46% and the probability of being strongly-deprived and of being mildly-deprived *rose* to, respectively, 19% and 35%. This story was repeated when subgroups (single parents; retired persons; inactive persons; unemployed persons; and persons living in large families) from the sample were analysed. With two exceptions (retired and unemployed persons) the probability of being not-deprived *always* fell, and the probability of being strongly-deprived *always* rose, when Protestant attributes were evaluated at Catholic coefficients though, naturally, the magnitude of these changes varied according to the subgroup being considered²⁶. The largest fall (in the probability of being not-deprived) and the sharpest rise (in the probability of being strongly-deprived) was recorded for persons who were economically inactive. The pattern with respect to the probability of being mildly-deprived was that the position of Protestant persons who were single parents, or retired, or unemployed or living in large families would have been unchanged²⁷, but that of persons who were inactive would have worsened, had their attributes been evaluated at Catholic coefficients.

The difference between the proportion of Protestants and Catholics in the different categories of deprivation, $p_j^P - p_j^C$, can be decomposed as:

$$p_j^P - p_j^C = (q_j^P - p_j^C) + (p_j^P - q_j^P) = A_j^* + B_j^* \quad (9)$$

In equation (9), A_j^* represents that part of the “deprivation gap” between Catholics and Protestants that is due to inter-community differences in attributes and B_j^* represents that part of the gap that is due to inter-community differences in coefficient values. These absolute differences, can be expressed in percentage form as:

$$A_j = A_j^*/(p_j^P - p_j^C) \text{ and } B_j = B_j^*/(p_j^P - p_j^C) \quad (10)$$

and the values of A_j and B_j are shown in Table 6, below.

<Table 6>

Table 6 shows that, computed over all the persons in the sample, 66% of the gap between Catholics and Protestants²⁸, with respect to their respective

²⁴The values taken by j are: 0 (no-deprivation); 1 (mild-deprivation); 2 (severe-deprivation).

²⁵That is, Protestant attributes evaluated at Protestant coefficients.

²⁶In the case of unemployed and retired persons these probabilities hardly changed.

²⁷In the sense of having the same average probability of being mildly-deprived.

²⁸That is, the difference in the proportions of Catholics and Protestants at a particular level of deprivation.

proportions who were not-deprived, was due to the fact that persons in the Catholic subsample had attributes which were different from persons in the Protestant subsample and 34% was due to the fact that Catholic attributes were evaluated differently from Protestant attributes. With respect to strong-deprivation, 69% of the Catholic-Protestant gap was due to attribute differences but, with respect to mild-deprivation, only 55% of the Catholic-Protestant gap was due to attribute differences.

Turning to the specific subgroups, for persons who were single-parents, or retired, or unemployed, a comparatively large percentage of the Catholic-Protestant gap, with respect to the different levels of deprivation, was due to differences in attributes between Catholics and Protestants²⁹ and relatively little of the gap was due to the fact that specific attributes, when applied to Catholics, had more serious consequences for deprivation than they did when applied to Protestants. For example, for unemployed persons, over 94% of the Catholic-Protestant gap, with respect to strong-deprivation, could be explained in terms of differences in attributes between persons belonging to the two communities. However, for inactive persons, differences in the coefficients used to evaluate attributes (as opposed to differences in the attributes themselves) accounted over two-thirds of the deprivation gap between Catholics and Protestants. For persons living in large families, nearly half of the inter-community deprivation gap, in respect of strong deprivation, and over 70% in respect of mild deprivation was due to differences in the coefficients used to evaluate the deprivation generating attributes.

6 Conclusions

The Northern Ireland government has been sensitive to the issue of economic and social differentials between the Catholic and the Protestant communities and has initiated a number of policy initiatives to redress such imbalances. These initiatives have been launched against a background of debate as to the proximate causes of inter-community disparities, particularly with respect to differences in the unemployment rate between Catholics and Protestants. As the introductory section observed, this has generated considerable debate in Northern Ireland. On one side of this debate are the “structuralists” who see high levels of Catholic unemployment as being the product of structural factors: poor location; labour market segmentation; educational differences; and differences in work commitment. Opposing the structuralists are those who see Catholic disadvantage as being the product of discrimination, whether direct or indirect.

This paper extended this debate into the area of deprivation. Given that certain circumstances are more likely to generate deprivation than others, it asked whether higher levels of Catholic deprivation could be explained by the fact that Catholics were victims of such circumstances to a greater degree than

²⁹ Respectively, 16% (retired), 19% (inactive) and 26% (large families).

Protestants or whether, in addition, Catholics paid a higher price for such circumstances than did Protestants? Our answer, based on an econometric analysis of Census data, showed that the latter explanation often played a major role in explaining disparities in deprivation levels. In policy terms, therefore, a plank for reducing disparities in deprivation levels between Catholics and Protestants would be to reduce differences in unemployment rates between the communities and, indeed, this the area on which most debate and attention in Northern Ireland has focused. But another question, worthy of policy attention, might be to ask why the same set of circumstances should generate higher levels of deprivation among Catholics than among Protestants. This paper has pointed to the importance of asking such a question.

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