# Fertility and Revolution:

# How Does Political Change Influence Reproductive Behavior?

Amy Kate Bailey

University of Washington

Association for the Study of Ethnicity and Nationalism

Political Demography Conference

London, England

September 2006

This research was supported in part by an NICHD Training Grant to the Center for Studies in Demography and Ecology. I am grateful to Stewart E. Tolnay, Avery M. Guest, Edgar Kiser, Lowell Hargens, and Becky Pettit for helpful comments, and to Jerald Herting and C. Elizabeth Hirsh for methodological guidance. Earlier versions of this paper were presented at the Pacific Sociological Association in April 2003 and the Social Science History Association in November 2003. Direct correspondence to: Amy Kate Bailey, Department of Sociology, Box 353340, University of Washington, Seattle, WA 98195-3340; email: akbailey@u.washington.edu.

**ABSTRACT**: Existing theory has identified the capacity of political revolutions to effect change in a variety of social institutions, but relationships between revolution and many of these institutions remain largely unexplored. This study hypothesizes that revolutionary events and the ideological changes they engender may influence popular understandings of the individual's relationship to society, and ultimately the legitimacy of couples' authority over their reproductive capacities. Using historical data from 22 European and diaspora countries, I examine the temporal relationship between timing of revolution and onset of fertility decline. Results indicate that specific forms of popular democratic revolution – but not institutionalized democratic structures – predict fertility decline.

**Fertility and Revolution: When Does Political Change Influence Reproductive Behavior?**

Europe under the *ancien regime* was a continent of hierarchical relationships, with power concentrated in the hands of a few. The individual was in no sense master of his (and certainly not mistress of her) own destiny; rights and liberties were enjoyed not by the individual *as an individual*, but as a member of a group (Gellner 1983; Hobsbawm 1962; Sperber 1994 and 2000). The concepts of self and of place in society dramatically altered in conjunction with evolving social institutions following the Reformation and Enlightenment. For example, Protestantism's theological focus on the individual has been linked to changes in both the state and the economic order (Gorski 1993; Weber 1930). In what Hobsbawm (1962) has termed the "dual revolution," expansionist capitalism threatened to tip the balance of power from landed nobility to the new class of industrialists and bourgeoisie.

These economic and spiritual changes turned the existing worldview on its head, even without political change. We know, however, that political change did occur, and that it was frequently visited on societies as dramatic, transformative events. Despite centuries of estate structure and elite privilege, within 150 years nearly every country in Europe experienced popular challenges to established order, demands for representative government, and the expansion of civil rights. The political upheavals of the Revolutionary Era differed from earlier unrest in that demands were not exclusively focused on economic redress, but on reweaving the web of social relationships (Markoff 1996: 4). These democratizing events did not seek the maintenance of traditional group-based rights, but rather aimed at expanded political inclusion, elimination of class-based elite privilege, and codification of rights of the individual rather than of the group. Even countries without revolutionary social movements underwent changes to

their political structures, with democratizing reforms often implemented to prevent popular uprisings.

The effects of revolutionary movements on political outcomes are well documented (Bendix 1978; Goldstone 1991; Goodwin 2001; Hunt 1984; Skocpol 1979; Tilly 1993). If we take seriously the idea that political revolutions, as both social movements and historical events, influence a variety of social structures and relationships (Andrews 1997; Meyer and Whittier 1994; Rochon and Mazmanian 1993; Sewell 1996, 1999), the links between revolutionary movements and changes in other social institutions must be examined. This paper seeks a more complete understanding of the impact that revolutions had on the family. I ask whether year of revolution predicts the timing of the onset of fertility decline in 22 "European world" countries. (NOTE 1) I hypothesize that ideas about individual autonomy engendered during revolutions may have changed the acceptable calculus of reproductive decision-making (Coale 1986), leading to declining marital fertility. Fertility may represent one facet of a broader ideological transition to greater individuation, and a critical component of this transformation may be political revolution (Binion 2001).

My primary theoretical orientation is that revolutionary processes fundamentally alter cultural ideologies and power structures in a way that exerts independent effects on other social institutions. Given the fundamental role that ideologies of modernization and individuation play in theories of fertility decline, a relationship between the phenomena may exist. Could macro-level changes wrought by revolutionary movements affect the ideology individual couples use in making fertility decisions? My main data sources are public-use aggregate data, published writings on socioeconomic and political factors, and secondary historical sources (NOTE 2). I use ordinary least squares regression to determine whether year of revolution predicts the onset

of fertility decline in 22 European world countries. I confirm my findings with two additional model estimations. The first substitutes a measure of institutional democracy for the year of revolution; the second uses year of revolution to predict subsequent primary school enrollment levels, a measure that may represent ideologies of individualism (Boli et. al. 1985).

## I. Review of the Literature

### A. Political Revolution

Events, including revolutions, are *historical* not merely because of the actions they entail, but because of their capacity to transform social structures and alter the balance of power among social actors (Sewell 1996, 1999) in ways that gradual change does not. Markoff (1996), Gould (1995) and Hunt (1984) assert that revolutionary events must be understood in terms of their causes and outcomes, and *also* as transformative events that facilitate creation of new social identities or relationships. These ostensibly *political* events accelerate the rate of change along other social dimensions – at least temporarily – and may have a "ripple" effect, changing the social web and hierarchies within the family, workplace, or pew. This understanding of revolutions has implications for fertility decline (Binion 2001).

