The Role of Institutional Context in European Regional Fertility Patterns*

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Abstract

Northwestern Europe has been known historically as the leading edge of the fertility decline associated with the demographic transition, with Southern and Eastern Europe later following a similar trajectory. However, in the 1980s through most of the 1990s, Northwestern Europe's TFR rose quickly, while Southern Europe's remained at very low below replacement levels and Eastern Europe's actually declined further. Using microdata from the Luxembourg Income Surveys (LIS), in conjunction with various national level data for 18 European countries, I construct multilevel models of the influences and interactions of individual and societal characteristics on fertility in Europe. Examining factors such as: religion, pro-natalist social policy, and family structure, as well as socio-economic factors, I find coherent and distinctive regional patterns of the causes and correlates of European fertility. These results emphasize the utility of comparative multilevel analysis in developing more sophisticated, accurate models of the causes and correlates of low fertility.

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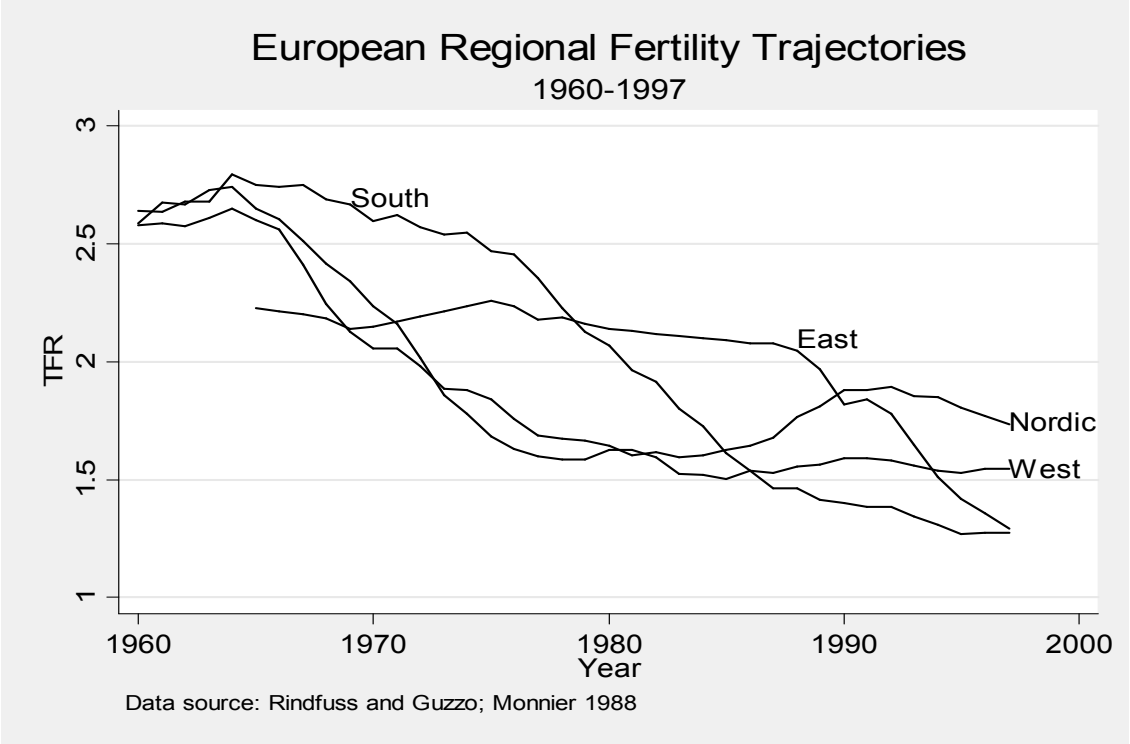
INTRODUCTION

The headline, "Europe's Population Implosion", from a recent issue of the British periodical, Economist (2003), well illustrates a growing public awareness of the threat of European depopulation. Despite predictions of continued fertility decline in most of Europe (United Nation, 2004) and a rising sense of concern among the European public, policy-makers have been slow to address the issue. Part of policy makers reluctance stems from the lack of immediate threat, but there is also ambiguity as to what remedies are appropriate and effective. Even among demographers there is little consensus as to the causes of low fertility. In fact, as recently as the late 1990's demographers suggested that the threat of depopulation due to low fertility was seriously exaggerated due to statistical artifacts, namely tempo effects (Bongaarts and Feeney 1998). Though it has been demonstrated that most contemporary population predictions are mildly biased due to tempo effects, experts including Bongaarts (2002) now generally agree that depopulation is not a statistical artifact and that tempo effects are declining in developed nations as the transition to postponed childbearing ends (Kohler, Billari, and Ortega 2002; Frejka and Calot 2001). Considering the now undeniable reality of European depopulation, the need for nuanced, empirical models of European fertility is greater than ever.

Though the causes of Europe's fertility decline remain obscure, the trends are clear—over the past twenty-five years a remarkable reversal in regional fertility patterns has taken place within Europe (Figure 1). The fertility rates of the nations of Western Europe, long regarded as the vanguard of the fertility decline of the demographic transition, rebounded significantly from the 1980s through the late 1990s. This



phenomenon, coupled with continuing levels of very low fertility among the nations of Southern Europe and further declines in Eastern European fertility, has led to a realignment of fertility differentials among European regions.

There is now a substantial body of theory, data and analysis on the characteristics typifying the regions of Europe. These regional patterns include: economic factors such as GDP, unemployment and labor market characteristics; socio-political factors such as polity and welfare state policy; and also cultural factors including religion, family structure, and general social liberality. Much of this research comes from outside the discipline of demography, but is salient to the current discussion as it corroborates the regional typology, showing that fertility and its correlates consistently cluster into similar regional patterns.

Esping-Andersen (1990, 1999) has developed a welfare state typology corresponding to European region in his examination of polity, labor markets and social welfare policy. He found redistributive social policy to generally be most generous among the Nordic nations, followed by Western Europe, and finally Southern Europe[1], while lending qualified support to the link between labor market rigidity and youth unemployment in Western and Southern Europe. A similar delineations emerge in Palomba and Moors' (1995) two volume examination of European attitudes based on the Population and Policy Attitudes and Acceptance surveys (PPA) which show clustering between Western, Southern, and Eastern European spheres on attitudes toward female labor force participation, social issues, preferred family structure and welfare policy. The general pattern that emerged from this detailed analysis depicted Western European as generally holding more liberal or modern attitudes, followed by Eastern Europeans[2], and Southern Europeans generally being the most conservative and family-centered. Pinnelli, Hoffmann-Nowotny, and Fux (2001) have integrated these various approaches in a comprehensive, descriptive analysis of European family and fertility. Using principle components and multiway analysis on development, gender, fertility and family behavior Pinnelli et al. (2001) demonstrate European nations cluster relatively distinctly into a regional classification of North, West, East, and South[3].

