

Time Bomb or Damp Squib? Fertility in Contemporary Northern Ireland

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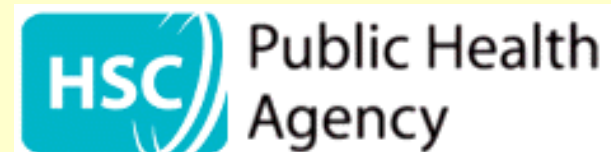
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Time Bomb or Damp Squib? Fertility in Contemporary Northern Ireland

- Overview
- The background
- The NILS
- The data
- The statistical model
- Results
- Conclusion

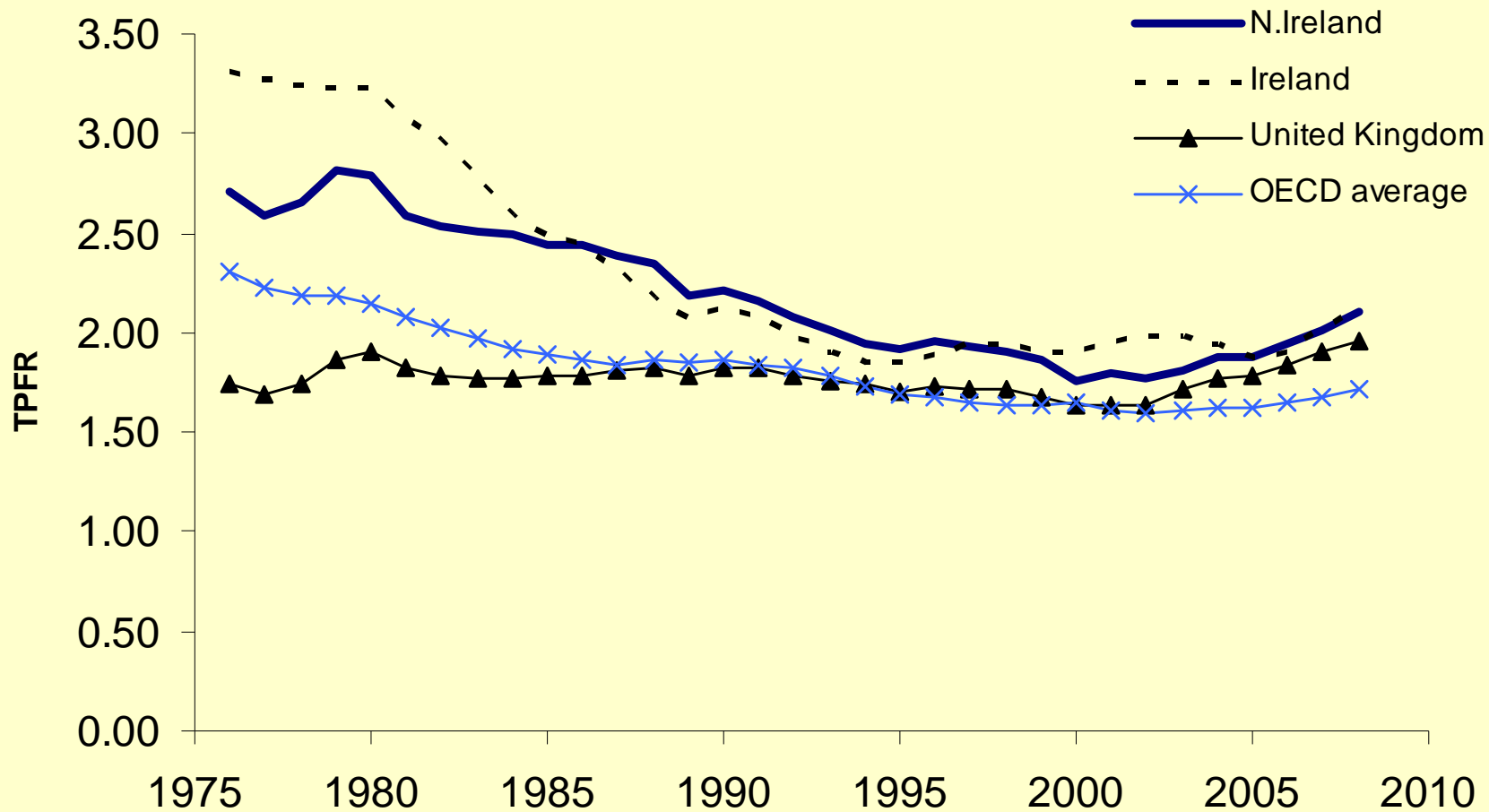
"Don't worry, Gerry, your numbers are getting better all the time!"

President Bill Clinton to Gerry Adams, 1998

The Compton and Coward Analysis of the 1983 NI Fertility Study

- Northern Ireland was subject to two overlapping demographic regimes – the pre-transition Irish one with high marital fertility moderated by less than universal marriage and the British regime with low, planned fertility accompanied by comparatively universal marriage.
- Within Northern Ireland the “majority Protestant population exhibits all the characteristic features of the British regime, while the demographic behaviour of the Catholic population places it firmly within the Irish regime” (Compton and Coward 1989:19).
- Lower economic development and geographic separation, together with religion, explained the higher fertility in NI compared to GB.

Total Period Fertility Rates in OECD and British Isles



Year	All Resident Births	Total Period Fertility Rate	Births Outside Marriage	Teenage Mothers		Mothers aged 30 and over		Average age of first time mothers
				%	rate	%	rate	
1980	28,582	2.79	6.1	7.4	29.2	31.3	67.1	24.8
1990	26,251	2.21	18.8	7.1	29.2	34.0	57.6	..
2000	21,512	1.75	31.8	7.5	25.6	46.9	53.4	26.5
2001	21,962	1.80	32.5	6.9	23.9	48.5	55.6	26.8
2002	21,385	1.77	33.5	7.0	23.3	49.0	54.5	26.9
2003	21,648	1.81	34.4	6.9	22.9	49.6	55.7	27.0
2004	22,318	1.87	34.5	6.7	23.0	50.7	58.8	27.3
2005	22,328	1.87	36.3	6.2	21.7	50.4	58.7	27.3
2006	23,272	1.94	38.0	6.1	22.5	49.9	60.8	27.2
2007	24,451	2.02	37.9	5.7	22.5	50.0	64.3	27.5
2008	25,631	2.11	38.9	5.6	23.0	49.2	67.1	27.5
2009	24,910	2.04	39.8	5.4	21.8	49.4	66.1	27.5
2010P	25,315	2.06	40.4	5.0	20.8	50.6	69.2	27.6

http://www.nisra.gov.uk/archive/demography/publications/births_deaths/births_2010.pdf

Religion and Fertility

Static economic analysis

$$\begin{array}{ll} \text{Max} & U = U(n, q, s) \\ \text{ST} & I \geq nq\pi_c + s\pi_s \end{array}$$

Children assumed to be normal 'goods' so:

$$\varepsilon_n + \varepsilon_q > 0 \text{ but possibly } \varepsilon_n < 0$$

The home production framework allows the cost of children to be expressed as a function of the parents' wages and their respective shares in the costs of producing child quality