Most current theories of revolution, however, focus on structural and ideological antecedents or outcomes rather than revolutions' transformative capacities (Skocpol 1979; Tilly 1993). Still, many researchers identify the relationship between ideology and high-risk action that directly challenges existing power structures (McAdam 1986). Bendix (1978) asserts that while force is necessary to maintain autocratic rule, it is not sufficient. He identifies ideological factors – including Church sanction and popular acceptance of the inviolability of kingly authority – as crucial for pre-revolutionary regimes' maintaining power. When ideologies of

legitimate authority change, the existing regime may be challenged. Kiser and Cai (2003) emphasize the importance of a regime's ideological basis in promoting political stability. Goldstone, writing alone (1991) and with Useem (1999) identifies ideology as mobilizing revolutionary actors, influencing the course of revolutionary events, and determining political outcomes of revolutionary behavior.

I contend the influence of these ideological fissures may extend beyond institutional political structures. Ideologies present in or emergent during revolutions may be adopted in other social arenas. Following Bendix (1978), I assert that the revolution in thought required for a population to rebel against the *ancien regime* in sufficient proportions to force a revolution implies redefinition in popular understandings of legitimate authority. This is also likely to create shifts in other social relationships and the concept of self. That popular demands in revolutionary Europe were not for economic benefits *per se*, but for a larger voice in national affairs and a greater degree of control over one's own life, would imply that this transition in *political* self-concept was underway. If revolutionary events provide an opportunity for reorganizing social relationships, it follows that revolution's effects on other cultural aspect may differ predictably for countries based on their revolutionary experiences.

Some theorists situate the causes of revolution almost exclusively within structural factors (Skocpol 1979; Tilly 1993). Purely structural explanations, however, may inadequately specify causal mechanisms, and fail to explain why all cases of structural opportunity do not develop into revolution (Kiser and Hechter 1991). More nuanced approaches incorporate structural *opportunities*, but allow for interplay between structure, historical circumstance, and human action in creating popular revolt *and* state structures (Kiser and Cai 2003; Kiser and Linton 2002; Wuthnow 1989). Political change does not always imply social revolution (Bendix

1978). In societies with increasingly powerful and centralized states, however, radical social reform requires radically reforming the state (Goodwin 2001). In revolutionary societies, political structures come to be understood as extensions of social relations, and insurgents situate the cause of social grievances within the halls of political power (Bendix 1978). Goodwin, for example, posits that states *construct* revolutions, and political ruptures "reform extensive social arrangements in more or less fundamental ways" (2001: 41). The character of the social revolutions accompanying political change may depend on social differences between pre- and post-revolutionary rulers, the depth of division caused by revolutionary action, and the reorganization of social and political life occurring during the revolution (Tilly 1993).

If revolutions are social movements with capacity to redefine social relationships and cultural values outside the nexus of individual rights vis-à-vis the state, then revolutions may signal changes in other institutions. These changes may occur due to "spillover effects" (Meyer and Whittier 1994), reshaping individual identities (McAdam 1986; Gould 1995) and civic culture or social values as an unintended outcome (Rochon and Mazmanian 1993; Tarrow 1989). Much as the 1960s social movements produced a culture of political activism (Freeman 1983), the democratizing struggles of Revolutionary Europe may have created a culture of individualism that pervaded other institutions. The family may be one such institution and fertility, as one of the family's major social functions, may change in the wake of revolution.

**B. Fertility Decline**

Fertility fell dramatically throughout the European world in a short period of time, generally concentrated from the mid-nineteenth through the mid-twentieth centuries (van de Walle and Knodel 1980) (NOTE 3). This drop is *described* by classic Demographic Transition Theory (DTT), which postulates a triphasic structure: in Stage I, fertility and mortality are high,

with relatively stable population; in Stage II, mortality declines, but fertility remains high, causing rapid population growth; in Stage III, fertility falls until population stabilizes. DTT typically focuses on economic correlates of fertility decline, understanding fertility as a function of the demand for children: when children are an asset, as agricultural labor and old-age or risk insurance for parents, and mortality is sufficiently high that parents cannot expect all children will survive, fertility is high. As industrialization and modernization lower mortality and increase costs of childrearing, parents no longer want more children to create additional household labor or insure against premature deaths, and fertility falls (Caldwell 1976; Davis 1945; Easterlin 1975; Notestein 1945). However, the predictive factors cited in DTT -- urbanization, industrialization, increasing education, and falling infant/child mortality -- are inconsistently related to the onset of the European fertility decline (Anderson 1986; Lesthaeghe and Wilson 1986; Matthiessen and McCann 1978; F. van de Walle 1986; Watkins 1986). The structural forces identified by DTT as being associated with declining fertility, therefore, provide an incomplete explanation of historical fertility decline.