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[1] Esping-Andersen recognizes the distinct institutional context of Southern Europe and recognizes it may legitimately by considered a separate sphere. (p. 90—Esping-Andersen 1999). For the purpose of maintaining the heuristic simplicity of his "three worlds" typology, he does not make a formal delineation between this region and the "Conservative" states of continental Europe.

[2] Though generally true, Palomba and Moors findings are multi-dimensional and the breadth of information presented in the two volumes cannot be adequately captured on a single continuum of traditional—progressive. The classification of Eastern Europe is especially problematic as FLFP and relative child benefit levels are comparatively high, (characteristics generally considered "progressive"), yet gender and family attitudes remain fairly traditional.

[3] Pinnelli et al. (2001) convincingly demonstrate regional clustering, but also note that Eastern Europe cluster shows some sign of divergence.

The literature described above demonstrates the breadth of knowledge currently available on European fertility and its correlates. Demographers now have a solid foundation in descriptive analysis available to determine the causes and mechanisms of low fertility in Europe. However, little work has yet been done to isolate the various influences of micro and macro influences on contemporary fertility behavior. Too often trends are presented linking TFR to other macro factors in simple bivariate descriptions, which don't allow the control of various confounding factors. Thus, the correlated macro factors influencing fertility such as national wealth (GDP), social conservatism (percent religious or the nonmarital ratio), or female labor force participation are left entangled, giving legislators little leverage for policy intervention. This leads to an agnostic stance in which institutional context is essentially viewed as a black box. Certainly, this sort of methodological conservatism has been justified in the past; however, with the combination of powerful computing, sophisticated quantitative methodologies, and high quality data at both macro and micro levels that is currently available, it is now feasible to engage the process of isolating the specific effects of various macro and micro and cross-level interactions on fertility. Toward this end, the primary aims of this study are to a) estimate associations of individual-level factors such as socio-economic status, family structure, and labor force participation with fertility, b) estimate the impact of macro-level, national characteristics such as national wealth, social conservatism/liberality, and child/family benefit policies on fertility, c) examine the mediating effect of regional context on associations between individual-level characteristics and fertility, and finally 4) demystify institutional context by decomposing regional effects into tangible national characteristics.

BACKGROUND

For the purpose of this literature review I will categorize the relevant research in European fertility into one of four approaches based on substantive focus. First, I will discuss the literature on the influence of child and family policy, followed by a discussion of economic factors influencing fertility behavior, such labor market conditions, unemployment, and wealth. Next, cultural influences on childbearing such as family structure and religion will be addressed; and finally, I will round out the discussion with a treatment of institutional context broadly.

Pro-natalist policy effects on fertility

In 1996 Europe experienced natural depopulation for the first time in contemporary history (Guibert-Lantoine and Monnier 1997).[4] As Europe begins what appears to be an era of depopulation, demographers have increasingly drawn attention to this area in an effort to avert future problems related to graying age structures and worsening dependency ratios (Lesthaeghe and Willems, 1999; Golini, 1998; Foster, 2000; Morgan, 2003). Naturally, pro-natalist policy has been seen as a likely remedy and as such has received considerable attention in recent European demographic research. In the early 1990's, for example, Hoem (1993) theorized that Sweden's total fertility rate (hereafter—TFR) spike to replacement level around 1990 was due to unusually generous family benefits, paid maternity leave, and sundry pro-natalist policies. However, his optimistic prediction of social policies influence over fertility proved premature, as the

[4] The "natural" caveat excluding the world war years.

following years witnessed Sweden's convergence with other Western European TFRs, with Swedish TFR dropping from 2.202 in 1990 to 1.551 in 2001 (Rindfuss, Guzzo & Morgan, 2003).

Chesnais (1996) theorized a link between the empowerment of women, as evidenced by generous child and family policy, and sustainable fertility levels, but lacked empirical substantiation. Building on this theoretical framework, Gauthier and Hatzius (1997) reviewed the literature on this topic finding most of it to affirm the link between pro-natalist policy and fertility. However, Gauthier and Hatzius note shortcomings of this previous research including the prevalence of descriptive approaches, which prevent control of other fertility determinants. Their more rigorous quantitative analysis found that family benefits have a quite small (on the order of a .07 child increase per women per 25% increase in family allowances), but significant positive effect on fertility. However, even Gauthier and Hatzius' research share a common limitation of much comparative European fertility research, namely studying only at an aggregate, national level. Though these findings have been interesting, significant questions have yet to be answered concerning the function of such policies within nations.

Cultural factors: family structure, religion, and modernization

Family structure has recently received much attention as a correlate of European regional differences in fertility (Baizan, Aassve, Billari 2003; Zuanna 2001; Michelli 2000). Consistent regional differences here include: percentage of adults leaving with parents, cohabitation rates, and proportion of households headed by single parents (Pinnelli et al. 2001). For example, in 1994 approximately 11% of women 25-29 years

old lived with their parents in both France and the UK, contrasted with roughly 46% in Spain and Italy (Reher 1998). Similarly, Guibert-Lantoine and Monnier (1997) present data demonstrating that the nonmarital ratio (the percentage of all birth occurring outside marriage) ranged widely across Europe in 1995, from a mere 3% in Greece to 51.6% in Sweden. Reher (1998) has speculated the origins of these differences in family structure to be long-standing cultural differences traceable back into the middle ages. However, as discussed in the following section, prominent European intellectuals such as Esping-Andersen (1999) and Livi-Bacci (2002) have argued that a more nuanced view of family structures effects on fertility includes a consideration of the role of labor markets and social policy.

While the role of religion has been mentioned theoretically in some recent discussions of fertility (such as McDonald, 2000), there has been a dearth of systematic quantitative inquiry into its role in the European fertility pattern reversal. Yet, there is ample reason to suspect cultural conservatism/liberality as a significant determinant of fertility differences among European regions. For example, in 1990 the European nation with the highest TFR, Sweden at 2.134, was also the least religious on the continent with only 10.3% of the population being regular church attendees; uncannily, the European nation with the lowest TFR in the same year, Italy at 1.319, was also found to be the most religious with over 50% of the population identifying as church attendees (World Value Survey, 1991). Though the possible effects of religious culture on fertility have not yet been tested while controlling for other effects, such inquiry is now feasible as high quality data on a wide array of religious indicators is available from the WVS and also

from the International Social Survey Programme (ISSP) for most European nations through the 1980's and 1990's.