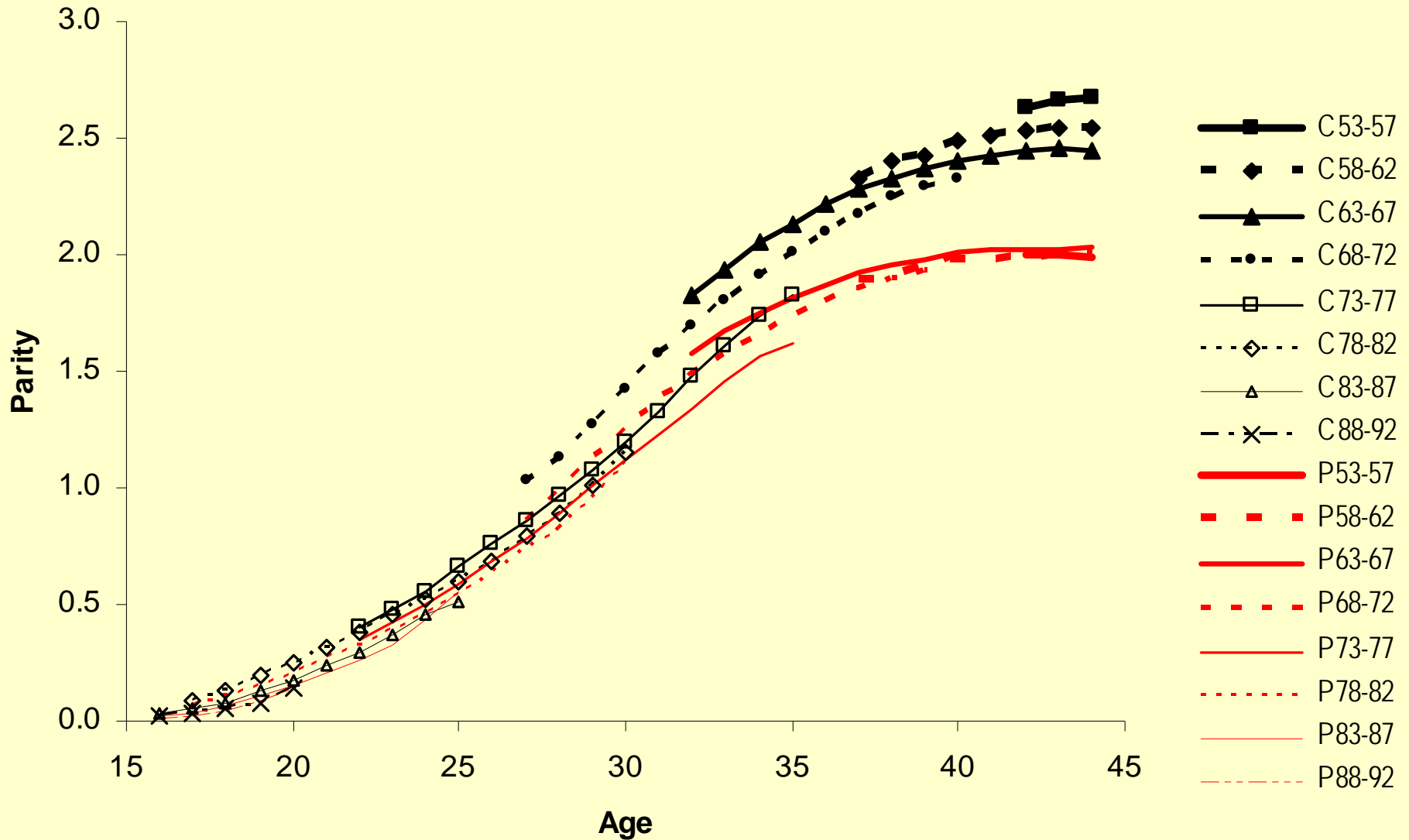
Influence of religion then is through preferences

The Northern Ireland Longitudinal Study

- The NILS potential mothers:
those women with health card registrations,
aged 16-44 years and whose DOB is
one of the 104 in the systematic sample
- Registrations downloaded biannually and
constitute potential panel members
- Details of any birth to a NILS mother are
forwarded by the GRO to the NILS
- 2001 Census: An attempt is made
to link the Census details of all NILS mothers

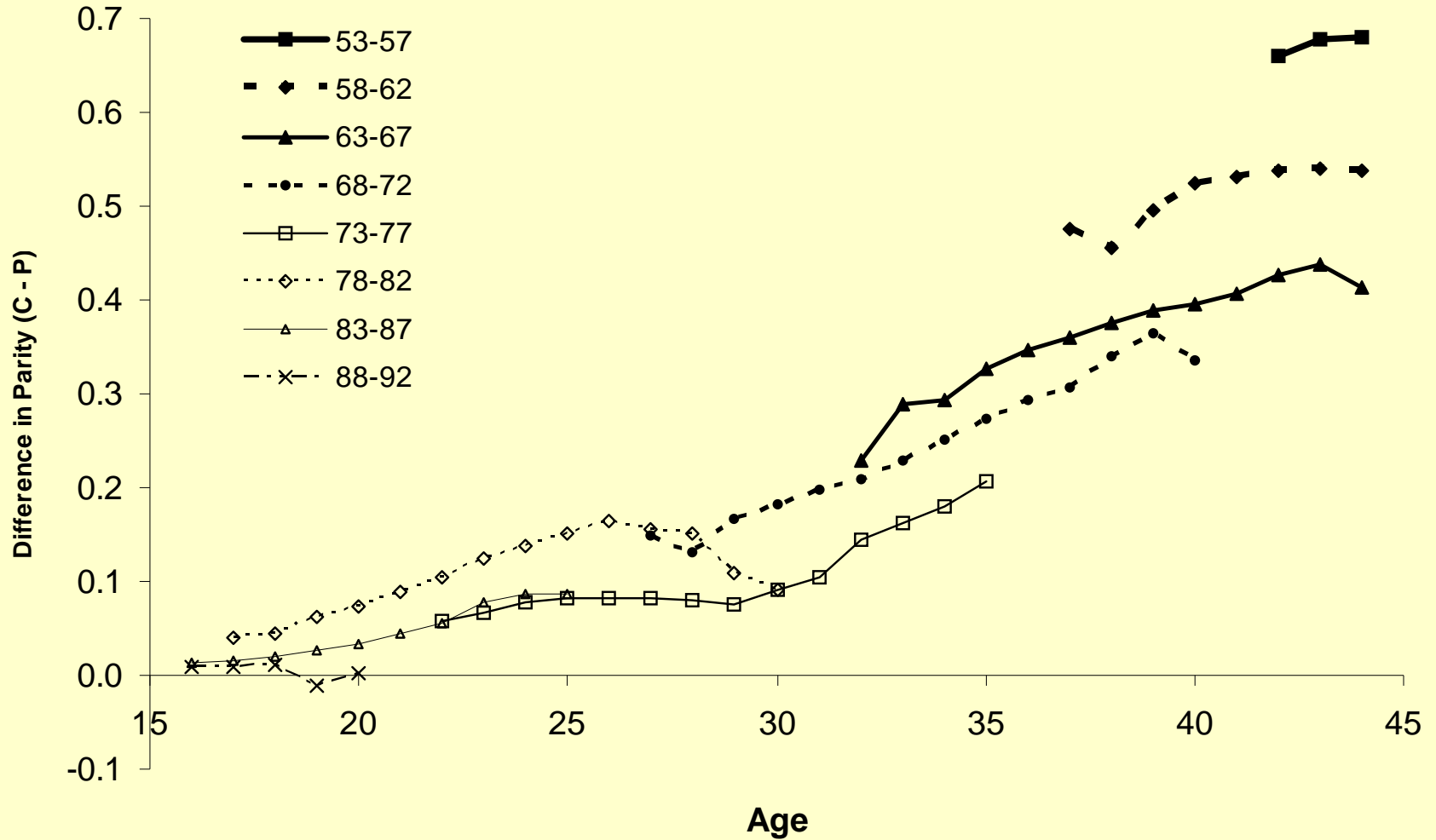
The result is a panel of 126,604 women for 1997 – 2007
in which there are 1,008,902 observations