Alternative explanations focus not on economic factors, but cultural diffusion and ideational aspects of fertility. Ideation and diffusion theorists claim that couples produced more children than desired, and as knowledge about family planning methods traversed channels of social contact, fertility began to decline (Mason 1997). This argument is bolstered by the fact that cleavages in rates of fertility frequently fall along lines of linguistic, cultural, and religious division (Levitt 1974; Livi-Bacci 1977; Spiegelman 1950; Watkins 1991). Cultural arguments also focus on social pressures for large families and the psychic and status-based "costs" of restricted fertility (Easterlin 1975); when couples no longer face these costs, they restrict their childbearing. "Modernizing" European couples did not simply begin to limit their family size in

response to macro-level pressures: some intervening cultural variables made restricting fertility a newly-acceptable or desirable choice (Coale 1986; Cutright and Hargens 1984). Once social supports for high fertility begin to disintegrate, individuals gain the moral authority and social latitude to make decisions that affect their own lives and the futures of the groups to which they belong. It is possible that this moral authority is generated in part via the process of political revolution and cultural acceptance of individualistic, democratic principles.

Economic factors related to the value of children are clearly important. Several demographic theorists also find ideational "modernization" to be critical to fertility declines (Cleland and Wilson 1987; Lesthaeghe 1980 and 1983; Lesthaeghe and Wilson 1986). Much demographic research and theory links societal fertility decline to economic modernization (Guinnane et. al. 1994; Teitelbaum 1975; van de Walle and Knodel 1980), increasing autonomy (Leasure 1989) and individualism (Lesthaeghe 1980 and 1983; Lesthaeghe and Wilson 1986), and cultural ideals of "modern" family structure (Thornton 2001).

The link between political factors and demographic concepts has been hinted at in prior literature. Watkins (1991) links politics and fertility when she hypothesizes that ideational shifts enabling individuals to share a common national rather than a provincial identity (Gellner 1983) may explain converging fertility levels within national boundaries following the revolutionary period. Lesthaeghe (1983) connects leftist voting trends to declining fertility in Belgium, France, and Switzerland, and notes the United States and France had the first democratic revolutions and earliest fertility declines in the European world (NOTE 4). Benz (1999) associates groups of political actors with specific fertility patterns. Caldwell (2004) identifies that politically-linked social upheavals have the capacity to trigger temporary fertility depressions in pre-transition societies, or to accelerate transitions that are already underway. Theorists studying revolution

have identified that declining mortality and consequent population increases create social conditions conducive to political instability and revolution (Goldstone 1991).

This paper is the first attempt at systematically linking ideological individuation, as expressed through fertility decline, to broader concepts of individualistic political ideologies. Rudolph Binion (2001) has identified this shift in the French and U.S. contexts; I am undertaking a more systematic analysis of a broad cross-section of the European world. It examines the temporal relationship between political revolution and fertility decline across the European world between the late 18th and early 20th centuries. I ask whether the social transformations facilitated by political revolution might include declining fertility. I expect that countries in which ideas about *political* autonomy and self-determination found earliest revolutionary expression will provide early endorsement for couple-based family limitation, and should experience early fertility decline (NOTE 5). Countries with the earliest revolutionary events should experience the earliest onset of fertility decline. Conversely, countries where traditional political authority is most strongly entrenched should evidence delayed revolutionary events and delayed fertility decline.

## II. Data and Methods

This article seeks to identify temporal linkages between revolutionary events and demographic patterns, as both may indicate cultural adoption of individualistic ideologies. I use measures of the timing of fertility decline from the European Fertility Project (EFP) *Master File* public use dataset (Treadway 1980) (NOTE 6), and numerous monographs and published articles written by EFP scholars. Michael Hechter's (2001) dataset *International Colonialism Study: National Integration in the British Isles, 1851-1966* (ICPSR # 7533) was used to disaggregate

statistical measures for England, Scotland and Wales. I used additional historical social statistics to construct other variables. Chief among these are Mitchell's (1988, 1998a, 1998b, 1998c) monographs on historical statistics and the 1912 *Catholic Encyclopedia* (Lafort 2003).

The dependent variable is the year in which a country's marital fertility level fell 10-percent from its highest recorded level. Van de Walle and Knodel (1980) and Coale (1986) have determined that year for many countries included in this analysis. For countries for which no EFP documents report the date at which marital fertility declined by 10 percent, but for which EFP data exist, I calculated that date assuming a mean annualized rate of fertility growth, which could, of course, be negative (Preston et. al. 2001). For the few countries not included in the original EFP analyses, I employed other scholars' estimates using approaches pioneered by the EFP group (NOTE 7). For countries with multiple reliable estimates of the onset of fertility decline, the mean of the earliest and latest estimates was used.