Economic influences: employment, labor markets, and growth

Economic explanations have begun solidify into a coherent theory explaining European regional fertility differentials as a function economic stability and labor market conditions. Kohler, Billari, and Ortega (2002) have demonstrated that the Eastern and Southern European nations experiencing lowest low fertility have distinct economic profiles that offer intuitive explanations for delayed and foregone childbearing. Building on earlier research on Eastern European demographic responses to the 1990's socio-economic transition (Witte and Wagner 1995), Kohler et al. (2002) point out that Eastern Europe has suffered tremendous political and economic instability over the course of the last 15 years with an economic situation characterized by substantial inflation and negative or weak GDP growth. The researchers then suggest that fertility postponement, coupled with human capital investments to adapt to changing labor market demands are rational responses given such socio-economic uncertainty.

In the case of Southern Europe, Kohler et al. (2002) note that these nations[5] have had the highest levels of youth unemployment in the European Union for most of the past fifteen years. For example, in 1999 the Italian unemployment rate for men under 25 years old was 28.6% compared to the EU (15) average of 16.7% for the same year and demographic. Kohler et al. (2002) go on to drawn an intuitively sensible link between this labor market situation and the tendency of Italian youth postpone childbearing and

[5] Excluding Portugal.

marriage while remaining at their parent's home much longer than the youth of other European regions.

This explanation of the fertility situation in Southern Europe is corroborated by the work of Esping-Andersen (1999) and Livi-Bacci (2002). However, the arguments of Esping-Andersen and Livi-Bacci essentially fuse cultural and economic arguments. They argue that cultures of Southern Europe place a strong emphasis on maintaining traditional family structures and gender roles. As a result, Southern Europe is characterized by more rigid labor markets that protect male breadwinners and reduce employment opportunity to the young, while discouraging cohabitation and nonmarital fertility through channeling social insurance and other income transfers through male breadwinners. Given the reciprocal relationship between cultural and economic factors implied here, it is remains unclear what the foundational causes of regional patterns in fertility Europe are.

Institutional context

The concept of institutional context has a long history in fertility and family research, serving a major explanatory role in research as early as Judith Blake's (1968) classic response to Gary Becker's New Home Economics theory (1960). The concept has recently been repopularized in fertility research by Pampel's (2001) analysis of the Easterlin effect when controlling for contextual variation. The popularity of the concept derives from the empirical reality that the strength, and even direction, of relationships among individual characteristics often vary across time and place. Recent work by Rindfuss (Rindfuss, Guzzo, and Morgan 2003; Brewster and Rindfuss 2000) well illustrate this phenomenon, demonstrating that at the national level, in the span of 30

years, the correlation between fertility and female labor force participation (hereafter—FLFP) has reversed from negative to positive among developed nations. Findings such as this suggest that the association of individual characteristics to fertility behavior may vary depending on larger societal characteristics, such as policy and economic performance. Thus, "institutional context effects" may be statistically conceptualized in as an interaction between individual characteristics and macro societal characteristics (Pampel 2001). Understandably, much comparative fertility research to date has not tested the effects of European institutional context from such a quantitative approach due to methodological limitations associated with small sample size. Instead, most discussions of European institutional context have relied on bivariate descriptive analysis, which has not allowed the analytical separation and estimation of the effects of specific national characteristics and cross-level interactions on fertility behavior.

DATA AND METHODS

Individual-level data

The primary source of data for this study was the Luxembourg Income Study (LIS), database. LIS collects data from national microdata sources and harmonizes the datasets to make cross-national and over-time comparisons possible. The data is arranged in waves, which are roughly five year increments beginning in 1969 and extending to 2000. The LIS surveys have an extensive battery of demographic variables and provide the best socio-economic cross-national over-time data source available for OECD nations (OECD, 1995).

For this study I integrated the data available for 18 European nations from the LIS 1995 Wave IV.[6] Due to nature of the outcome of interest, recent fertility, I limited the sample to women of childbearing age (16-47). Also, I further limited the sample to only householders and partners of householders, as they were the only women for whom the parent-child relationship was explicitly documented.[7] The sample sizes of the individual nations are listed, along with sample means of the variables of interest, in table 1. The development of the individual-level variables of interest required minimal data manipulation in the case of the family structure variables, employment (which are dichotomously coded as 1 = yes and 0 = no) and age. In order to capture the curvilinear relationship of age to the outcome—number of children born in the past three years, I introduced a natural log age term in addition to actual age.[8] The development of measures for fertility, income, and education the development was slightly more complex. I operationalized the outcome variable—fertility, as the number of children born to a woman over the past three years. My rationale in choosing a three year window parallels the compromise described in Clelland and Rodriguez (1988). As the amount of time examined is reduced, random error and sampling variation become increasingly problematic. Conversely, as the period examined increases shifts in

[6] Though most national samples come from the years 1994-1995, the range extends from 1991 (Hungary) to 2000 (Sweden).

[7] Sensitivity analysis indicate no significant differences when cases in which childbearing aged women (other than householder/partner) and children (other than householder/partner) are included in the analysis. In all nations this group represented a small proportion of the sample.

[8] The coefficients resulting from this modeling of age are difficult to interpret. However, as age was not of central interest in this analysis, I chose they strategy as it was superior (in terms of amount of variance explained) to a more conventional quadratic approach. In future analysis I intend to include a categorical dummy for cohort to include an analysis of tempo effects.

Table 1. Sample Means of Individual Characteristics by Nation/Year

Nation/Year	Fertility*	Income	Education**	Cohabiting	Single	Employment	N
Austria 1995	0.238	24681.92	2.827	0.086	0.168	0.677	9063
Belgium 1997	0.27	25775.56	3.888	0.09	0.119	0.664	1838
Denmark 1992	0.252	27668.58	3.725	0.22	0.278	0.755	5036
Finland 1995	0.312	20659.85	3.953	0.226	0.135	0.694	4491
France 1994	0.282	22220.76	3.606	0.178	0.165	0.68	5240
Germany 1994	0.19	22816.3	3.85	0.12	0.13	0.724	3012
Hungary 1991	0.238	10928.98	3.323	0.061	0.148	0.789	854
Ireland 1995	0.397	18600.77	4.718	0.051	0.128	0.515	1200
Italy 1995	0.248	21208.69	3.072	0.009	0.086	0.53	3001
Netherlands 1994	0.284	23224.11	3.656	0.003	0.199	0.608	2311
Norway 1995	0.295	28141.91	3.801	0.171	0.145	0.749	4074
Poland 1992	0.277	8059.661	3.164	0.136	0.13	0.673	2990
Romania 1995	0.162	8819.019	4.505	0.032	0.164	0.767	1645
Russia 1995	0.171	5589.953	5.654	0.027	0.096	0.727	13050
Switzerland 1992	0.328	25564.34	2.66	0.056	0.245	0.511	2503
Czech Rep. 1992	0.241	15176.07	2.828	0.036	0.126	0.927	7537
Sweden 2000	0.262	28084.28	3.471	0.311	0.216	0.84	4948
Slovakia 1997	0.188	14956.67	3.289	0.09	0.093	0.838	1156