Average Parity by Religion and Age in the NILS Fertility Panel

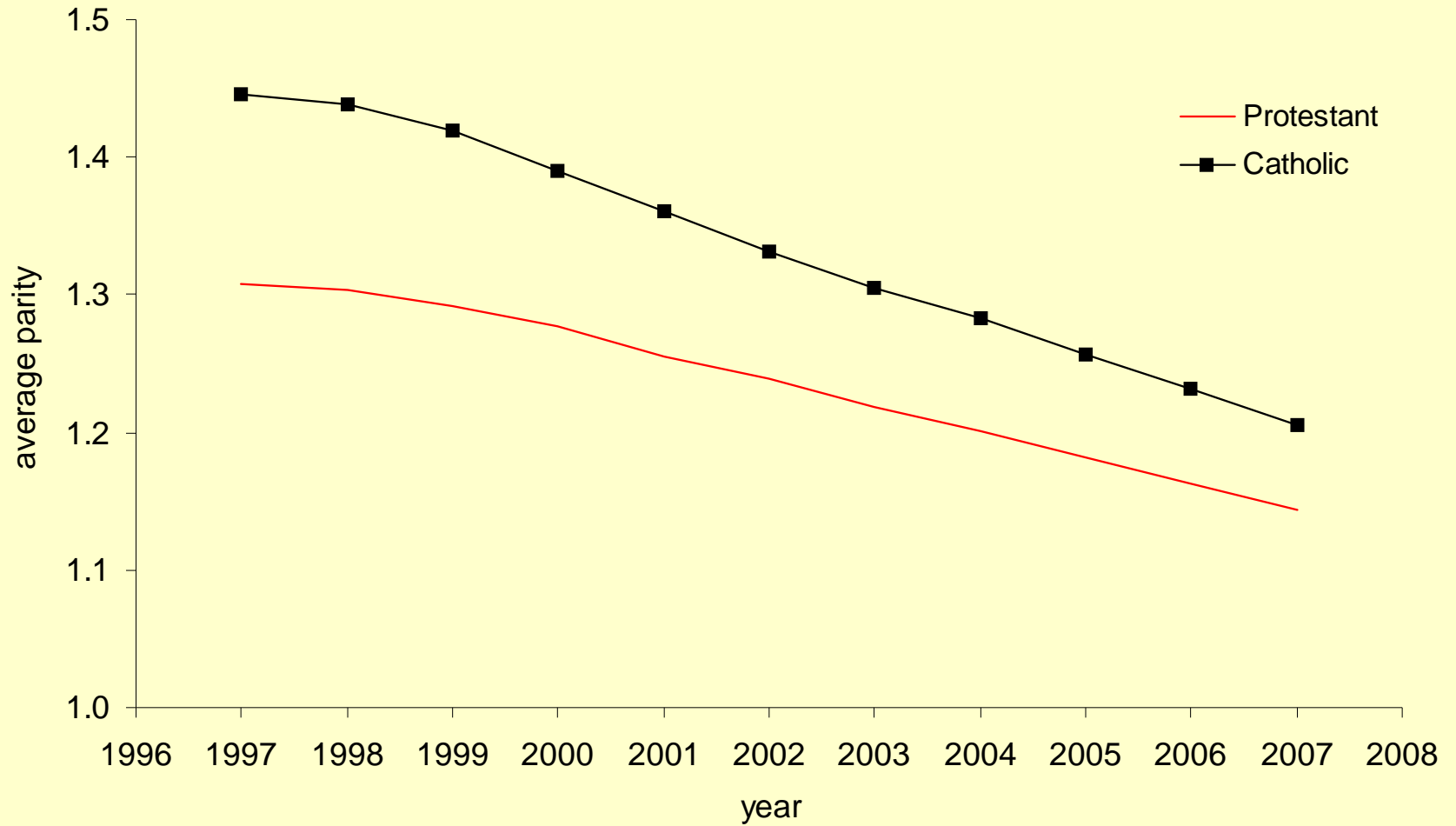


The data

Difference in Average Parity by Age and Cohort



Average Parity of Women aged 16-44



The Statistical Model

- Raftery, AE, Lewis, SM and Aghajanian, A (1995).
- Demand or Ideation? Evidence from the Iranian Marital Fertility Decline, *Demography*, vol. 32.
- Data: 1977 Iran Fertility Survey
- “ each woman-year of exposure is treated as a separate case”
- Five clocks:
 - Age Parity Duration Period Cohort

The Logit Model

Let B^*_i be the propensity for the i^{th} woman to have a baby

$$B^*_i = \alpha_0 + \alpha_1 \text{DEMOGRAPHIC PROFILE}_i + \alpha_2 \text{COHORT}_i + \alpha_3 \text{PERIOD}_i \\ + \alpha_4 \text{LOCALITY}_i + \alpha_5 \text{RELIGION}_i + \varepsilon_i$$

$$B_i = 1 \quad \text{if} \quad B^*_i > 0$$

$$B_i = 0 \quad \text{if} \quad B^*_i \leq 0$$

DEMOGRAPHIC PROFILE: Quartic in *AGE*, 3 Parity dummies, Quadratic in Duration

LOCALITY: 4 rotated principal components of Census variables plus separate religious density variables

RELIGION: All coefficients allowed to vary between Catholic and Protestant panel members