The measure of marital fertility used is Coale's $I_g$ index, which compares a society's marital fertility rate to that of the Hutterites, a population with early and universal marriage and very high levels of fertility within marriage. It is calculated as follows:

$$I_g = \frac{\text{Total number of births in period X}}{\sum (\text{Number of women in age interval} * \text{Hutterite age-specific marital fertility rate})} \quad \text{Eq. 1}$$

The 10-percent threshold is used for several reasons. First, while populations exhibit pre-transition fluctuation in fertility, once a society has achieved a 10-percent decline, fertility continues to shrink irreversibly, often at an accelerated pace (Coale and Treadway 1986). Second, wide fertility variation existed both within and between pre-transition societies, probably resulting from behavioral factors that influence reproduction, such as breastfeeding and

age at marriage (Bongaarts 1978). Using a *percentage* decline rather than *threshold* value essentially weights each society's "natural" fertility based on the influence of unknown behavioral factors that affected its pre-transition fertility level. Finally, European fertility decline in the late nineteenth and early twentieth centuries was primarily caused by restricting fertility within marriage, rather than changes in nuptuality patterns or extramarital childbearing. The measure of marital fertility, then, provides a parsimonious, effective summary of overall fertility trends.

As with many historic methods, this approach has limitations, most obviously that we are not able to record directly the family planning behavior practiced by European couples, and must use the proxy measure of national fertility rates. Problems with the index of marital fertility itself are aptly summarized by Guinnane, et. al. (1994). Through computer simulation, Guinnane and colleagues demonstrate that sizable minorities within the population may be controlling fertility before this threshold level of decline in marital fertility is attained; thus initial adoption of fertility control may be missed. Coale's index also may not capture more subtle changes in couples' strategies to reduce family size – those who formerly used "spacing" (non-parity-specific control) shifting to "stopping" behavior (Bean et. al. 1990).

The independent variable of primary interest is the year each country experienced its revolutionary event. Selecting revolutionary events poses several conceptual and methodological challenges. First, although each society included here experienced a mass democratizing social movement, not every country's experience included *violent* revolution (NOTE 8), and not all revolutionary events successfully achieved long-term expansion of popular participation in governance. Second, many countries revolted on multiple occasions during the period under investigation. Finally, many attempts at democratization involved small

groups of elites rather than large swaths of the populace. In some instances those reforms were actively opposed by peasants and urban workers.

It is unlikely that my efforts will identify a perfect measure: even revolutionary specialists disagree about what constitutes a revolution. Tilly (1993) has constructed perhaps the best-known typology, coding events as revolutionary if: 1) Multiple claims to sovereignty are made; 2) There is popular involvement in revolutionary action; and 3) The existing regime is unable to maintain control. Goldstone (1991) has developed a system that classifies political crises according to eight dimensions including: lost faith in existing regime's legitimacy; elite and/or popular revolt; widespread violence; and changes in political institutions, the status of traditional elites, economic organizations, or ideologies of stratification. His criterion for state breakdown includes "a crisis of central state authority, elite revolts, popular uprisings, and widespread violence or civil war" (1991: 12).

However, neither typology is applicable here because both fail to capture the issue of primary concern in the relationship between revolution and fertility: the relationship of each to *individualistic ideology*. It is the redefinition of social patterns that occurs during mass revolutionary movements, combined with increased popular support for individualistic ideologies, that should hasten declining fertility. Because I am concerned with revolutions as transformative events in the development of *popular ideology* – rather than institutional state features – this typology must address revolutionary activity that does not garner durable results as well as non-violent movements in early-centralizing states (such the Great Reform Bill of 1832 in England, Scotland, and Wales). Movements that failed to become violent because elites acquiesced to popular demands as a means of preventing serious unrest, as occurred in the Netherlands in 1848, may have had effects on popular ideology as substantial as those of

revolutions that became violent. Movements capable of impacting ideology in multiple social strata likely mobilized elites *and* commoners, rather than simply being factional elite contests for power. Critical features of a revolutionary movement, then, would be the character of public discourse, the population segments involved, and the insurgency's halt in response to *expectations* of democratization.

To meet these challenges, I code revolutionary events as each country's first event that is broader than local or regional in scope, and satisfies the following: 1) Claims focus on democratic goals (expanded voting rights, guaranteed civil liberties, etc.); 2) Multiple social classes, including peasants and/or urban workers, collaborate; and 3) The existing regime is toppled and/or agitation ceases due to credible promises of reforms. To acknowledge the impact of nonviolent movements on individualistic ideologies, multi-class action that uses existing channels of political discourse is included under this rubric. A listing of the event identified for each country, and a brief description of why each was selected, appears in Appendix A, Table A-1. For countries with violent revolutions, the year of revolution is the year violence erupted. For countries with nonviolent revolutionary political movements, it is the year political concessions were made or promised (NOTE 9). Clearly, this is not a perfect measure. However, there is no reason to believe that any measurement error involved will result in findings that are more supportive of, rather than contradictory to, my main hypothesis.

Because I argue that political events provide a measure of individualistic attitudes that also impact fertility, *and* may accelerate ideological transformation, I control for other factors associated with fertility decline. This allows me to isolate more effectively the influence of individualistic ideology on fertility. However, I am limited in the statistical methods available due to the small number of cases included in this sample. While a parsimonious model is

required, the variables included in the model must represent the major factors DTT and ideation and diffusion theories identify as affecting fertility restriction: changing wealth flows within the family; declining benefits from high fertility; and linguistic or cultural barriers to implementing fertility control techniques. My regression analysis, then, can only contain a small number of variables, selected with care in order to allow the demographic, socioeconomic, and cultural factors to fairly compete with year of revolution for statistical significance. Table 1 presents the demographic variables considered for use in the model, along with values for each country.

