Female Labour Force Participation and Unemployment in Northern Ireland: Religion and Family Effects

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Abstract: Econometric models of the incidence of economic activity and employment by religion for females in Northern Ireland are presented. Particular attention is paid to family effects. Censored bivariate probit models are estimated for single women and significant religion effects are found. In the case of married women, possible endogeneity and logical coherency problems are overcome by modelling the joint economic activity of females and their partners instead of attempting to condition on the male's economic activity. An indirect or family, rather than a direct, religion effect is found. This family effect occurs since, other things being equal, the wives of unemployed men are significantly less likely to be economically active. This may be the result of how the benefit system operates.

I INTRODUCTION

Differences in the economic activity of Catholic and Protestant men in Northern Ireland, particularly their unemployment rates, have provoked a lively debate amongst academics and policy makers about the causal factors.[1] However as Davies *et al.* (1995) note, little or no attention has been paid to differences in the economic activity of Catholic and Protestant females. On the one hand, Davies *et al.*, suggest that there is an "under-examined consensus" that the differences in economic activity by religion are smaller for females than for males and so are less important. On the other

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1 See Compton (1991); Eversley (1989); Gallagher (1991); Murphy and Armstrong (1994); and Smith and Chambers (1991) *inter alia*.

hand, it is often claimed that Catholic women face a double disadvantage because of their sex and their religion.

In this paper a large household survey dataset, the Northern Ireland Labour Force Survey, is used to model the incidence of female economic activity by religion. Econometric models of the incidence of economic activity and employment are constructed. This fills a gap since no econometric modelling has been carried out before now. Particular attention is paid to religion and family effects — family size, family composition and, in the case of married women, their partner's economic activity. Modelling married women's economic activity is involved since there is a complex relationship between their activity and their partner's economic activity, which is likely to be endogenous. This problem and the separate logical coherency problem are overcome by modelling the joint economic activity of females and their partners rather than by attempting to condition on the male's economic activity. This approach is novel.

Turning to religion, the basic issue is to what extent the observed differences in labour market outcomes — differences in the incidence of economic inactivity and unemployment etc. — reflect differences in labour market opportunities. According to some it is possible to explain a large part of the male unemployment differential in terms of so called "structural factors" such as age, number of children, location and social class which, it is argued, have little or nothing to do with differences in economic opportunities. According to others, much of the differential is explained by religion, or factors highly correlated with it, and not just by differences in the observed characteristics of Catholics and Protestants. This is the issue addressed in this paper.

The econometric modelling results are interesting. Fairly large and significant religion effects are found for single females. *Ceteris paribus*, single Catholic females are significantly less likely to be economically active and, if they are economically active, significantly less likely to be employed than single Protestant females. However, in the case of married women, the estimated religion effects are small once the partner's economic activity is taken into account. However, large and highly significant effects are found for their partners. Thus an indirect, rather than a direct, religion effect is found. Females with unemployed partners are, other things being equal, much more likely to be inactive. The operation of the benefit system is likely to be a major factor in generating this result.

II THE LFS DATA

The dataset used in this paper consists of four years pooled Labour Force Survey (LFS) data for Northern Ireland. The four years are 1985, 1986, 1990

and 1991. These four years were chosen because religion data were not collected in the LFS between 1987 and 1989. The actual sample used in this paper consists of females aged 20 to 54 with a known religion — Catholic, Protestant, other religion and no religion. The age range 20 to 54 was chosen to avoid extensive modelling of participation in education and training schemes and retirement decisions. The data for the four years were pooled since the sample size in any single survey is quite small. When pooling the data, care was taken to ensure that the data were consistently defined and coded. See Murphy and Armstrong (1994) for further details. The LFS dataset used here is much larger than the Women Working Lives survey used by Davies *et al.* (1995).

In the LFS, the employed, the unemployed and the economically inactive are defined as follows. Any adult who did some paid work or who had a job that they were temporarily away from or who was on a government employment or training scheme is classified as employed. Any adult without a job who was available to start a job within two weeks and who had either looked for work in the previous four weeks or was waiting to start a job already obtained is classified as unemployed. Finally, any adult not employed or unemployed is deemed to be economically inactive. This group includes the retired, the long-term sick and disabled and most full-time students.

Table 1(a): *Marital Status and the Presence of Children*
Women Aged 20 to 54

| | Religion | | |
	Catholic	Other	All
	%	%	%
Single etc., No Children	22.2	19.9	20.9
Single etc., With Children	9.5	6.5	7.7
Single etc.	31.7	26.4	28.6
Married, No Children	13.2	26.5	21.0
Married, With Children	55.1	47.1	50.4
Married	68.3	73.6	71.4
All	100.0	100.0	100.0
Sample Size	4,398	6,308	10,704

Note: Sample from pooled Northern Ireland Labour Force Surveys for 1985, 1986, 1990 and 1991. The category single etc., includes widowed, divorced and separated women. Cohabitating women are included in the category married. Children refers to children aged under 16 years.