Notes: *Mean number of child born in the previous three years. **Measured on a 0-7 scale—see text for details.

institutional context make it impossible to accurately measure their effects. Thus a compromise of a three year period of observation on fertility seemed appropriate.[9]

In conceptualizing yearly income I faced the dilemma of measuring its effect as a relative or absolute measure. After conducting the analysis both by standardizing income across all nations and standardizing it within nations (with each individual's yearly income expressed as a deviation from the nation/year mean) I opted to include the latter, relative conception in the analysis on the grounds that it is better suited for the purpose of

[9] Sensitivity analysis indicate no change when the interval of fertility observation is increased to five years.

examining differences in the role of income across national and regional context and it also explains a larger proportion of the outcome variance. Finally, education was the most difficult measure to harmonize across nations. This is largely due simply to the lack of attention this issue has received in contemporary comparative literature. As a result, I have used the LIS adaptation of the UNESCO ISCED-97, which is a three level classification schema in which level one represents lower secondary education or less, level two—upper secondary education and post-secondary non-tertiary education, and level three indicates tertiary education (LIS 2004). Given the variation lost in this aggregation, I consider education primarily as a control in the following analysis.

National-level data

For the second level of my model I have assembled aggregate, national data from a variety of sources (data presented in table 2). I have used LIS microdata to devise a national measure of child and family benefit level as equation 1. With B_i = total child and family benefits received by a family of one child under the age of three, and I_i = the total net income of a family of one child under the age of three, and N = total sample size

$$\text{Child/Family Benefit Level} = \frac{\Sigma(B_i/I_i)}{N} \qquad \text{(Eq. 1)}$$

of households with one child under the age of three. For the measure of FLFP I specified the measure simply as the proportion of women over the age of 15 currently employed, and gathered the data directly from multiple International Labor Organization Yearbooks (ILO 1993-2002). Nonmarital ratio data was directly recorded from several of the

Population: An English Section, Annual Reports (Monnier and Guibert-Lantoine 1995; Monnier and Guibert-Lantoine 1997; Monnier 2001). Per Capita GDP-PPP was directly extracted from the Penn World Table Version 6.1 (Heston, Summers and Aten 2002). Finally, the 'percent religious' national variable was conceptualized as the percent of respondents who attend church once a month or more frequently. Following Barro and

Table 2. National Characteristics by Nation/Year

Nation/Year	Child/Family Benefit Level*	FLFP Rate	Nonmarital Ratio	Per capita GDP-PPP	Percent Religious**
Austria 1995	0.122	0.465	27.4	21025.73	37.82
Belgium 1997	0.081	0.409	16.8	21845.25	25.76
Denmark 1992	0.037	0.617	46.4	22003.71	10.8
Finland 1995	0.262	0.552	33.1	18789.07	11.4
France 1994	0.122	0.479	36	19821.28	16.55
Germany 1994	0.119	0.574	15.4	20728.81	23.78
Hungary 1991	0.279	0.44	14.1	8511.32	24.8
Ireland 1995	0.049	0.395	22.2	17266.24	78.53
Italy 1995	0	0.34	8.1	20292.64	50.51
Netherlands 1994	0.084	0.572	14.4	20368.11	27
Norway 1995	0.111	0.64	47.6	23891.9	12.5
Poland 1992	0.115	0.542	7.2	6296.478	75.15
Romania 1995	0.076	0.515	21.1	7175.34	8
Russia 1995	0.051	0.604	19.7	4728.958	30.7
Switzerland 1992	0	0.465	6.2	24879.72	35.3
Czech Rep. 1992	0.186	0.596	10.7	12170.99	10.2
Sweden 2000	0.205	0.75	55	23635.13	8
Slovakia 1997	0.127	0.523	32.7	13786.59	30.3

Notes: *As a proportion of total income for a family with one child under 3 years of age. **Measured as those attending church more frequently than "just on holidays".

McCleary (2003), I combined religious data from both the WVS and the ISSP, five surveys in all, into a single dataset. Thus, for any given nation there was data for between two and five years over the span of 1980 to 2000 (WVS 1981, 1990, 1995; ISSP

1991-1993, 1998-2000). I then interpolated the data to estimate values for the cases in which religion data was not available for the exact year of interest.[10]

Methods

My primary interest in the following analyses is to a) examine the effects individual and national characteristics on childbearing in Europe b) model the differences in the effects of key individual characteristics (income, relationship status, and labor force participation) across the four primary European regions, and finally, c) disaggregate the regional effects into tangible national characteristics and estimate the mediating effects of these national characteristics on the relationships between the individual characteristics of interest and fertility. Toward this end I construct two-level random intercept Poisson models, written as:

$$Y = \exp(\beta_{0j} + \beta_1 \mathbf{X}_{ij} + \beta_2 \mathbf{Z}_j + \beta_3 X_{ij} * Z_j + \upsilon_j) \qquad \text{Eq. 2}$$

with:

$$\upsilon_j \sim \gamma(1,\alpha) \qquad \text{Eq. 3}$$

where i= individuals in the sample, Y = fertility over the 3 years prior to the survey, **X** = a vector of individual characteristics hypothesized to influence childbearing, **Z** = a vector of national characteristics hypothesized to influence childbearing, and X*Z cross-level interactions modeling the mediating effects of national context on the relationship between individual characteristics (income, relationship status, and labor force participation) and fertility. As described in equation 3, υ_j is a nation specific error term with gamma distribution, a mean of 1 and an empirically derived variance of α.

[10] Any bias introduced here is likely to be quite small, as changes in national church attendance tend to be glacially slow on the order of <1 percent per year. The largest gap between a data point and an interpolated value was 5 years.

Though multi-level (or mixed) models have been used for some time in fertility research (e.g.—Mason, Wong, and Entwisle 1983; Entwisle, Casterline, and Sayed 1989), application at the micro level has tended to be problematic for two reasons: 1) linear multi-level models are inappropriate when the outcome is a low count variable, as is the case with fertility, and 2) conventional multi-level models for non-normally distributed outcomes (Poisson in this case) cannot be directly estimated, because the unconditional likelihood has an intractable functional form involving multiple integrals (Guo and Zhao 2000; Rodriguez and Goldman, 1995), thus the likelihood of such models must be approximated by using quadrature techniques (Anderson and Aitkin 1985). However, the Poisson multi-level model used for this analysis circumvents problem 2, by empirically determining a gamma distribution of υ_j, instead of assuming it be normally distributed (StataCorp, 2003). This results in a tractable log-likelihood functional form, which eliminates the need for numerical approximation and allows asymptotically unbiased parameter estimation.