	Pooled Logit		Reduced Pooled Logit		Multilevel Logit	
<i>DEMOG</i>	Col 1 * <i>CATHOLIC</i>		Col 1 * <i>CATHOLIC</i>		Col 1 * <i>CATHOLIC</i>	
<i>AGE</i>	58.1031*** (9.995)	5.4937 (13.731)	54.0393*** (6.8729)	13.3608*** (1.6342)	25.7042*** (6.7532)	13.9261*** (1.5910)
<i>AGE</i> ²	-66.9972*** (15.864)	-20.4485 (21.863)	-60.3441*** (11.0217)	-33.3935*** (4.0061)	-19.6830 (10.8638)	-34.5470*** (3.9218)
<i>AGE</i> ³	37.6070*** (10.939)	21.5386 (15.118)	33.0274*** (7.7079)	30.4602*** (3.7206)	7.9480 (7.6204)	31.3901*** (3.6573)
<i>AGE</i> ⁴	-9.5118*** (2.769)	-7.0302 (3.836)	-8.3615*** (1.9838)	-9.2726*** (1.1754)	-2.7311 (1.9675)	-9.5372*** (1.1585)
<i>PAR0</i>	0.5126*** (0.032)	-0.1340*** (0.044)	0.5091*** (0.0317)	-0.1323*** (0.0422)	0.6648*** (0.0319)	-0.1686*** (0.0418)
<i>PAR1</i>	1.0199*** (0.024)	-0.1695*** (0.032)	1.0212*** (0.0236)	-0.1748*** (0.0315)	1.1910*** (0.0252)	-0.2073*** (0.0325)
<i>PAR2</i>	0.0850*** (0.025)	0.1831*** (0.032)	0.0861*** (0.0248)	0.1796*** (0.0324)	0.1683*** (0.0254)	0.1725*** (0.0334)
<i>DUR04</i>	0.9155*** (0.025)	-0.1095*** (0.035)	0.9109*** (0.0233)	-0.1009*** (0.0295)	0.9521*** (0.0237)	-0.1000*** (0.0295)
<i>DUR04</i> ²	-0.2176*** (0.007)	0.0287*** (0.009)	-0.2164*** (0.0062)	0.0266*** (0.0082)	-0.2162*** (0.0061)	0.0271*** (0.0080)
<i>DUR</i> >4	-0.1548*** (0.031)	-0.0946** (0.043)	-0.1571*** (0.0269)	-0.0888*** (0.0323)	0.1088*** (0.0295)	-0.0802** (0.0334)
<i>DUMDUR</i>	0.4946*** (0.028)	-0.0268 (0.039)	Results (0.0196)		0.8045*** (0.0244)	

PERIOD	Pooled Logit		Reduced Pooled Logit	Multilevel Logit
<i>PER1998</i>	0.0350 (0.028)	0.0058 (0.040)	0.0381 (0.0200)	0.0690*** (0.0202)
<i>PER1999</i>	-0.0151 (0.029)	-0.0324 (0.041)	-0.0306 (0.0205)	0.0252 (0.0215)
<i>PER2000</i>	-0.0816*** (0.031)	-0.0238 (0.044)	-0.0926*** (0.0222)	-0.0191 (0.0233)
<i>PER2001</i>	-0.1125*** (0.034)	-0.0478 (0.048)	-0.1352*** (0.0242)	-0.0527** (0.0253)
<i>PER2002</i>	-0.0224 (0.038)	-0.0199 (0.054)	-0.0312 (0.0270)	0.0590** (0.0285)
<i>PER2003</i>	0.0271 (0.041)	-0.0763 (0.058)	-0.0095 (0.0289)	0.0813*** (0.0307)
<i>PER2004</i>	0.0608 (0.044)	-0.0871 (0.062)	0.0187 (0.0312)	0.1097*** (0.0331)
<i>PER2005</i>	0.0546 (0.047)	-0.0312 (0.067)	0.0405 (0.0336)	0.1328*** (0.0358)
<i>PER2006</i>	0.1191** (0.051)	-0.1012 (0.072)	0.0701 (0.0362)	0.1651*** (0.0386)
<i>PER2007</i>	0.1856*** (0.054)	-0.0830 (0.078)	0.1453*** (0.0388)	0.2451*** (0.0414)

	Pooled Logit		Reduced Pooled Logit		Multilevel Logit	
<i>COHORT</i>	Col 1 * <i>CATHOLIC</i>		Col 1 * <i>CATHOLIC</i>		Col 1 * <i>CATHOLIC</i>	
<i>C88t92</i>	0.1954 (0.231)	-0.7667** (0.309)	0.3224 (0.2086)	-1.0319*** (0.2361)	0.2886 (0.2078)	-1.0702*** (0.2301)
<i>C83t87</i>	0.3731 (0.216)	-0.5700** (0.286)	0.4862** (0.1975)	-0.8069*** (0.2277)	0.4555** (0.1961)	-0.8407*** (0.2218)
<i>C78t82</i>	0.4522** (0.203)	-0.4743 (0.266)	0.5476*** (0.1895)	-0.6717*** (0.2242)	0.5402*** (0.1872)	-0.6941*** (0.2182)
<i>C73t77</i>	0.5882*** (0.192)	-0.5736** (0.250)	0.6637*** (0.1832)	-0.7302*** (0.2222)	0.6823*** (0.1799)	-0.7582*** (0.2159)
<i>C68t72</i>	0.6020*** (0.184)	-0.6196*** (0.237)	0.6602*** (0.1787)	-0.7405*** (0.2209)	0.6656*** (0.1744)	-0.7596*** (0.2143)
<i>C63t67</i>	0.5044*** (0.178)	-0.6221*** (0.228)	0.5462*** (0.1751)	-0.7096*** (0.2192)	0.5175*** (0.1697)	-0.7200*** (0.2118)
<i>C58t62</i>	0.4585*** (0.173)	-0.5706*** (0.219)	0.4818*** (0.1716)	-0.6203*** (0.2161)	0.4556*** (0.1658)	-0.6260*** (0.2088)