Table 1(b): *Non-Participation Rates Disaggregated by Marital Status and the Presence of Children, Women Aged 20 to 54*

	Non-Participation Rates			Ratio of Non-Participation Rates
	Catholic	Other	All	
	%	%	%	
Single etc., No Children	21.6	15.6	18.2	1.4
Single etc., With Children	70.1	61.0	65.6	1.2
Single etc.	36.1	26.7	31.0	1.3
Married, No Children	34.7	24.1	26.8	1.4
Married, With Children	51.8	40.7	45.7	1.3
Married	48.5	34.7	40.1	1.4
All	44.6	32.6	37.5	1.4
Sample Size	4,398	6,308	10,704	

Note: Sample from pooled Northern Ireland Labour Force Surveys for 1985, 1986, 1990 and 1991.

Some details of the sample are set out in Tables 1 and 2. The sample is disaggregated by religion, marital status and the presence of children under the age of sixteen. The single etc., category includes widowed, divorced and separated women; the married category includes those who are cohabiting. Table 1(a) shows that relatively more Catholics are single. They are also more likely to have children under sixteen years of age. This is partly because Catholic women are younger on average. Economic inactivity rates vary with marital status and the presence of children — single etc., women with children have the highest non-participation rates. As Table 1(b) shows, Catholic economic inactivity rates tend to be about one-third higher than Other (i.e., non-Catholic) economic inactivity rates. However this uniform pattern does not hold for the incidence of unemployment.

In Table 2(b) the ratio of Catholic to Other unemployment rates, or the so-called "unemployment differential", is about 1.5 on average. This is much lower than the male unemployment differential which is about 2.5 in the LFS dataset.[2] Thus, there is nothing to indicate that Catholic women are at a double disadvantage because of their sex and religion. However, the unemployment differential varies greatly with the presence of children. It is much lower for those with children than for those without children, irrespective of marital status. This is an intriguing finding.

2 See Murphy and Armstrong (1994).

Table 2(a): *Marital Status and the Presence of Children*
Economically Active Women Aged 20 to 54

| | Religion | | |
	Catholic	Other	All
	%	%	%
Single etc., No Children	31.4	25.0	27.3
Single etc., With Children	5.1	3.7	4.2
Single etc.	36.6	28.7	31.6
Married, No Children	15.6	29.9	24.6
Married, With Children	47.9	41.4	43.8
Married	63.4	71.3	68.4
All	100.0	100.0	100.0
Sample Size	2,436	4,251	6,687

Note: Sample from pooled Northern Ireland Labour Force Surveys for 1985, 1986, 1990 and 1991.

Table 2(b): *Unemployment Rates Disaggregated by Marital Status*
and the Presence of Children, Economically Active Women Aged 20 to 54

| | Unemployment Rates | | | Ratio of Unemployment Rates |
	Catholic	Other	All	
	%	%	%	
Single etc., No Children	15.4	9.7	12.1	1.6
Single etc., With Children	28.8	24.5	26.4	1.2
Single etc.	17.3	11.6	14.0	1.5
Married, No Children	7.7	4.4	5.2	1.7
Married, With Children	10.8	8.9	9.7	1.2
Married	10.0	7.0	8.0	1.4
All	12.7	8.4	9.9	1.5
Sample Size	2,436	4,251	6,687	

Note: Sample from pooled Northern Ireland Labour Force Surveys for 1985, 1986, 1990 and 1991.

III USE OF ECONOMETRIC MODELS

A major limitation of much research on religion and economic activity in Northern Ireland has been the absence of quantifiable models. Without model results it is difficult to identify the relative importance of the various factors which contribute to the observed differences in economic activity by religion. Another problem with many studies is the difficulty of simultaneously

handling the large number of explanatory variables which are available. These variables tend to be correlated with each other and often interact. Thus, cross-tabulations may be misleading and econometric models are required to properly disentangle the effects of the various explanatory variables. Of course, there are always data and econometric limitations. For example, the absence of income data in the LFS means that the estimated models presented later on are very much reduced forms. Ideally one would like to use large panel data sets with data on income or earnings. Unfortunately, these data do not exist for Northern Ireland.