I developed two main models, the first of which conceptualizes region (i.e.- north, west, east, and south) as a proxy for institutional context. Thus, I begin this model with all seven micro independent variables and four dummy variables for region.[11] In the subsequent three regressions I introduce interactions between region and: income, cohabitation, and employment, respectively; followed by a full model with all micro, regional dummies, and interactions. Finally, in model 6, I introduce the five national characteristics of interest (child benefit level, FLFP, GDP-PPP, religiosity, and the

[11] The regional breakdown is: North—Denmark, Norway, Sweden, and Finland. West—Austria, France, Germany, Netherlands, Belgium, Switzerland, and Ireland. South—Italy. East—Poland, Russia, Czech Republic, Romania, and Slovenia.

nonmarital ratio) into a model with the micro variables and the regional dummies to assess the degree to which these national characteristics explain the regional effect.

In order to determine more specifically what institutional factors are responsible for the regional effects, the second main model replaces the regional dummies with the national characteristics. The model is then developed in a stepwise fashion beginning with a regression including all individual and national variables. In each of the five subsequent regressions I examine the interactions of a single national variable with the three micro variables (income, cohabitation, and employment) of interest, before including all micro, national, and interaction terms in model 7.

RESULTS

Analyses of institutional context as region

The parameter estimates and z statistics for the first set of analyses are reported in table 3. As the coefficients in Poisson models relate the independent variables to a logged transformation of the dependent variable, coefficients should not be interpreted as linear functions relating X to Y, as is the case in OLS. Instead, Poisson coefficients should be interpreted as exponentially relating X to Y. Thus, coefficients for continuous variables will be interpreted as marginal effects and those of categorical variables as logged odds ratios (for a more detailed treatment of Poisson interpretation see Long, 1997).

The coefficients of the micro variables are all highly significant in all models in this first set of analyses. Coefficients of both the relationship status indicators—cohabitation and unmarried-living singly, come out significantly negative relative to the married reference group in all six models. Parameter estimates for cohabitation are stable

across models ranging from -.46 (model 2) to -54 (model 3). Thus, cohabiting women are expected to have approximately 60% as many children as the married reference group, holding all other variables constant. Coefficient estimates for single women are also quite robust across models ranging from -1.57 (model 2) to -1.6 (model 3). Thus, single women are expected to have about 20% the fertility of married women, holding other variables constant. Income was robust across models and significantly positively associated with childbearing, with each standard deviation of household income associated with between a 5-7% increase in fertility. Similarly, the coefficient for education was also robust, positive, and significant in all models, with each increase in level of education associated with a 2% increase in fertility. The coefficients of the

Table 3. Poisson Random Effects Estimates of Direct Effects and Interactions of Individual Characteristics and Regional Context on Fertility

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	-0.647	-0.649	-0.648	-0.647	-0.651	-0.646
	(50.26)**	(50.35)**	(50.41)**	(50.25)**	(50.51)**	(50.22)**
Ln Age	16.109	16.165	16.136	16.110	16.196	16.094
	(41.49)**	(41.61)**	(41.60)**	(41.46)**	(41.69)**	(41.45)**
Cohabit	-0.459	-0.456	-0.544	-0.458	-0.540	-0.460
	(18.74)**	(18.59)**	(17.05)**	(18.69)**	(16.94)**	(18.77)**
Single	-1.581	-1.573	-1.595	-1.581	-1.585	-1.581
	(42.49)**	(42.18)**	(42.77)**	(42.41)**	(42.33)**	(42.49)**
Income	0.047	0.066	0.047	0.047	0.065	0.047
	(6.78)**	(10.52)**	(6.60)**	(6.65)**	(10.50)**	(6.79)**
Education	0.019	0.019	0.020	0.019	0.021	0.019
	(3.32)**	(3.32)**	(3.60)**	(3.43)**	(3.74)**	(3.37)**
Employment	-0.317	-0.316	-0.314	-0.347	-0.349	-0.316
	(18.85)**	(18.69)**	(18.71)**	(11.47)**	(11.53)**	(18.81)**
West	-0.110	-0.137	-0.128	-0.100	-0.151	-0.330
	(0.78)	(0.96)	(0.93)	(0.71)	(1.08)	(1.88)
East	-0.438	-0.305	-0.501	-0.504	-0.445	-0.231
	(3.02)**	(2.08)*	(3.51)**	(3.43)**	(3.05)**	(0.91)
South	-0.312	-0.328	-0.331	-0.442	-0.424	-0.644
	(1.25)	(1.29)	(1.34)	(1.75)	(1.69)	(2.13)*
West*Income		0.029			0.041	
		(1.22)			(1.72)	
East*Income		-0.135			-0.148	
		(5.32)**			(5.63)**	
South*Income		0.022			-0.049	
		(0.45)			(0.81)	
West*Cohabit			-0.003		0.006	
			(0.05)		(0.10)	
East*Cohabit			0.622		0.621	
			(9.53)**		(9.52)**	
South*Cohabit			-0.678		-0.764	

		(1.17)		(1.32)		
West*Employment			-0.025	-0.037		
			(0.63)	(0.92)		
East*Employment			0.096	0.128		
			(2.22)*	(2.94)**		
South*Employment			0.276	0.300		
			(3.48)**	(3.51)**		
Child Benefits					0.937	
					(1.59)	
FLFP					-0.697	
					(1.11)	
Religiosity					0.009	
					(3.94)**	
GDP-PPP					0.000	
					(1.96)*	
Nonmarital Ratio					0.001	
					(0.27)	
-2 Log-Likelihood	-35298.2	-35276.3	-35287.7	-35253.5	-35217.9	-35290.9

Notes: Absolute value of z statistics in parentheses. North is the referent for the area indicator. For all models N=70,207 and Nations=18.
* significant at 5%; ** significant at 1%

employment dummy ranged from -.32 to -.35; thus, working women are predicted to have about 72% the fertility of non-working women.

Moving to the macro level, the regional indicators for Western Europe showed no significant difference from the Northern European reference group in any models while controlling for individual characteristics. The Eastern European indicator was significantly negatively related to fertility in all but the final model, indicating that individuals in Eastern Europe had approximately 65% of the fertility observed in the Nordic countries, when controlling for individual characteristics. The finding described in the last model of this set of analyses—model 6 indicate that the national characteristics introduced in model 6 explain a substantial amount of the regional effect observed for Eastern Europe. Finally, the coefficient for the Southern Europe indicator was negative and large but non-significant, probably due to the inclusion of only one nation, Italy, in this cluster.