**[TABLE 1 HERE]**

To select variables for this model, I grouped them along major theoretical dimensions of wealth flows within the family, cultural/linguistic diffusion, and declining benefit from high levels of fertility, and calculated bivariate (Pearson's R) correlations between each pair of variables, presented in Table 2. From each conceptual dimension, I selected the variable having the lowest level of correlation with other variables to maximize the amount of variance explained by the final models. These selections were verified using factor analysis. Based on this selection process, the Demographic Model includes: percent of women in the paid labor force, representing changing wealth flows within the family (NOTE 10), the percent of the population living in urban areas, identifying lost economic benefit from high fertility, and the percent of the population that is Roman Catholic, reflecting cultural barriers to family size limitation. Women's labor force participation and urbanization are measured within three to four years of fertility decline. The percent Catholic is measured in 1905. While the Catholic measure has reduced temporal correlation with the dependent variable, and may reflect a time several decades later than the onset of fertility decline, because religious affiliation exhibits a great degree of durability over time, I believe it is appropriate to include here.

**[ TABLE 2 HERE ]**

Despite the careful process followed, it is possible that my results will be affected by omitted variable bias. Clearly, with a small sample, I am limited in the number of predictor variables I can include. However, I am confident that the possibility of severe omitted variable bias is reasonably low. It is difficult to think of theoretically appropriate predictor variables that have been omitted, but (1) are not highly correlated with predictor variables that are included, and (2) are strongly related to the timing of both revolutions and fertility decline.

I utilize Ordinary Least Squares (OLS) to regress the timing of fertility decline on that of revolution. Because of the possibility that France and the United States may exert undue influence based on their early revolutions and fertility declines, regression equations are estimated with the complete sample (22 cases) and a restricted sample (20 cases) that excludes these countries (NOTE 11). Because of the small sample size, I then confirmed the OLS results using both Iteratively Weighted Least Squares (IWLS) and bootstrapping. IWLS iteratively estimates the regression equation, reweighting each time to reduce the influence of unusual cases that might unduly affect the results. Bootstrapping uses repeated sampling (NOTE 12) with replacement to estimate a sampling error and construct confidence intervals for sample statistics (Mooney and Duval 1993).

For both samples, I estimate two regression equations. The first (Demographic Model) uses the variables associated with changes to within-family wealth flows, declining benefits of high fertility, and cultural/linguistic barriers, to predict the onset of fertility decline. The second model (Revolution Model) regresses year of fertility decline on the variables included in the Demographic Model plus year of revolution.

## III. RESULTS

Using factors predicted by the Demographic Transition Theory and diffusion and ideation models to be correlated with the onset of fertility decline yields disappointing results. The overall model has little to explain variance between observations ($R^2$ = -.007), regardless of whether all 22 cases are included or the U.S. and France are excluded. The F statistic is less than one for the Demographic Model with both samples, and no predictor variable approaches statistical significance (NOTE 13). While these results are somewhat surprising, given the inconsistency with which individual DTT factors are linked to fertility decline across countries and the variation in socioeconomic indicators, they hardly seem improbable. Results of these estimations appear in Table 3 (and the reader is referred again to Table 1 for measures of these variables for each country).

**[ TABLE 3 HERE ]**

Incorporating year of revolution changes the picture substantially; this measure has far greater power to predict the onset of fertility decline. When all 22 cases are included, the model explains more than half of the variance between cases ($R^2$ = .506). The F-statistic value is 6.382 ($p \leq .01$). While the Demographic Model variables still fail to attain statistical significance, the coefficient for year of revolution is significant at the $p \leq .001$ level, with a t-value of 4.438. While the excluding France and the U.S. reduces the model's predictive power and statistical significance of the year of revolution, results for the Revolution Model are similar for the restricted sample. The model explains more than one-quarter of the variation between cases, ($R^2$ = .288) and the model fit remains significant (F = 2.919; p = .057).

## IV. Confirmatory Evidence: Political Institutions and Primary School Enrollment

It is possible that the effects of revolution are related not to individualistic ideology, but to institutionalized political structures. If the effects of democratizing political outcomes operate through the changes they impose on political *structures*, it is possible that measures of institutionalized political change alone may account for the lion's share of any relationship between political and demographic regimes. To isolate the transformative effects of revolutions from those of political institutions – which may or may not be related to revolutionary activity – I conduct a secondary analysis using *Political Regime Characteristics and Transitions, 1800-2003* (Polity IV Project 2000).

The Polity IV Project provides standardized measures of democracy and autocracy for countries, stretching back to 1800 in many cases, and assesses the relative levels of autocratic governance and institutionalized democracy. Each measure is constructed additively based on a variety of dimensions, with possible values ranging from 0 to 10. Polity IV is primarily concerned with the openness and competitiveness of selection of a country's chief executive, institutionalized constraints on the executive's power, and openness and competitiveness of political participation. Component variables include whether the executive is chosen through open elections, how much access non-elites have to institutional political structures, and whether institutionalized procedures exist for transferring executive power. The overall polity score is calculated by subtracting the total autocracy score from the total democracy score, for possible values ranging from -10 through +10 (NOTE 14).