IV THE ECONOMETRIC MODELS USED

The economic activity of single etc., women is modelled using a censored bivariate probit model. The standard bivariate probit model with a non-zero correlation coefficient ρ allows the errors in the latent equations explaining labour force participation and employment to be correlated. For example, "highly motivated" women are more likely to be both in the labour force and in employment. Since motivation is not observed in the dataset, the errors in the two equations are likely to be positively correlated. If this correlation is significant then single equation probit model results will be biased and inconsistent. A censored bivariate probit model is appropriate when modelling the incidence of labour force participation and employment since, by definition, someone can only be employed if they participate in the labour force.

Consider the following pair of latent regression equations for the incidence of participation and employment:

$$y_1^* = x_1'\beta_1 + u_1$$
$$y_2^* = x_2'\beta_2 + u_2$$

where the errors are assumed to have a standard bivariate normal distribution with correlation ρ. Only the signs of the latent variables are observed so two indicator variables y_1 and y_2 are defined as follows:

$$y_1 = 1 \Leftrightarrow y_1^* > 0$$
$$= 0 \Leftrightarrow y_2^* \leq 0$$
$$y_2 = 1 \Leftrightarrow y_2^* > 0$$
$$= 0 \Leftrightarrow y_2^* \leq 0.$$

If an individual participates $y_1 = 1$; otherwise it is zero. Similarly, if an economically active individual is employed $y_2 = 1$; otherwise $y_2 = 0$ indicating that she is unemployed. In the censored model the second latent regression is only relevant when the individual participates i.e., when $y_1 = 1$. Thus only three combinations of the pair (y_1, y_2) are observed. The probabilities of these three combinations are as follows:

$$\text{prob(inactive)} \quad = \quad \text{prob}(y_1 = 0) \quad = \quad 1 - \Phi(x_1'\beta_1)$$
$$\text{prob(unemployed)} = \quad \text{prob}(y_1 = 1, y_2 = 0) = \quad \Phi(x_1'\beta_1, -x_2'\beta_2, -\rho)$$
$$\text{prob(employed)} \quad = \quad \text{prob}(y_1 = 1, y_2 = 1) = \quad \Phi(x_1'\beta_1, x_2'\beta_2, \rho)$$

where Φ is the univariate or bivariate cumulative standard normal distribution function.[3] In practise, the estimated ρ coefficient in the model for single etc., women is insignificant. This means that there is no need to model single womens' labour force participation and incidence of employment jointly given the set of explanatory variables used.

The effect of a small change in some explanatory variable x_j on the probability of being economically active or employed is called the marginal effect. Marginal effects are readily calculated but they are individual specific. The reported marginal effects in this paper are calculated using the sample average probabilities and estimated coefficients. An alternative approach is often used when considering the effect of changes in variables which are not continuous e.g., the effect of a dummy variable on the probability of some event. Dummy variables are discontinuous since they only take on two values. These alternative measures, which are often called *ceteris paribus* effects, are calculated as $\Phi(x'\hat{\beta} - x_j\hat{\beta}_j + \hat{\beta}_j) - \Phi(x'\hat{\beta} - x_j\hat{\beta}_j)$. In practise, the estimated marginal and *ceteris paribus* effects tend to be similar.

Initially, the economic activity of married women is modelled using separate probit equations for participation and employment which condition on the male partner's economic activity. There are a number of related practical and theoretical problems with this approach. First, the estimated religion effects for married women are very different from those for single women. Second, male economic activity is likely to be endogenous which will result in inconsistent parameter estimates. Third, there is a potential logical coherency problem.[4] A priori there is no particular reason to condition female

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3. See Greene (1993) for further details.

4. See Maddala (1983). The simplest logical coherency problem arises when a latent variable y^* depends on the indicator variable y and other variables: $y^* = \alpha y + X'\beta + u$ where u is a standard normal random error term. When only the sign of y^* is observed, the probabilities of the two outcomes are $1 - \Phi(x'\beta)$ and $\Phi(\alpha + x'\beta)$ which only sum to one when $\alpha = 0$. More generally, a logical coherency problem occurs in systems of equations for latent variables when the endogenous indicator variables appear on the right hand side. Identification of these equations is a separate issue.

economic activity on male economic activity since male and female economic activity are likely to be jointly determined. However, if male economic activity is conditioned on female activity and female economic activity is conditioned on male activity, a logical coherency problem arises. The best way to avoid logical coherency and endogeneity problems appears to be modelling the combined economic activity of married women and their partners. In the absence of panel data, this joint modelling approach is likely to be preferable to the conditional modelling approach since it helps to control for any common unobserved traits between married women and their partners. In principle, this involves modelling nine outcomes i.e., all the combinations of male employed, unemployed or inactive and female employed, unemployed or inactive.