In order to examine whether the key micro variables functioned the same across institutional context, I introduced interactions between the region indicator and: income, cohabitation and employment in model 2, 3 and 4, respectively. In model 2 the only region showing a significant interaction with income was Eastern Europe, which indicates in the context of Eastern Europe income actually has no statistically significant effect on fertility. Interestingly, the unique functioning of income in Eastern Europe seems to explain a substantial amount of its lower fertility as the coefficient for the direct effect of Eastern Europe decreases substantially in this model, though it remains significant. This suggests that a substantial portion of the fertility differential between Northwestern and Eastern European nations maybe due to low fertility at upper incomes in Eastern Europe.

In model 3 interaction between region and cohabitation were examined with surprising results. With a large, positive coefficient, it is shown that cohabitation functions uniquely in Eastern Europe. Cohabiting women in Eastern Europe are estimated to have roughly 80% greater fertility than woman in the referent—Nordic nations. In fact, in the model of fertility behavior estimated only for Eastern European nations presented in appendix 1, cohabitation shows no negative association to fertility, relative to the married fertility. Though as shown in table 1, cohabitation is a relatively uncommon phenomenon in Eastern Europe, my findings indicate it functions rather differently here than in Northwestern Europe. The estimate for cohabitations effect in Southern Europe is quite large and negative (but again non-significant due to the inclusion of only one Southern European case at the macro level) suggesting that the institutional context of Southern Europe tends to discourage cohabiting fertility.

The third interaction model, model 4, examined contextual differentials in the association of employment and fertility. The findings indicate that women in both Eastern and Southern Europe are more likely to be employed while having young children. With employed women having 9% and 30% more children in Eastern and Southern Europe respectively, than in the Nordic nations. This differential is likely to be explained by differences in maternity leave and child benefit policies between Scandinavia, Southern and Eastern Europe. The most likely explanation being that women in Nordic and Western European nations tend to return to work later after childbearing as they can afford to do so due to welfare state generosity and more lengthy maternity leave policies (Gauthier 1996). The last interaction model—model 5, is the full model including all the regional interaction of the previous three models. The coefficients and significance levels reported for the former three models all held in this model with no notable change.

Finally, in model 6 national characteristics (child benefit level, FLFP, GDP-PPP, religiosity, and the nonmarital ratio) are introduced to determine the degree to which these macro variables explain the contextual effects of the regional indicator. With the introduction of these variables the Eastern Europe indicator becomes non-significant, indicating that the regional context of Eastern Europe is largely explained by this group of national indicators. Oddly, it appears that the Southern European context has a stronger negative impact on fertility (relative to Northern Europe) after controlling for these macro characteristics. However, overall it seems that these national variables do explain much of the regional context effects formerly discussed. The next set analyses

will examine the direct effects of these national characteristics, and also their mediating effects on the relationships of the micro-characteristic of interest to fertility.

Analyses of institutional context as national characteristics

Presented in table 4, the final set of analyses examine the direct and cross-level interaction effects of each of the national characteristics of interest individually in the first five models, before combining them in the full model—model 6. In model 1 the effect of child benefit generosity is considered. Surprisingly, the only significant interaction is negative with cohabitation. The most intuitive interpretation of this finding is that each 10% increase in the national child/family benefit level result in approximately 6.7% increase in the marital and cohabitating fertility gap. Thus, there tends to be a relatively small difference between the fertility of cohabiting and married women in nations with less generous child and family policies as compared to the greater difference between these two groups in nations with more generous child and family benefits. This is an intriguing finding that should be explored in future analyses by disaggregating the child and family benefits into various policies to see precisely what aspect of these benefits favors marital fertility over non-marital.

Model 2 examines the effects of FLFP, finding significant positive interactions with both cohabitation and employment. Thus, expansion of the female labor force is associated with increases in cohabiting fertility relative to marital fertility. This effect can be interpreted as: for each 10% increase in FLFP the gap between cohabiting and marital fertility narrows by 9.7%. This finding is intuitive as it indicates that in societies where women are more financially independent they feel less reliant on marriage as a

pre-requisite for childbearing. The positive interaction between employment and FLFP may be interpreted as: for each 10% increase in FLFP the gap between employed and non-employed women declines by 6.3%. Interpretation here is difficult as it is not easy to identify the degree to which this is an actual context effect as distinct from a Table 4: phenomenon in which more working women will result in more fertility among working women as selection into employment becomes less a function of unique characteristics negatively associated with fertility (Manski 1993).

Model 3 present the most counterintuitive results in these analyses, finding a positive interaction between cohabitation and societal religiosity, and (more sensibly) a negative one with employment. Thus, for each 10% increase in societal religiosity the Table 4.

Table 4. Poisson Random Effects Estimates of Direct Effects and Interactions of Individual and National Characteristics on Fertility

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	-0.647	-0.646	-0.648	-0.649	-0.647	-0.650
	(50.27)**	(50.18)**	(50.32)**	(50.46)**	(50.21)**	(50.50)**
Ln Age	16.120	16.075	16.128	16.181	16.108	16.171
	(41.50)**	(41.39)**	(41.53)**	(41.68)**	(41.45)**	(41.64)**
Cohabiting	-0.302	-0.853	-0.589	0.217	-0.433	-0.246
	(5.99)**	(5.95)**	(16.40)**	(2.42)*	(6.33)**	(1.01)
Single	-1.579	-1.567	-1.580	-1.592	-1.579	-1.550
	(42.41)**	(41.96)**	(42.39)**	(42.74)**	(42.27)**	(41.26)**
Education	0.018	0.018	0.018	0.021	0.019	0.017
	(3.23)**	(3.24)**	(3.15)**	(3.67)**	(3.33)**	(2.99)**
Income	0.045	0.119	0.052	-0.037	0.009	0.403
	(3.44)**	(2.31)*	(4.50)**	(1.31)	(0.52)	(4.05)**
Employment	-0.308	-0.585	-0.238	-0.343	-0.365	-0.439
	(10.12)**	(5.96)**	(8.15)**	(7.62)**	(10.19)**	(2.47)*
Child benefits	0.263					2.450
	(0.30)					(3.92)**
Income*Child benefits	0.012					-0.734
	(0.14)					(3.39)**
Cohabiting*Child benefits	-1.118					-0.671
	(3.53)**					(1.96)
Employment*Child benefits	-0.084					-0.365
	(0.37)					(1.43)
FLFP		-0.419				0.320
		(0.64)				(0.54)
Income*FLFP		-0.112				-0.820
		(1.35)				(4.61)**
Cohabiting*FLFP		0.676				0.259
		(2.81)**				(0.65)
Employment*FLFP		0.491				0.557
		(2.76)**				(2.13)*
Religion			0.005			0.011