To examine the temporal relationship between institutionalized democracy and fertility decline, I use the date at which a threshold score of 5 on the total polity score was achieved. This represents a point at which the highest possible autocracy score would be in the middle-range, and then only with extremely high levels of institutionalized democracy. Under this

scenario, the most "undemocratic" government would fit into one of two schemes: it could have low levels of emergent democracy, with no vestiges of autocracy; or could have a more advanced democratic system in which full competition and participation were stymied by persistent autocratic tendencies (as with retention of an hereditary executive, or systematic exclusion of certain groups from the political process). The inclusion of this measure has empirical as well as theoretical grounding. Preliminary explorations tested four separate threshold measures, with this value demonstrating the strongest relationship to the onset of fertility decline.

The Political Institutions Model uses the 22 countries from the revolutionary analysis plus four European world countries that did not experience democratizing revolutionary events (NOTE 15). I estimate models using three separate samples: the full sample of 26 countries; a sample restricted to the 22 countries that experienced democratizing revolutionary movements; and a final sample of revolutionary countries, excluding the U.S. and France. Again, all results are confirmed with both IWLS and bootstrapping. While many countries included in the Political Institutions Model also experienced political revolution, the social and ideological changes concomitant to revolutionary events should not obtain for institutional changes that occur more gradually or without passionate public engagement (NOTE 16). I hypothesize, therefore, that the statistical significance of any relationship between non-revolutionary structural change and fertility decline will be attenuated when examined in concert with date of revolution.

Results from this analysis are presented in Table 4. The variable indicating the year in which each country attained the threshold level of institutionalized democratic structures significantly predicts the timing of the onset of fertility decline in models using all three samples (NOTE 17). However, overall model fits and amounts of variance explained are lower for the

Political Institutions than for the Revolutions Models (Table 3). Results from the Combined Political Model, which includes both Year of Revolution and Year of Institutionalized Democracy Threshold, demonstrate that year of revolution has greater power to predict the onset of fertility decline than do institutionalized political structures. The variance explained roughly doubles with the inclusion of year of revolution for the sample utilizing all revolutionary countries as well as the sample excluding France and the U.S. Additionally, although the coefficient for year of revolution is significant in both models, the institutionalized democracy variable is reduced to borderline significance when all 22 revolutionary countries are included in the sample, and becomes nonsignificant when the U.S. and France are excluded.

**[ TABLE 4 HERE ]**

Clearly, revolution has greater power to predict the onset of fertility decline than do democratizing political structures. But how do we know that these results support my hypothesis about individualistic ideology? To further test this, I use revolution to predict another social institution theorized to be associated with individualistic ideology: the percent of children enrolled in primary school (Boli et. al. 1985). State capacity for educational provision should be correlated with same institutional factors associated with Polity IV. However, provision of – and particularly enrollment in – primary education in the European world context generally resulted from bottom-up social action. State-mandated primary school generally lagged behind increases in enrollment (Tyack and Hansot 1990), with governments focused on providing elite levels of education – secondary and university.

I again use OLS regression, confirmed using IWLS and bootstrapping, to predict the percent of children enrolled in primary education in 1905. This is calculated by dividing the number of children enrolled in primary school by the sum of [(70 percent of children aged 5 – 9)

+ (all children aged 10 – 14)]. I estimate three pairs of models, using all 22 revolutionary countries and then excluding the U.S. and France. Results are presented in Table 5. In the first set of models (Demographic Model), I use only the predictor variables from the Demographic Model (Table 3). These variables have virtually no capacity to predict primary school enrollment. Only the variable for women's labor force participation approaches statistical significance ($p = .081$) with all 22 countries, and model fit statistics perform poorly ($R^2 = .022$ and $F = 1.159$ with the full sample; $R^2 = .007$ and $F = 1.048$ excluding the U.S. and France).

**[ TABLE 5 HERE ]**

The second pair of models adds the year the Polity IV score first attained a score of 5 or greater. Using all 22 revolutionary countries, no variables approach statistical significance, and the model explains only 5% of the variance ($R^2 = .050$). The F-statistic is 1.277. Excluding the U.S. and France yields much the same picture. The adjusted $R^2$ falls to .010, the F-statistic to 1.047, and all coefficients remain statistically insignificant. If the percent of children enrolled in primary school is, in fact, a reflection of the level of a culture's individualistic ideology, there is no measurable relationship between this ideology and the level of institutionalized democratic political structures.