Ideally one would like to model these nine outcomes using the multinomial probit (MNP) model since this is a very general model. The pattern of correlations between the random error terms in the MNP model is fairly unrestricted and could be estimated using simulated maximum likelihood or method of moments estimators.[5] However, the simpler multinomial logit model (MNL) is used in this paper. The results are likely to be similar to those obtained using the independent probit model.

In the multinomial logit model, the probability of "choosing" alternative j from the set of available alternatives $1, \ldots, J$ is:

$$p_j = \frac{\exp(x'\beta_j)}{\sum\limits_{k=1}^{J} \exp(x'\beta_k)}, \ j = 1, \ldots, J$$

where the β_j's are choice specific coefficient vectors. Some normalisation is required so, without loss of generality, β_1 is set equal to zero. Marginal effects, which are individual specific, are readily calculated although there is no simple relationship between the β_j's and the marginal effects $\delta p_j / \delta x$ since this depends on all the β coefficients and not just β_j. Thus the sign of the j'th marginal effect often differs from the sign of β_j. The reported marginal effects in Table 7 are all calculated at the sample average of the x's. Approximate standard errors for these marginal effects have also been calculated.

The simplicity of the multinomial logit model comes at a price. The ratio of any two probabilities is independent of all other alternatives: $p_j/p_k = \exp(x'\beta_j)/\exp(x'\beta_k)$. This "irrelevance of irrelevant alternatives" (IIA) property is restrictive. The MNL also has a large number of parameters. More efficient estimates are obtained by restricting some of the parameters either through

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5. See Borsch-Supan and Hajivassiliou (1993), Hajivassiliou (1993), McFadden (1989) and Pakes and Pollard (1989) for example.

zero or cross-equation restrictions. In the estimated MNL model in Table 7, some cross-equation restrictions are tested and imposed. The qualifications dummy variables are restricted to enter each equation in the form of a common index.

V THE ECONOMIC ACTIVITY OF SINGLE, WIDOWED, DIVORCED AND SEPARATED WOMEN: ECONOMETRIC RESULTS

The economic activity of single, widowed, divorced and separated women is a good ideal easier to model than the economic activity of married and cohabitating women. The reason is that one does not have to account for their partner's economic activity. Some simple probit model results for the incidence of labour force participation and employment of single women are set out in Table 3. A large number of standard explanatory variables are included — location, age, marital status, number of children, age of youngest child, housing tenure, health problems which limit economic activity, highest educational or vocational qualifications as well as religion. The list of explanatory variables is based on studies for the United Kingdom and elsewhere.[6]

The results in Table 3 appear plausible. They accord well with one's priors and with the results for males in Murphy and Armstrong (1994). For example, a high local unemployment rate, more children, the presence of young children, a health problem which limits one's economic activity, and poor or no qualifications at all reduce the probability of being economically active. Other things being equal, those with the higher qualifications are more likely to be economically active with one exception. Females aged 20 to 24 with degrees or A levels are more likely to be in further or higher education.

Religion is a significant explanatory variable in both the participation and employment equations. *Ceteris paribus*, single Catholic women are less likely to participate in the labour force and, if they do participate, to be employed. In the LFS sample used, the actual difference in participation rates between Catholics and Others is 9.7 percentage points. The estimated marginal and *ceteris paribus* religion effects are both 2.7 percentage points. This suggests that about one-third of the difference in participation rates between Catholics and Others is accounted for by religion and the rest by differences in family size, age of youngest children, educational qualifications etc. The actual difference in unemployment rates between Catholics and Others is 6.2 percentage points whilst the estimated marginal and *ceteris paribus* religion

6. See Nickell (1980) and Pissarides and Wadsworth (1992) for example.

Table 3: *Incidence of Participation and Employment*
Single, Widowed and Divorced Women Aged 20 to 54
Probit Model Results