			(1.51)			(4.48)**
Income*Religiosity			-0.000			-0.001
			(0.43)			(1.63)
Cohabiting*Religion			0.007			0.009
			(5.21)**			(4.62)**
Employment*Religion			-0.003			-0.003
			(3.37)**			(2.66)**
GDP-PPP				0.000		0.000
				(2.35)*		(3.64)**
Income*GDP-PPP				0.000		0.000
				(3.43)**		(1.10)
Cohabiting*GDP-PPP				-0.000		-0.000
				(7.71)**		(8.58)**
Employment*GDP-PPP				0.000		0.000
				(0.70)		(0.44)
Nonmarital ratio					0.004	0.001
					(0.92)	(0.15)
Income*Nonmarital ratio					0.002	0.007
					(2.49)*	(4.53)**
Cohabiting*Nonmarital ratio					-0.001	0.027
					(0.41)	(5.76)**
Employment*Nonmarital ratio					0.002	-0.003
					(1.63)	(1.55)
-2 Log-Likelihood	-35298.0	-35295.5	-35285.9	-35265.0	-35298.5	-35175.7

Notes: Absolute value of z statistics in parentheses. For all models N=70, 207 and Nations=18.
* significant at 5%; ** significant at 1%

fertility gap between employed and non-employed women increases 3%, indicating role incompatibility between employee and mother in more religious societies. Strangely, I find the fertility gap between cohabiting and married women to be slightly smaller in more religious nations, on the order of a 7% narrowing per 10% increase in religiosity. This is a puzzling finding deserving further investigation. One possible explanation is to consider the macro level correlation of cohabitation rates and religiosity (r= -.513, see appendix 2), indicating that cohabitation is strongly discouraged in such socially conservative settings. Thus, it seems a reasonable conclusion that cohabiters in religious societies are selected on their willingness to endure stigma, thus are less constrained by social norms discouraging nonmarital fertility than their counterparts in more secular societies. However, this is obviously a very tentative, post hoc explanation, which should be tested in future research.

The fourth model examines the effects of GDP-PPP, here GDP is found to have a small, but significant, positive direct effect on fertility, with each increase of $1000[12] to GDP associated with a 2.2% increase in fertility. Consistent with other findings, the interaction of income and GDP was also small, positive and significant in this model. This result may be interpreted as: each increase of $1000 in GDP is associated with a .43% increase in the effect of relative income. Thus, the positive effect of income on fertility is stronger in wealthier nations. Finally, I found a very small, but strong, negative interaction between employment and GDP, which indicates for every $1000 increase in GDP the fertility gap between employed and non-employed women increases by .17%.

The effects of the national nonmarital ratio were assessed in model 5. Here the only significant finding was a positive interaction between income and nonmarital ratio. Thus, for every increase of 10% in the nonmarital ratio the effect of relative income increases by 2%. Thus, in socially liberal nations with frequent nonmarital childbearing, personal income becomes more important in facilitating fertility. One interesting question arising from this finding is whether income has the same effect on both marital and nonmarital fertility in such socially liberal contexts.

The final model—model 6, is the most ambitious of the analysis, as it is an attempt to separately estimate the direct effects and cross-level interactions of all the national level indicators of interest on fertility. Before evaluating the parameter estimates of this model, a short caveat is in order. In this final model I have stretched the data close to its limit by estimating five macro effects, plus interactions, from a national sample of

[12] As per the Word Penn Table 6.1 conversion of original currencies to 1990 US dollars (Heston, Summers and Aten 2002).

18 nations. However, even considering this there is good reason to seriously consider these estimates. As shown in appendix B, there is no collinearity among the national characteristics examined here, with the strongest correlation only moderate (r = -.544). Also, though a few coefficients showed dramatic changes, most estimates were robust across models. Thus, until corroborated by future research these findings should be considered a tentative sketch of the web of relationships effecting fertility.

This model estimates a very substantial, significant positive effect for the effect of the national mean child benefit level after controlling for other conflating factors. Though former research has estimated rather modest effects for child benefit level, this finding indicates these estimates may have been downwards biased by uncontrolled heterogeneity on other important national characteristics. Here the effect of national child benefit level is estimated as a 24.5% increase in women's fertility for every 10% increase in the mean child benefit level as a proportion of total income. In addition, national child benefit level also shows a negative interaction with income, such that for every increase 10% increase in the national child benefit level the positive effect of income is lessened by 7.3%.

FLFP also is estimated to have negative interaction with income, with every increase in the national FLFP rate associated with a drop of 3.2% in the effect of income. These negative interactions with income are contrasted by the positive income-nonmarital ratio effect estimated as 5% increase in the effect of income for every increase of 10% in the national nonmarital ratio. GDP was found to have a positive impact on fertility in European nations, with every increase of $1000 associated with an increase of 2.2% in fertility. GDP was also found to have a slight, significant interaction with cohabitation.

Thus, each increase of $1000 to per capita GDP is associated with a 3.3% expansion of the gap between cohabiting and marital fertility.

Finally, the most unexpected finding of the model relate to the effects of societal religiosity. After controlling for obfuscating factors it appears that societal religiosity exerts a positive effect on fertility of the magnitude of a 1% increase in fertility for each 1% increase in societal religiosity. Most surprisingly, the interaction effect of societal religiosity with cohabitation was estimated at a narrowing of .9% of the gap between cohabiting and marital fertility for each increase of 1% in societal religiosity. Religiosity was also estimated to have a significant negative interaction with employment, widening the fertility gap between employed and non-employed women by .3% for every 1% increase in societal religiosity.

DISCUSSION AND CONCLUSION

Using multilevel models I examined the mediating influence of European institutional context on the association of various individual characteristics to fertility. I begin by conceptualizing European institutional context broadly using a regional typology—Nordic, Western, Eastern, and Southern. Using this regional typology I analyzed how the effects of personal income, cohabitation, and employment vary across European region. After mapping these regional differentials, I then disaggregated regional effects into specific national characteristics (i.e.—child and family benefit generosity, FLFP, GDP, religiosity, and nonmarital fertility rates) to find more precisely the mechanisms through which institutional context effects fertility. Through the use of multilevel techniques I have developed models of both the direct effects of these macro

factors and also interactions of these factors with individual characteristics known to be important determinants of fertility. Though former research has theorized that each of the national characteristics examined here are related to fertility, such studies have generally been inconclusive due to the predominance of bivariate analyses lacking control of potential spurious associations. In the few cases where appropriate controls have been used, former studies still lack the multilevel structure necessary to study the mediating effects of institutional context at the individual level. Thus, the current study makes several substantive contributions to European fertility literature.