Incorporating year of revolution changes the story. For the sample including all 22 revolutionary countries, the model explains over half the variance (adjusted $R^2 = .545$) and F statistic of model fit if 7.129 ($p \leq .001$). No demographic variables attain statistical significance, but the coefficient for year of revolution is significant at the $p \leq .001$ level. Excluding the U.S. and France only strengthens the model's performance, with the adjusted $R^2$ reaching an astonishing .757 and the F statistic 15.789. Using the restricted sample, the percent of the population living in urban areas attains modest statistical significance ($p=.047$), and year of

revolution retains its power ($p \leq .001$). These results indicate that at least for the countries under examination here, the ideological linkage between revolution and educational expansion is borne out. It may, indeed, be individualistic ideology that allows year of revolution to have such predictive capacity for the onset of fertility decline.

## VII. DISCUSSION

To the best of my knowledge, this is the first systematic exploration of political variables as explanatory factors in demographic regime change, and the first marriage of theories of revolution and fertility transition. I hypothesized that reproductive and political control might both be expressions of broader cultural ideologies of autonomy and legitimized individuation. This approach has implications for scholars studying both fertility and revolutionary movements, in that it signals the critical role ideology may play in effecting major social change, and the way that change may be expressed through different social institutions. Perhaps more to the point, the relationship between political autonomy and reproductive control evidenced here underscores the importance of increased study of fertility in concert with various cultural and institutional factors.

The effect of year of revolution further indicates that aspects of culture not previously explored by demographers may have lasting effects on population trends. The transformative experience of revolutionary social movements may impact arenas commonly understood to be quite separate from politics. Current demographic research may pay too little attention to relationships between overlapping spheres of influence of major social institutions (See Easterlin 1975; Lesthaeghe 1980 and 1983; and Caldwell and Caldwell 1990, for exceptions). Indeed, political processes better predict the timing of fertility decline than do variables traditionally

associated with DTT or diffusion and ideational perspectives, at least for this subset of countries and this time period. Theories of revolutionary ideology may provide greater leverage on the causative factors of demographic transition than "demographic transition" variables themselves.

These results support my hypothesis that cultural endorsement of individual autonomy creates a social climate allowing greater latitude in personal decision-making. However, the results also evidence that ideology may create different behavioral outcomes for different groups, in areas over which they have the most control. In this analysis, and as emphasized in earlier work by Binion (2001), male claims to political autonomy and female claims to reproductive autonomy appear to have gone hand-in-hand, mapping onto nineteenth-century ideologies of gendered public and private spheres. The historical record demonstrates that women in the modernizing European world adopted new economic roles within the family as wage labor and industrialization expanded. That these women may have simultaneously applied emergent cultural ideals of individualistic autonomy to this newly-feminized domestic sphere provides insight into the process of cultural diffusion and subsequent behavioral adaptation.

Finally, the theory that dramatic shifts in cultural ideology are more predictive of changes in fertility behavior than are strictly structural variables was supported. The year of revolutionary event was significantly and positively predictive of the timing of onset of fertility decline. Conversely, while institutional political processes have a significant relationship to fertility decline in isolation, its significance is all but eliminated when used with year of revolution. This indicates that something specific about cultural transformation associated with revolutions is involved, rather than the degree of democratization a country's populace enjoys. The results of supplementary analyses predicting primary school enrollment with year of revolution clarify that it may indeed be cultural adoption of ideological individualism that

matters. While the tension between structural opportunities and cultural ideology remains in the study of the *causes* of political revolutions, this finding invites increased attention to their structural and ideological *outcomes*, particularly in supposedly non-political arenas.

## VIII. CONCLUSIONS

This project alone cannot settle the debate over relative contributions of structural opportunities and ideational changes in "causing" revolution, nor the ultimate question of causative factors for the onset of fertility decline. It does, however, support the supposition that increasing individuation affects notions about the role of the individual in making decisions about both fertility and governance. It also supports the hypothesis that the process of revolution – and changing understandings of power and authority – plays some role in hastening the onset of fertility decline. If true, it implies that radical social movements have the capacity to change not only the social arrangements explicitly targeted through collective action, but a panoply of power relationships, cultural values and behaviors.

This project is limited by the scope of countries examined and the independent variables included. Clearly, a finer-grained analysis of revolution might provide greater leverage on the relationship between politics and fertility. Including additional countries or more specific political variables might increase the model's explanatory value. The interaction between major institutions is likely to be critical, and more substantive indicators of shifts in religious participation or economic structures may also be useful. However, analyses of this type are beyond the scope of this paper, and left for future researchers.

These results also may be limited by minor irregularities in the data, mainly having to do with the fact that data for many variables came from multiple sources. For example, there is

incomplete uniformity on the urbanization variable, as estimates reflect a mix of numeric thresholds and official designations. The percent Catholic was calculated based on the number of Catholics reported in the 1912 *Catholic Encyclopedia*. Because Church doctrine does not recognize the loss of practicing Catholics who leave the Church, this number likely includes an unknown number of "lapsed Catholics," who may be active in Protestant denominations, or adhere to no religion.

In general, these results support the hypothesis at hand, and provide a basis for further exploration of the relationship between fertility and social and political factors. Future researchers may wish to examine whether the relationship between democratization – particularly when achieved through multi-class social action – and fertility obtains for non-European populations, during different time periods, or under non-Christian majority religious structures. These findings suggest that relationships between social structures may be more complex and overlapping than previously believed, and further investigation is warranted.