Explanatory Variables	Employment		Participation	
	Coeff	Abs t Stat	Coeff	Abs t Stat
Constant	−0.510	0.9	0.275	0.5
Ln TTWA Unemployment Rate	−0.026	2.3	−0.014	1.5
Belfast DC*	−0.218	2.4	−0.243	3.5
Age	0.085	2.5	0.070	2.5
Age Squared x 1000	−0.979	2.1	−1.222	3.2
Number of Children	−0.147	2.5	−0.307	6.3
Youngest Child Aged 0-1*	—	—	−1.516	10.0
Youngest Child Aged 2-4*	—	—	−1.163	8.4
Youngest Child Aged 5-9*	—	—	−0.699	5.5
Widowed*	—	—	−0.426	3.8
Divorced/Separated*	−0.302	2.6	—	—
Own/Buying House*	0.455	5.8	0.331	5.1
Health Problem Limits Economic Activity*	−0.404	3.0	−1.167	13.9
Highest Qualification — Degree etc.*	0.792	5.8	0.872	5.9
Highest Qualification — A Level*	0.971	5.4	0.353	1.8
Highest Qualification — Apprenticeship etc.*	0.397	2.6	0.369	2.8
Highest Qualification — O Level etc.*	0.513	4.9	0.696	6.9
Highest Qualification — Other*	0.378	3.1	0.364	3.6
Degree etc. Highest Qualification and Aged 20-24*	—	—	−0.556	2.4
A Level Highest Qualification and Aged 20-24*	—	—	−1.353	6.2
Catholic*	−0.202	2.7	−0.124	2.1
Sample Size	2,084		3,021	
Log Likelihood	−730.2		−1187.6	
Percent Correction Predictions	85.9		82.3	
McFadden's Pseudo R^2	0.113		0.417	

Notes: The sample consists of single, divorced and separated women aged 20 to 54 and is from the pooled Northern Ireland Labour Force Surveys for the four years 1985, 1986, 1990 and 1991. In the sample the economic inactivity (non-participation) rates are 31.0% overall, 36.3% for Catholics and 26.6% for Others. The sample consists of 1,378 Catholics and 1,643 Others. Amongst the economically active, the unemployment rates are 14.0% overall, 17.8 for Catholics and 11.6% for Others. The unemployment differential (ratio of unemployment rates) is 1.5. The sample of economically active single etc., women is made up of 878 Catholics and 1,206 Others.

Dummy variables are denoted by an asterisk. The educational dummy variables are defined as follows. The degree level category includes those with higher degrees, degree equivalents (such as nursing or teaching qualifications) and those with BTEC(H)'s, HNC's, HND's etc. The apprenticeship category includes those with completed trade apprenticeships, City & Guilds and BTEC(O)'s, ONC's, OND's etc.

The restrictions that religion only appears as a dummy variable, and not interacted with other variables, were not rejected.

effects are both about 3.9 percentage points. This suggests that about two-thirds of the difference in unemployment rates between Catholics and Others is accounted for by religion and the rest by structural factors. Murphy and Armstrong (1994) found that religion accounted for about half of the much larger difference in male unemployment rates.

These findings must be interpreted with care. They do not necessarily equate with current direct or indirect discrimination. For example, the current incidence of unemployment depends, in part, on the past incidence of unemployment. In addition some would argue that the large and significant Catholic effects found may be explained by a range of factors which are not in the model because they are not measured in the LFS data used. Murphy and Armstrong (1994) discuss these issues and examine some of these arguments in more detail.

VI THE ECONOMIC ACTIVITY OF MARRIED AND COHABITATING WOMEN: ECONOMETRIC RESULTS

Some probit participation equations for married women are presented in Table 4. The first set of results exclude the male partner's economic activity and religion is significant. However, once one conditions on, or includes as an additional explanatory variable, the partner's economic activity religion becomes completely insignificant. Moreover, the other explanatory variables do not change sign or become insignificant.

Some probit equations for the incidence of unemployment are presented in Table 5. Religion is insignificant to start off with and becomes completely insignificant when one conditions on the husband's economic activity. The contrast between these results and those for single women is rather startling.

In the light of these results as well as the theoretical issues discussed in Section IV, it was decided to estimate multinomial logit models of the joint economic activity of married women and their partners, rather than continue with models which condition on the male partner's economic activity. Some details of the LFS sample used are set out in Table 6. The female unemployment differential is 1.4 whilst the male differential is over 2.8. The nine different joint outcomes are shown in Table 6(c). It is clear that the wives of unemployed men are much more likely to be economically inactive. On the one hand this may be the result of how the means tested benefit system works.[7] On the other hand it may just reflect the traditional "macho" view of the male as the principal bread-winner.[8] The largest differences in

7. See Davies et al. (1992), Dilnot and Kell (1987), Garcia (1989) and Kell and Wright (1990) for example.
8. See Barrère-Maurisson et al. (1985) for example.