Supporting the regional typology empirically demonstrated by Pinnelli et al. (2001), I found evidence of unique context effects by European region. One exception here is between Western and Nordic Europe, which were found to have very similar institutional context effects in all analyses. The most distinct region was found to be Eastern Europe, including samples from the Czech Republic, Hungary, Poland, Slovenia, Romania and Russia. These Eastern nations were shown to provide a unique context which seems to indicate some lasting legacy of their recent communist history. For example, in the Eastern nations the strong, positive associations of income to fertility evident in the north and west were attenuated. Similarly, the negative association of employment with fertility so strongly evident in the North and the West were again attenuated here, though still significant. Thus, overall we have a picture of Eastern Europe in which fertility is relatively depressed, but equally spread across the SES distribution, and it is more common for women to work while having small children. Also notable is the fact that though cohabitation is fairly rare in this region, such informal unions tend to produce children more frequently than in other contexts.

There is also some evidence of a unique institutional profile in Southern Europe. Though lacking a sufficient sample of Southern nations to have an accurate idea of statistical significance, Southern Europe did evidence differences in the functioning of cohabitation and employment relative to other nations. The analyses indicate that cohabiting fertility is suppressed in the Southern European context, not surprising considering the strong cultural influences of religion and conservatism in these nations. As in the Eastern countries, in Southern Europe employment was shown to have less of a negative effect on fertility than in the nations of Northern and Western Europe, but it is important to bear in mind that FLFP is also relatively uncommon in these Mediterranean nations. Though future research is needed on this topic, I suspect this is due to the more generous child benefits and maternity leave schemas of the North and West which allow women the luxury of being out of the labor force with young children (Gauthier 1996).

The second set of analyses provided an intriguing, though tentative look at the national characteristics driving the regional patterns described above. The full model, in particular, provides a glimpse into how the glacial processes of societal evolution structures and molds individual behavior. The picture that emerges is a fairly complex one, but one from which a number of tentative generalization maybe gleaned to form a coherent pattern. Noteworthy features of this pattern include the findings that national wealth, child benefit generosity, and societal religiosity all seem to exert a positive influence on fertility among nations having completed the fertility transition.

The contextual influences of nonmarital fertility rates, child benefit generosity, and FLFP on the effect of household income provide a fascinating picture of the role of security in fertility decisions. While, increases in FLFP rates and child benefit generosity

seem to lessen the effect of income, the rise of nonmarital fertility accentuates it. This suggests that in progressive societies where fertility outside of marriage is more common and socially acceptable, non-married women will tend to make more calculated fertility decisions realizing the lack of security implied by foregoing a steady partnership. By the same token, as FLFP increases families may tend to perceive greater security via diversified home economics, thus choosing to increase fertility with less regard to income level. The common axiom to both these interpretations is the idea that security is an important consideration in fertility decision. From this axiom, it is a short step to considering partnership, income, and child benefits as partially interchangeable in providing this security.

The association of cohabitation to fertility was found to be substantially influenced (in surprising ways) by a variety contextual factors including nonmarital fertility rates, GDP and societal religiosity. Not surprisingly, cohabitation was found to be more positively associated with fertility in socially liberal contexts where nonmarital fertility was common. On the other hand, GDP was found to have slightly negative mediating effect on the cohabitation-fertility association and religiosity a positive one. These last two findings are counterintuitive and difficult to interpret, and as such will be the subject of further analyses to test the robustness of these unexpected results.

With depopulation a potential threat to many European nations it is important to understand the function of macro factors such as: policy, culture and economics on individual fertility decision. However, as this analysis illustrates, these effects often are not direct and sometimes follow convoluted and circuitous routes via micro correlates of fertility. However, recent developments in quantitative methods provide promising new

avenues for mapping this complex web of relationships. In the above analysis I have demonstrated that Poisson mixed models are now mature enough to be used to estimate the micro, macro and cross-level interactive determinants of fertility. Though the current study was limited by a small N at the national level and its cross-sectional design, a tentative outline was observed. Further, I intend to continue this work by expanding the sample to include repeated cross sections of the 18 nations included here. Thus, future analyses will provide an interesting test as I examine the robustness of these cross-sectional findings across the past thirty years.

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Appendix A. Individual Level Random Effects Poisson Models with By Region

Variable	Nordic	Western	Eastern	Southern
Age	-0.926	-0.783	-0.541	-0.718
	(35.95)**	(29.72)**	(25.31)**	(10.05)**
Ln Age	26.216	20.892	11.298	18.785
	(32.76)**	(25.61)**	(18.54)**	(8.39)**
Cohabiting	-0.315	-0.442	-0.056	-1.257
	(9.46)**	(9.55)**	(0.96)	(2.17)*
Single	-1.568	-1.483	-1.155	-1.441
	(25.12)**	(24.25)**	(15.88)**	(5.11)**
Income	0.048	0.075	0.003	-0.007
	(5.43)**	(2.98)**	(0.16)	(0.10)
Education	0.046	0.017	-0.006	0.077
	(3.85)**	(1.98)*	(0.52)	(1.11)
Employment	-0.494	-0.376	-0.133	-0.079
	(16.03)**	(13.43)**	(4.15)**	(0.95)
N	18501	21877	26834	3001
Nations	4	7	6	1

Notes: Absolute value of z statistics in parentheses.
* significant at 5%; ** significant at 1%

Appendix B. Correlation Matrix of Variables Used in the Analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Fertility	1											
(2) Age	-0.3407	1										
(3) Cohabiting	0.0478	-0.1851	1									
(4) Single	-0.143	-0.0915	-0.1504	1								
(5) Education	-0.0073	-0.0265	-0.0313	-0.0166	1							
(6) Income	0.0254	0.1588	0.09	-0.1915	-0.0828	1						
(7) Employment	-0.1092	0.0848	0.0212	0.0341	0.1251	0.1222	1					
(8) Child/Family Ben.	0.0292	0.0082	0.1381	-0.0112	-0.2146	0.1014	0.1146	1				
(9) FLFP	-0.0222	-0.0363	0.1311	0.0231	0.1496	-0.0143	0.1521	0.2777	1			
(10) Religiosity	0.0119	0.0428	-0.1186	-0.0388	0.0227	-0.1679	-0.1472	-0.4244	-0.5354	1		
(11) GDP-PPP	0.0595	-0.0366	0.1645	0.1064	-0.3443	0.5083	-0.0421	0.1738	-0.0984	-0.2769	1	
(12) Nonmarital Ratio	0.0273	-0.0315	0.2475	0.0694	-0.0054	0.3069	0.0409	0.2229	0.4899	-0.5123	0.5441	1