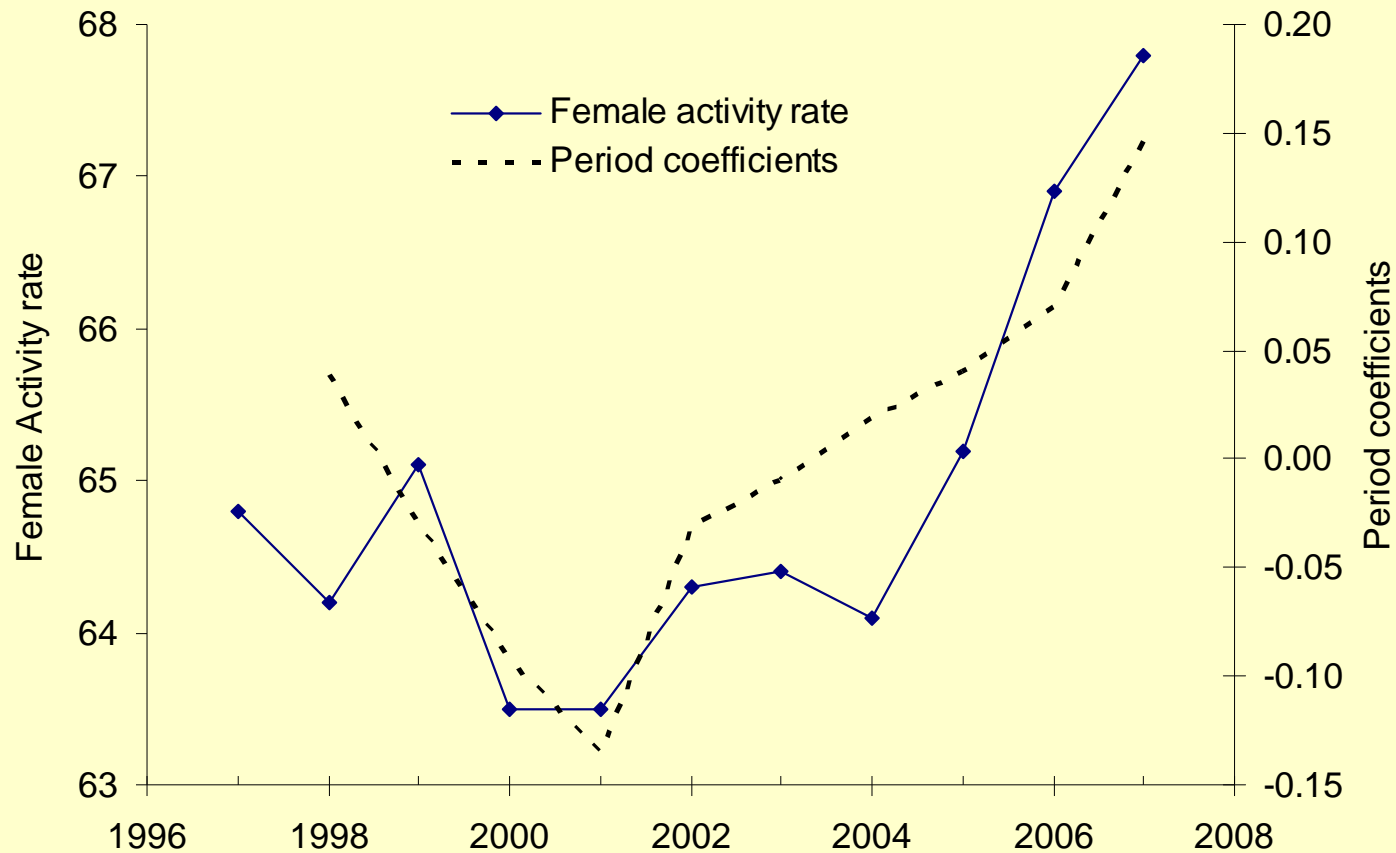
	Pooled Logit		Reduced Pooled Logit		Multilevel Logit	
<i>LOCALITY</i>		Col 1 * <i>ATHOLIC</i>		Col 1 * <i>ATHOLIC</i>		Col 1 * <i>ATHOLIC</i>
<i>CP</i>	0.2037 (0.114)					
<i>CP2</i>	-0.1489 (0.094)					
<i>PP</i>	0.6919*** (0.144)		0.6955*** (0.1413)		0.7744*** (0.1474)	
<i>PP2</i>	-0.4926*** (0.112)		-0.5050*** (0.1108)		-0.5567*** (0.1170)	
<i>PROA8-1</i>	0.3074** (0.123)	-0.1723 (0.175)	0.2388*** (0.0864)		0.2530*** (0.0897)	
<i>RPC1</i>	0.0469*** (0.005)	0.0070 (0.007)	0.0535*** (0.0033)		0.0630*** (0.0034)	
<i>RPC2</i>	-0.0421*** (0.005)	-0.0192*** (0.007)	-0.0412*** (0.0043)	-0.0212*** (0.0052)	-0.0431*** (0.0046)	-0.0228*** (0.0056)
<i>RPC3</i>	0.0110 (0.007)	-0.0104 (0.010)				
<i>RPC4</i>	0.0135** (0.007)	-0.0173 (0.009)				
<i>CONS</i>	-22.8212*** (2.297)	1.4648 (3.141)	-22.0159*** (1.5666)		-15.4270*** (1.5293)	
Log-likelihood	-203775.6		-203787.6		-203587.6	
ρ			Results		.076 (0.0033)	17

Logit Regression Tests

- Equality of Coefficients across religions emphatically rejected
- *COHORT* and *DEMOGRAPHIC PROFILE* significantly different
- *PERIOD* effects not significantly different
- Protestant area effects significant but Catholic not
- Two locality rotated components significant, one significantly different for Catholics

Catholics respond to environmental changes in the similar way to Protestants but their demographic behaviour is distinct

Female Activity Rate and *PERIOD* coefficients



Positive correlation also noted in Ahn and Mira, 2002;
Rindfuss, Guzzo and Morgan, 2003

Marginal Effects

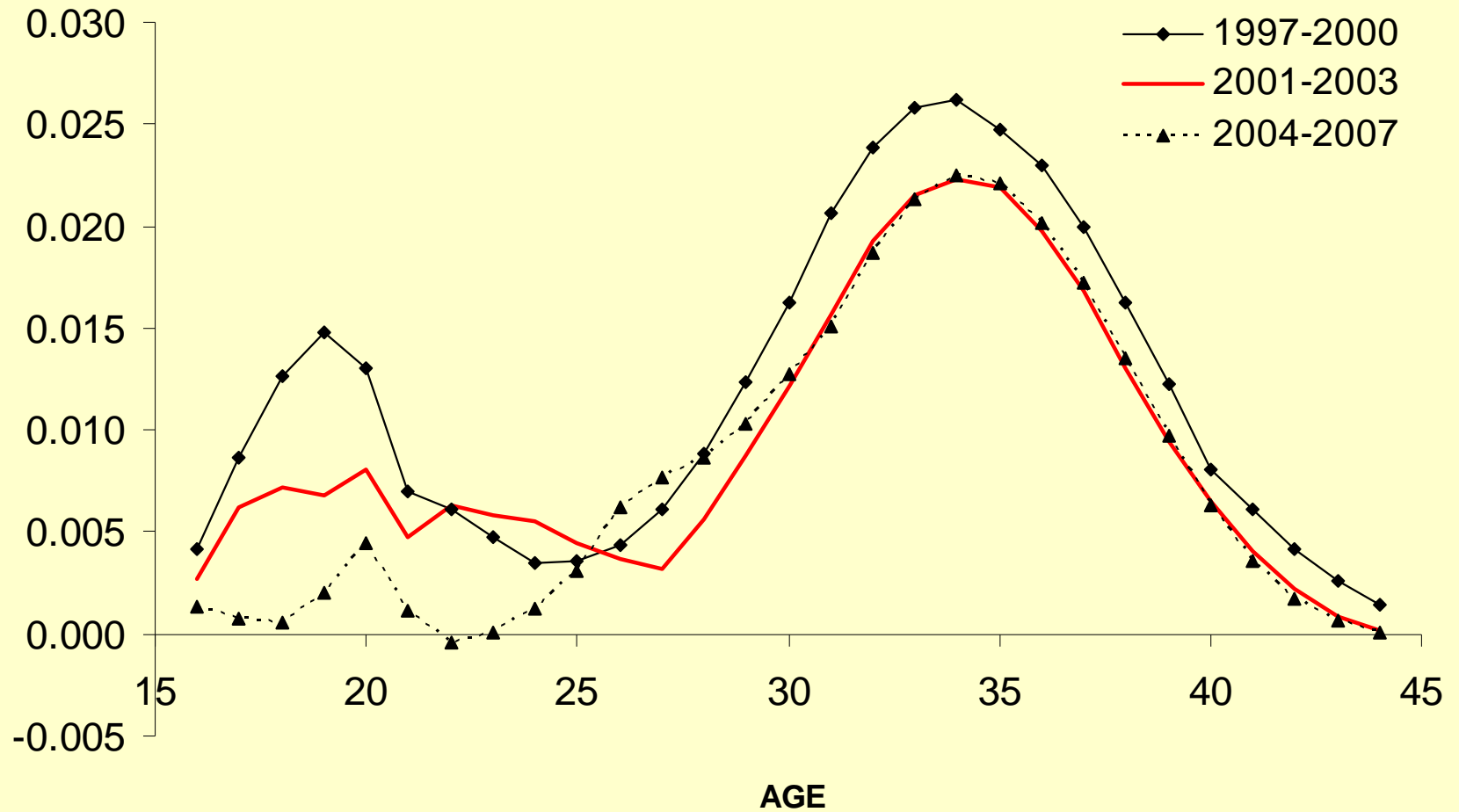
For *ith* woman:

$$ME_{CATHOLIC,i} = \hat{P}(B_i = 1 | \check{X}_i, CATHOLIC = 1) - \hat{P}(B_i = 1 | \check{X}_i, CATHOLIC = 0)$$

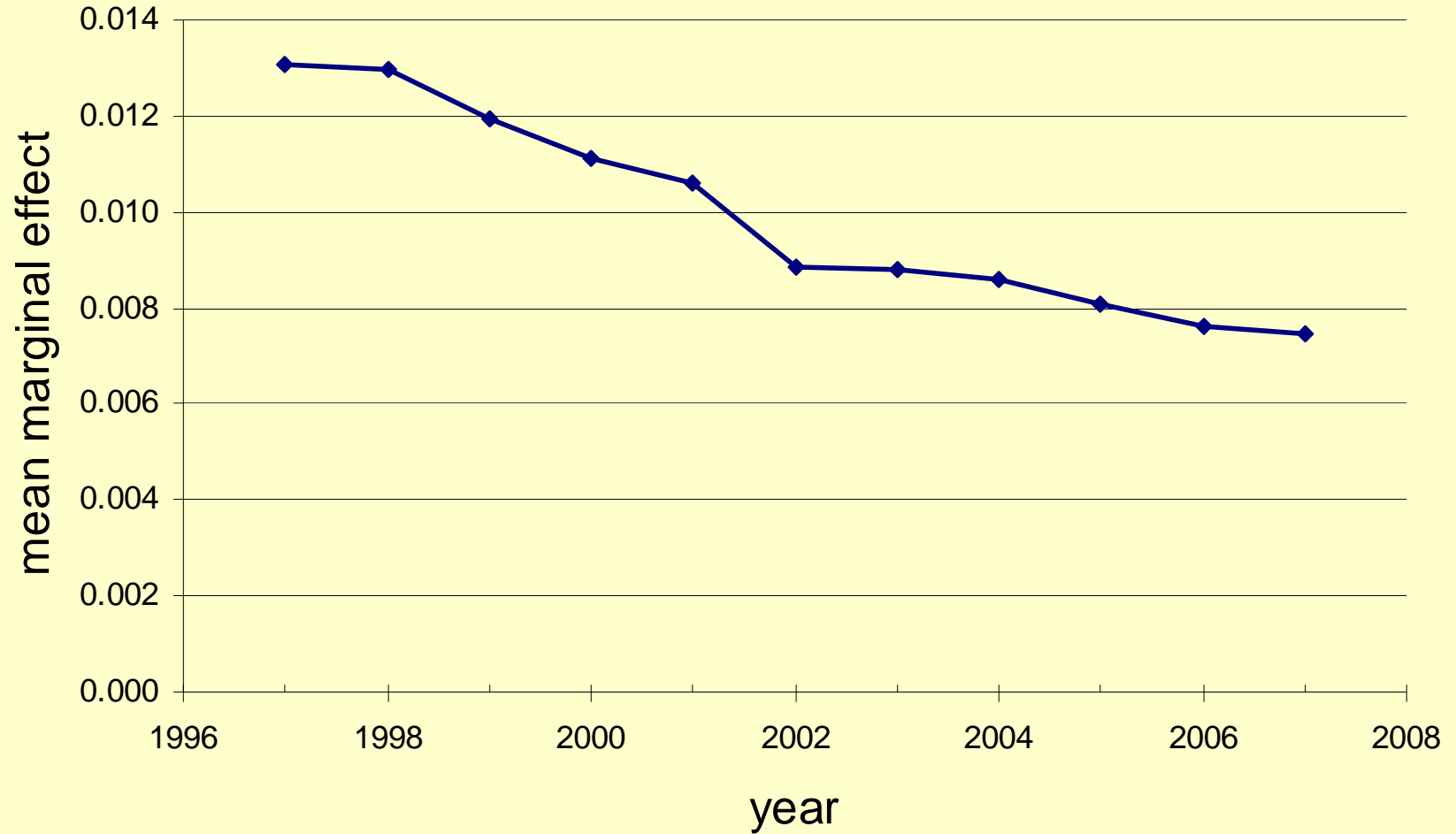
Where \check{X}_i is the vector of values of all the explanatory variables except for *CATHOLIC*

The marginal effect is taken as the mean of individual marginal effects over intervals of particular variables