Table 4: *Incidence of Economic Activity*
Married and Cohabitating Women Aged 20 to 54
Probit Model Results

Explanatory Variables	Excluding Partner's Economic Activity		Including Partner's Economic Activity	
	Coeff	Abs t Stat	Coeff	Abs t Stat
Constant	−0.534	1.6	−0.539	1.6
Ln TTWA Unemployment Rate	−0.030	5.9	−0.030	5.9
Belfast DC*	−0.009	0.2	0.034	0.7
Age	0.092	5.2	0.077	4.0
Age Squared x 1000	−0.147	6.3	−0.121	5.1
Number of Children	−0.209	11.9	−0.193	10.8
Youngest Child Aged 0-1*	−0.745	11.6	−0.795	12.1
Youngest Child Aged 2-4*	−0.528	8.7	−0.566	9.2
Youngest Child Aged 5-9*	−0.169	3.1	−0.197	3.5
Own/Buying House*	0.405	11.0	0.240	6.2
Health Problem Limits Economic Activity*	−0.808	14.8	−0.782	14.2
Highest Qualification — Degree etc.*	0.922	16.9	0.863	15.8
Highest Qualification — A Level*	0.647	6.7	0.586	6.1
Highest Qualification — Apprenticeship etc.*	0.310	4.4	0.275	3.9
Highest Qualification — O Level etc.*	0.497	10.2	0.448	9.1
Highest Qualification — Other*	0.283	5.3	0.255	4.7
Partner Employed/Scheme*	—	—	0.603	9.6
Partner Unemployed*	—	—	−0.104	1.4
Catholic*	−0.074	2.2	0.011	0.3
(Marginal Effect)	(−2.3%)		(0.3%)	
Sample Size		7,521		7,521
Log Likelihood		−4,145.4		−4,028.3
Percent Correction Predictions		71.8		73.1
McFadden's Pseudo R^2		0.224		0.252

Notes: See notes to Table 3. The sample consists of married and cohabitating women aged 20 to 54 and is from the pooled Northern Ireland Labour Force Surveys for the four years 1985, 1986, 1990 and 1991. There are 2,966 Catholics and 4,555 Others. The Catholic participation rate is 51.4% as opposed to 65.4% for Others. In the case of Catholic women, 68.6% of their partners are employed or on a scheme and 19.8% are unemployed. The corresponding figures for Other women are 87.0% and 7.5% respectively.

outcomes between Catholics and Others are for the combinations male and female employed; male unemployed and female inactive; male inactive and female inactive. Catholics are less likely to be dual earners; the Catholic male is more likely to be unemployed or inactive with an inactive spouse. However, these results may not hold when we take account of relevant explanatory variables such as location, the number of children, the age of the youngest child, highest educational and vocational qualifications etc.

Table 5: *Incidence of Employment*
Married and Cohabitating Women Aged 20 to 54
Probit Model Results

Explanatory Variables	Excluding Partner's Economic Activity		Including Partner's Economic Activity	
	Coeff	Abs t Stat	Coeff	Abs t Stat
Constant	–0.336	0.6	–0.105	0.2
Ln TTWA Unemployment Rate	–0.035	3.7	–0.035	3.7
Belfast DC*	–0.101	1.3	–0.070	0.9
Age	0.086	2.8	0.081	2.6
Age Squared x 1000	–0.889	2.1	–0.838	2.0
Number of Children	–0.144	5.5	–0.142	5.3
Own/Buying House*	0.421	6.4	0.308	4.4
Health Problem Limits Economic Activity*	–0.235	2.0	–0.235	2.0
Highest Qualification — Degree etc.*	0.653	6.3	0.613	5.9
Highest Qualification — A Level*	0.201	1.4	0.180	1.1
Highest Qualification — Apprenticeship etc.*	0.083	0.7	0.123	1.1
Highest Qualification — O Level etc.*	0.237	2.8	0.195	2.3
Highest Qualification — Other*	0.164	1.7	0.134	1.4
Partner Employed/Scheme*	—	—	0.045	0.3
Partner Unemployed*	—	—	–0.735	4.5
Catholic*	–0.051	0.8	–0.002	0.0
(Marginal Effect)	(–0.7%)		(0.0%)	
Sample Size		4,503		4,503
Log Likelihood		–1,139.7		–1,107.3
Percent Correction Predictions		92.0		92.1
McFadden's Pseudo R^2		0.07		0.10

Notes: See notes to Table 3. The sample consists of economically active married and cohabitating women aged 20 to 54. The sample is from the pooled Northern Ireland Labour Force Surveys for the four years 1985, 1986, 1990 and 1991 and consists of 1,525 Catholic and 2,978 Other women. The Catholic unemployment rate is 10.0% as opposed to 7.0% for Other women. In the case of the Catholic women, 84.1% of their partners are employed or on a scheme and 9.6% are unemployed. The corresponding figures for Other women are 92.8% and 3.8% respectively.

Table 6(a): *Economic Activity of Married and Cohabitating Women Aged 20 to 54*
Sample Used for Modelling Joint Male and Female Economic Activity

Female Economic Activity	Catholics (Religion of Male)	Others (Religion of Male)	All
	%	%	%
Employed/Scheme	46.1	60.9	55.1
Unemployed	5.1	4.7	4.9
Inactive	48.8	34.4	40.0
All	100.0	100.0	100.0
Participation Rate	51.2	65.6	60.0
(Sample Size)	(2,872)	(4,547)	(7,419)
Unemployment Rate	9.9	7.2	8.1
(Sample Size)	(1,471)	(2,983)	(4,454)

Table 6(b): *Economic Activity of Partners of Married and Cohabitating Women*
Aged 20 to 54
Sample Used for Modelling Joint Economic Activity

Male Economic Activity	Catholics (Religion of Male)	Others (Religion of Male)	All
	%	%	%
Employed/Scheme	68.7	87.4	80.1
Unemployed	20.2	7.5	12.5
Inactive	11.1	5.1	7.4
All	100.0	100.0	100.0
Participation Rate	88.9	94.9	92.6
(Sample Size)	(2,872)	(4,547)	(7,419)
Unemployment Rate	22.8	7.9	13.4
(Sample Size)	(2,553)	(4,315)	(6,868)

Table 6(c): *Economic Activity of Married and Cohabitating Women Aged 20 to 54*
and their Partners
Sample Used for Modelling Joint Male and Female Economic Activity

Male Economic Activity	Female Economic Activity	Catholics (Religion of Male)	Others (Religion of Male)	All
		%	%	%
	Employed/Scheme	39.6	57.4	50.5
Employed/Scheme	Unemployed	3.4	3.7	3.6
	Inactive	25.6	26.3	26.0
	Employed/Scheme	3.6	1.6	2.4
Unemployed	Unemployed	1.4	0.9	1.1
	Inactive	15.2	5.0	9.0
	Employed/Scheme	2.9	1.8	2.2
Inactive	Unemployed	0.3	0.2	0.2
	Inactive	7.9	3.1	5.0
All		100.0	100.0	100.0
Sample Size		2,872	4,547	7,419

Notes to Tables 6(a), (b) and (c): Sample of married and cohabitating women from the
four years pooled Northern Ireland Labour Force Survey for 1985, 1986, 1990
and 1991. Non-respondents and individuals with missing data are excluded. A
slightly smaller sample of 7,409 is used to estimate the restricted multinomial
logit model, some results of which are reported in Table 7.

In order to take account of these explanatory variables a multinomial logit
model was estimated. Some cross-equation restrictions on the qualifications
variables were imposed. One of the nine possible outcomes was dropped since

it contained too few cases. The religion dummy variable refers to the religion of the male. This is not a problem since there are relatively few mixed marriages in the LFS sample. A nested special case of the model assumes that male and female economic activity are independent. A likelihood ratio test decisively rejects this. (The test statistic is 456.7 with 75 degrees of freedom). The rejection is mainly due to the fact that, other things being equal, the wives of unemployed men are much more likely to be economically inactive.

The estimated multinomial logit model is rather large — it has 127 parameters — and is a little complicated so the estimated coefficients are not presented. However, the estimated marginal effects are set out in Table 7. These are evaluated at the sample averages of the explanatory variables. The model includes quadratic age terms for both males and females. The estimated turning points for these quadratics are pretty close to the average ages in the sample. As a result, the estimated marginal age effects evaluated at the sample averages are not very informative. Otherwise the results appear plausible. For example, variables such as the number of children, the age of the youngest child, health problems and educational qualifications all work as expected.

The estimated religion effects are generally significant. The results for males agree with those in Murphy and Armstrong (1994). The results for females are similar to those in Tables 4 and 5, which is a little surprising. However, the results in Table 7 do have the advantage that they are not affected by endogeneity or logical coherency problems. The results suggest that, *ceteris paribus*, married Catholic men are 7.8 percentage points less likely to be employed, 6.0 percentage points more likely to be unemployed and 1.8 percentage points more likely to be economically inactive. The results also suggest that women married to Catholic men are, *ceteris paribus*, 1.3 percentage points less likely to be employed and 1.2 percentage points more likely to be inactive. Thus, the direct effect of religion on the economic activity of married women appears to be small. However, the indirect or family effect of religion, working through the higher Catholic male incidence of unemployment and non-participation, is large. Other things being equal, Catholic families are more likely to consist of an unemployed or inactive man and an economically inactive woman. The benefit system is likely to be a major factor contributing to this effect. Unfortunately, with LFS data, one cannot determine the size of this benefit trap effect.