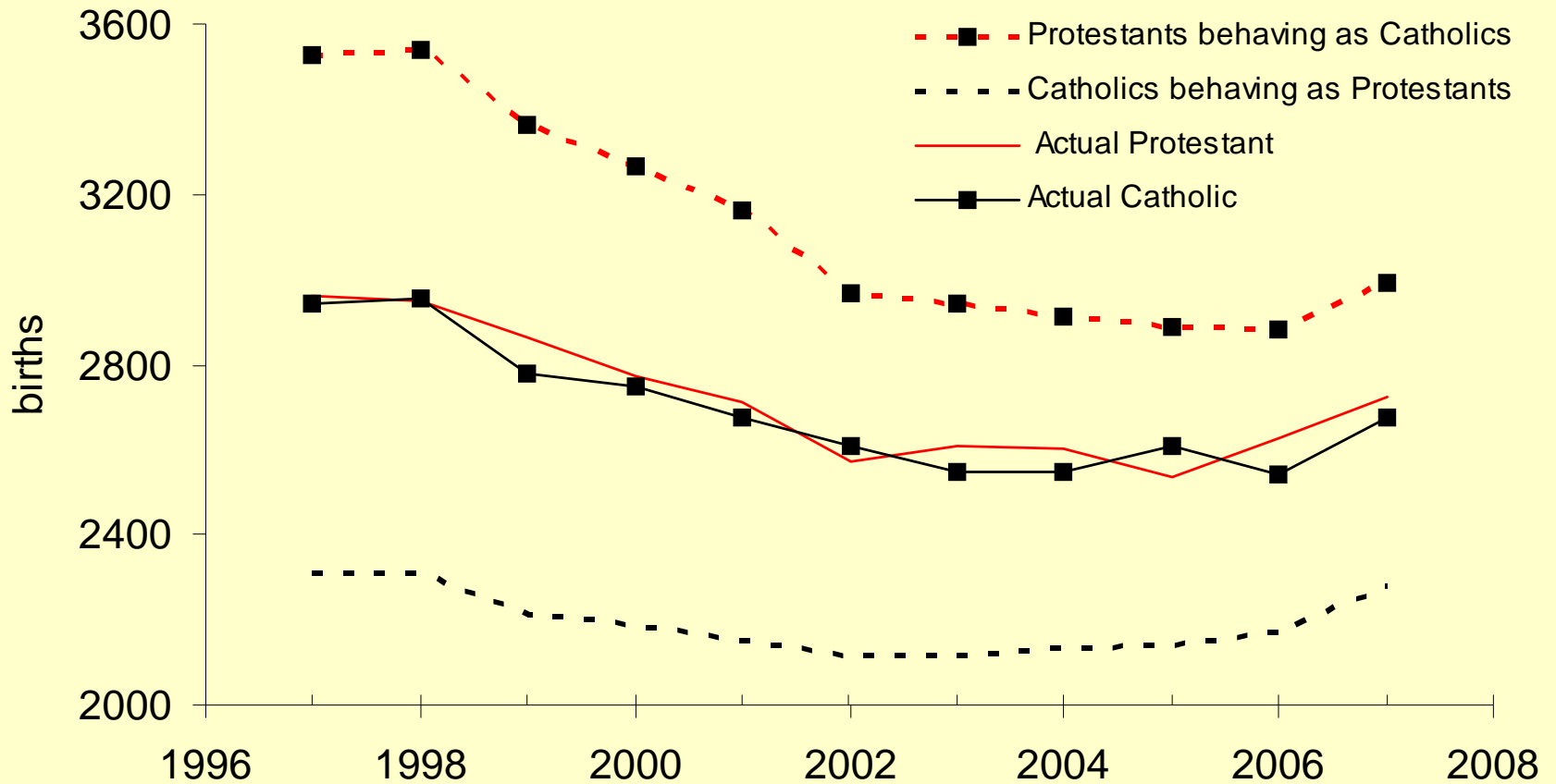
The Marginal Effect of Being Catholic by Age



The Marginal Effect of Being Catholic by Year



Births under Different Fertility Regimes



Conclusions

- Protestant fertility is considerably more stable than Catholic in the period 1997 – 2007.
- Both communities responded in the same fashion to changes in the economic environment
- There is a definite social gradient to fertility but the religious difference is small
- Catholic adjustment seems substantially complete – two communities with similar but distinct demographic profiles?

Demographic approach

Given that Catholic doctrine is pro-natalist, a Catholic would be anticipated to rank quantity more highly than quality thus leading to higher fertility relative to a member of the mainstream Protestant religions where the fertility is considered a matter of individual choice (Lehrer (1996)).

This has been characterised as the 'particularized theology' approach by Goldscheider (1971). Change then is essentially driven by doctrine and doctrinal change has been extremely limited in the Catholic Church.

Three elements required to establish a credible role for religion in determining fertility (McQuillan (2004)):

- it must articulate norms that have linkages to fertility outcomes
- the religious group must be capable of communicating its teachings and to enforce compliance
- members must feel a strong sense of attachment to the religious community

An inevitable conclusion from this is that if religion in contemporary Northern Ireland is to have a role it is as a social category rather than a doctrinal one.

Identity

Akerlof and Kranton (2000), “Economics and Identity”, *QJE*

The j^{th} person’s identity depends:

- on the social categories, \mathbf{c}_j , they are assigned
- the extent to which their characteristics, $\boldsymbol{\varepsilon}_j$, match the ideal of these
- the extent their actions correspond to the associated prescribed behaviour, \mathbf{P}

In this case, identity $l_j = l_j (n, q, s; \mathbf{c}, \boldsymbol{\varepsilon}, \mathbf{P})$

and $U = U(n, q, s; l(n, q, s; \mathbf{c}, \boldsymbol{\varepsilon}, \mathbf{P}))$

Maximizing the utility function subject to the budget constraint will generate the demand function for children; the effect of identity can then be measured by the statistical marginal effects

Census variables at Super Output Area

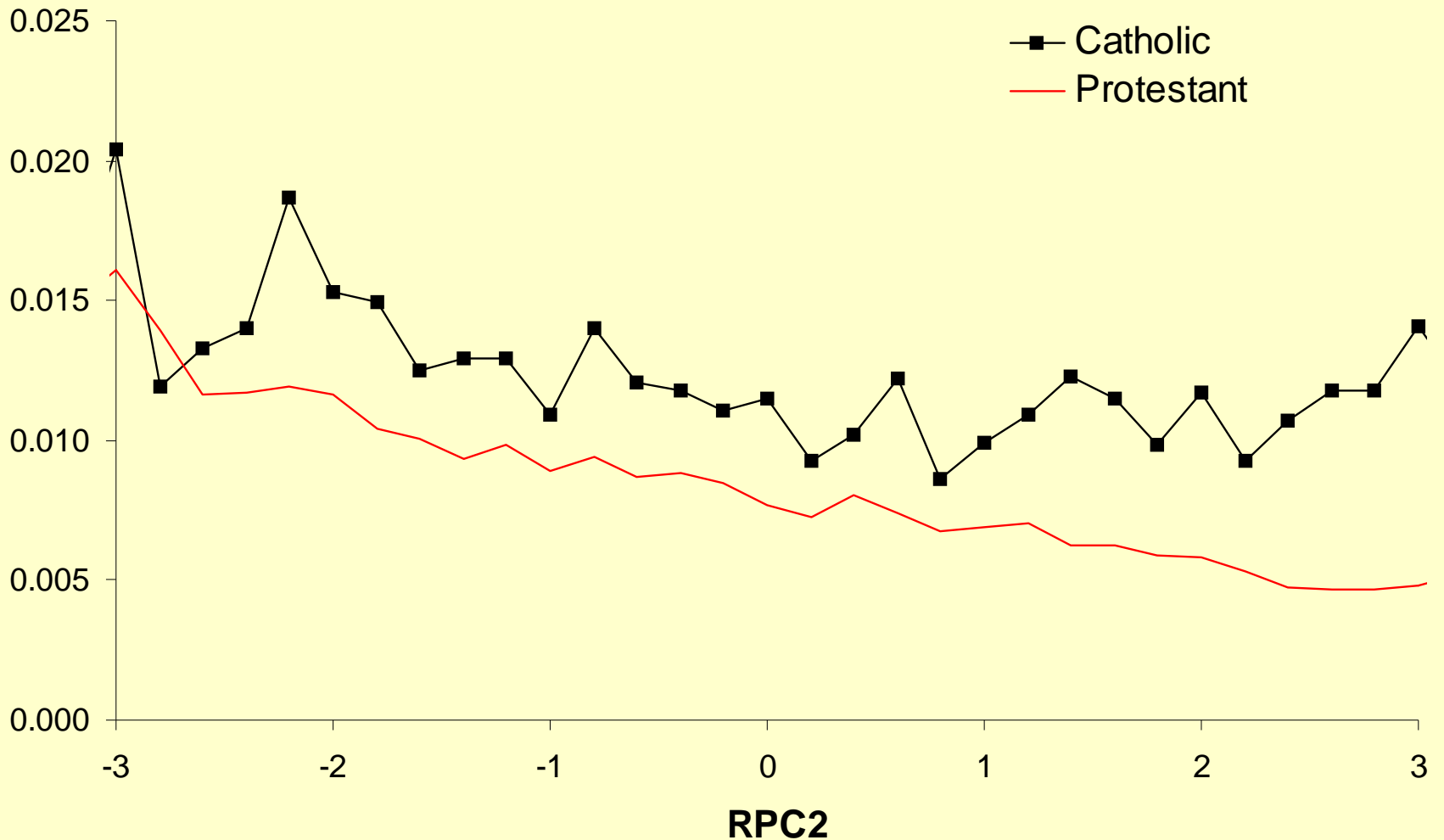
<i>POPNOQUAL</i>	% population with no/low levels of qualifications
<i>POPDEG</i>	% population with educational level 4 or 5
<i>SOCDEPER</i>	% persons aged >15 in social grades DE
<i>SOCDEHH</i>	% households in social grades DE
<i>RENTED</i>	% households rented
<i>MEDAGE</i>	median age of population in the area
<i>FLOOKFAM</i>	% females 16-74 economically inactive and looking after home/family
<i>POPSINGLE</i>	% persons aged 16 and over: single (never married)
<i>HHMARDEP</i>	% married households with dependent children
<i>HHCOHABDEP</i>	% households cohabiting with dependent children
<i>HHLONEDEP</i>	% households lone parent with dependent children