Table 7: *Joint Modelling of Male and Female Economic Activity*
Married and Cohabitating Women Aged 20-54

	Male Partner Employed			Male Partner Unemployed			Male Partner Inactive	
	Female Employed	Female Unemployed	Female Inactive	Female Employed	Female Unemployed	Female Inactive	Female Employed	Female Inactive
	%	%	%	%	%	%	%	%
Ln TTWA Male Unemployment Rate	−14.2*	1.5	11.0*	−0.5	0.2	0.9	0.0	1.0*
Belfast DC	−1.2	0.1	−3.8*	1.1*	0.3	2.5*	0.3	0.7*
Age	−0.5*	−0.1	0.6*	0.0	0.0	0.0	0.0	0.0
Partner's Age	0.0	0.0	0.1	0.0	0.0	−0.1	0.0	0.0
Number of Children	−7.9*	−0.3	5.8*	−0.1	0.1	1.8*	0.0	0.7*
Youngest Child Aged 0-1	−30.0*	3.1*	29.4	−2.4*	−0.3	0.6	−0.9*	0.4
Youngest Child Aged 2-4	−23.3*	2.6*	22.7*	−1.4	0.0	0.0	−0.2	−0.4
Youngest Child Aged 5-9	−7.8*	1.7	9.2*	−1.2	0.0	−0.9	−0.2	−0.9*
Own/Buying a House	17.9*	−0.6	−3.6	−2.1	−1.0	−7.4	−0.7	−2.5
Health Problem Limits Economic Activity	−30.3*	0.7	26.8*	−1.0	−0.4	3.6*	−0.3	0.9*
Partner's Health Problem Limits His Economic Activity	−12.6*	0.1	−1.9	1.9*	0.9*	4.1*	2.7*	4.7*
Highest Qualification – Degree or Equivalent	38.9*	−2.2*	−27.5*	2.0*	−0.8	−8.5*	0.6*	−2.6*
Highest Qualification – A Level	23.0*	−1.3*	−16.3*	1.2*	−0.5	−5.0*	0.4*	−1.5*
Highest Qualification – Apprenticeship or Equivalent	8.6*	−0.5*	−6.0*	0.4*	−0.2*	−1.9*	0.1*	−0.6*
Highest Qualification – O Level or Equivalent	18.8*	−1.1*	−13.3*	1.0*	−0.4*	−4.1*	0.3*	−1.2*
Highest Qualification – Other	10.6*	−0.6*	−7.5*	0.5*	−0.2*	−2.3*	0.2*	−0.7*
Partner's Highest Qualification – Degree etc.	1.8	0.7	10.3*	−3.2*	−1.0*	−5.8*	−0.7*	−2.2*
Partner's Highest Qualification – A Level	1.2	0.5	7.0*	−2.1*	−0.6*	−3.9*	−0.5*	−1.5*
Partner's Highest Qualification – Apprenticeship etc.	0.3	0.1	1.8*	−0.5*	−0.2*	−1.0*	−0.1*	−0.4*
Partner's Highest Qualification – O Level etc.	0.9	0.4	4.8*	−1.5*	−0.4*	−2.8*	−0.3*	−1.1*
Partner's Highest Qualification – Other	0.2	0.1	1.3	−0.4	−0.1	−0.7	−0.1	−0.3
Partner Catholic	−4.0*	−0.2	−3.6*	2.2*	0.2	3.6*	0.5*	1.2*

Notes: Sample Size = 7,403. Log likelihood = −8,223.52. The marginal effects are calculated at the sample averages. Significant marginal effects are denoted by an asterisk. The multinomial logit model includes quadratic terms in age and the qualification dummy variables are restricted to enter each exp(x′β) term as a common index. The LR test statistic for this restriction is 99.7 with 48 degrees of freedom so the restriction is not rejected. The sample is the same as in Table 6 except that the category male inactive, female unemployed is omitted since there were only 16 cases in that group.

VII CONCLUSIONS

In this paper econometric models for the incidence of economic activity and employment by religion for prime age females in Northern Ireland are presented. Particular attention is paid to family effects such as the number of children, the age of the youngest child and the partner's economic activity. Censored bivariate probit models of participation and employment are estimated for single women and religion is found to be significant. *Ceteris paribus*, single Catholic women are less likely to participate in the labour force and, if they do participate, to be employed. In the case of married women, possible endogeneity and logical coherency problems are overcome by modelling the joint economic activity of females and their partners instead of attempting to condition on the male's economic activity. A restricted multinomial logit model is estimated. Large and significant religion effects are found for males. Small direct religion effects are found for females. A large indirect or family religion effect is found instead since the wives of unemployed men are significantly less likely to be economically active. This may be the result of how the benefit system operates.

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