The loadings of the census variables on the rotated components

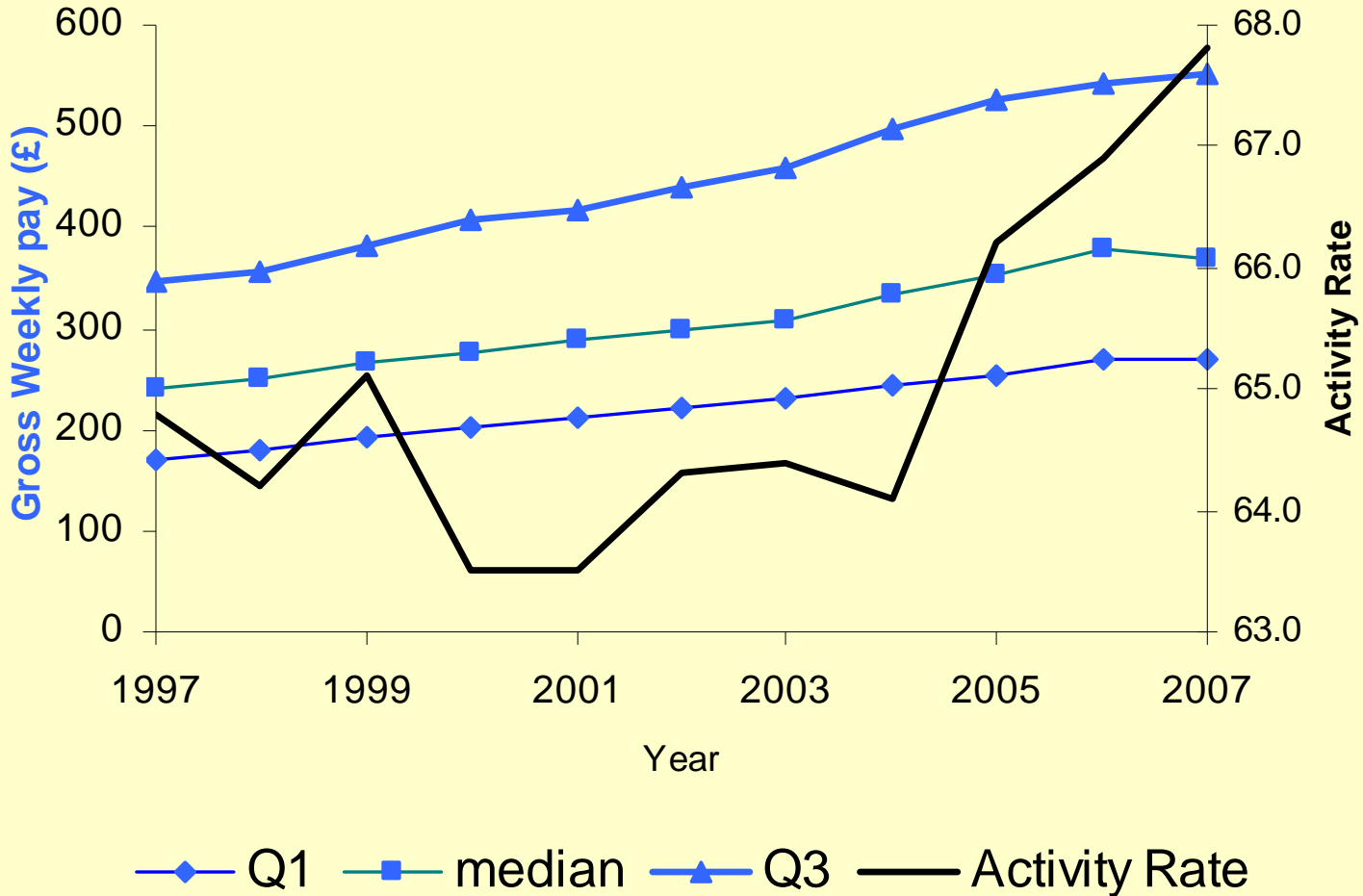
	<i>RPC1</i>	<i>RPC2</i>	<i>RPC3</i>	<i>RPC4</i>
<i>POPNOQUAL</i>	0.514	0.024	-0.066	-0.044
<i>POPDEG</i>	-0.561	0.099	0.128	-0.014
<i>SOCDEPER</i>	0.278	0.309	0.041	0.029
<i>SOCDEHH</i>	0.295	0.302	0.027	0.018
<i>RENTED</i>	0.088	0.422	0.150	-0.023
<i>MEDAGE</i>	0.000	0.182	-0.708	-0.117
<i>FLOOKFAM</i>	0.406	-0.142	0.288	-0.159
<i>POPSINGLE</i>	-0.216	0.377	0.499	-0.209
<i>HHMARDEP</i>	0.088	-0.636	0.240	-0.051
<i>HHCOHABDEP</i>	-0.016	0.004	0.020	0.922
<i>HHLONEDEP</i>	0.171	0.157	0.252	0.247

RPC1 is inversely related to potential wellbeing; *RPC2* is inversely related to social status

The Marginal Effect of Being Catholic by *RPC2*



Women in the Labour Market



Source: DETINI

The data