**NOTES**

1) I use "European world" to refer to countries geographically located on the European continent, or established through European colonization with majority European-origin populations.

2) Sources cited in the text are included in the bibliography. A complete listing is available from the author.

3) France, which also had an early revolution, is an outlier. Most estimates indicate French fertility began to decline by the early 19th century.

4) Recent work (Hacker 2003) indicates U.S. fertility may not have declined as early as previously believed, and also that the Civil War, rather than the American Revolution, may be the defining ideological American moment.

5) Countries in this analysis are Austria, Belgium, Bulgaria, Denmark, England, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Portugal, Russia, Scotland, Spain, Sweden, Switzerland, the United States and Wales. Including Austria and Hungary as separate cases, as well as England, Scotland, and Wales, seems warranted by large differences in estimates of the onset of fertility decline, for Austria and Hungary, and in social indicators for both groups of countries.

6) Please see the EFP website at http://opr.princeton.edu/archive/pefp/ for more information.

7) Sources are: Weir (1994) for revised French estimates; and Hacker (2003) and Haines (2000) for the U.S.

8) The decision to use or not use violence may have been tactical on the part of movement leaders. Substantial debate exists among social movement theorists as to whether movements that utilize violence are more or less likely than nonviolent movements to attain their goals, or

more durable outcomes. At question is under what conditions violence furthers movement goals (see, e.g. Button 1978; Gamson 1975; O'Keefe and Schumaker 1983; Piven and Cloward 1977; Schumaker 1975; Sharp and Maynard-Moody 1991).

9) This approach may result in modest measurement error due to varying temporal classification. However, early stages of social movements are difficult to identify, making precise measurement impossible.

10) To clarify, Caldwell's theory applies to *inter-generational* flows. I believe women's labor force participation captures this measure because cultural variation in women's willingness to engage in the paid labor force has been linked to an emphasis on providing resources for children (See, e.g., Perlmann 1988).

11) This restricted sample is used for theoretical, not methodological, reasons: dfBeta and Cook's Distance values indicate that no country exerts undue influence on the results – either the overall goodness of model fit, or the size and significance of individual regression coefficients.

12) The analyses presented in this paper were confirmed by bootstrap with 1,000 draws per regression estimation.

13) I also estimated all models using a predictive variable that summed the percentages of Catholics and Orthodox adherents among the population with largely the same results. While the summer measure attained statistical significance in the demographic model, these effects were eliminated when year of revolution was included.

14) I also estimated all models using a predictive variable that summed the percentages of Catholics and Orthodox adherents among the population with largely the same results. While the summer measure attained statistical significance in the demographic model, these effects were eliminated when year of revolution was included.

15) Those countries are Australia, Canada, New Zealand, and Romania. Romanian fertility data are from the European Fertility Project. Additional sources are: Caldwell & Ruzicka (1978) for Australia; Jones (1971) for Australia and New Zealand; and McInnis (2000) for Canada.

16) For example, many countries in this analysis crossed the threshold of institutionalized political scores following World War I, when reforms were imposed on them.

17) When the combined Catholic-Orthodox variable is used, the political institutions variable drops to borderline significance, with $p \leq .10$.

**REFERENCES**


Anderson, Barbara. 1986. "Regional and Cultural Factors in the Decline of Marital Fertility in Europe," pp. 293 – 313 in *The Decline of Fertility in Europe, Revised Proceedings from a Conference on the Princeton European Fertility Project*, Ansley J. Coale & Susan Cotts Watkins, eds. Princeton, NJ: Princeton University Press.

Andrews, Kenneth T. 1997. "The Impacts of Social Movements on the Political Process: The Civil Rights Movement and Black Electoral Politics in Mississippi." *American Sociological Review* 62 (5): 800 – 819.

Bean, Lee L., Geraldine P. Mineau, and Douglas L. Anderton. 1990. *Fertility Change on the American Frontier: Adaptation and Innovation*. Berkeley: University of California Press.

Bendix, Reinhard. 1978. *Kings or People, Power and the Mandate to Rule*. Berkeley: University of California Press.

Benz, Ernest. 1999. *Fertility, Wealth, and Politics in Three Southwest German Villages 1650 – 1900*. Boston: Humanities Press, Inc.

Binion, Rudolph. 2001. "Marianne in the Home: Political Revolution and Fertility Transition in France and the United States." *Population: An English Selection* 13 (2): 165 – 188.

Boli, John, Francesco O. Ramirez, and John W. Meyer. 1985. "Explaining the Origins and Expansion of Mass Education." *Comparative Education Review* 29 (2): 145 – 170.

Bongaarts, John. 1978. "A Framework for Analyzing the Proximate Determinants of Fertility." *Population and Development Review* 4 (1): 105 – 132.

Brewster, Karin L. and Ronald R. Rindfuss. 2000. "Fertility and Women's Employment in Industrialized Nations." *Annual Review of Sociology* 26:271-96.

Button, James W. 1978. *Black Violence: Political Impact of the 1960s Riots.* Princeton, NJ: Princeton University Press.

Caldwell, John. C. 1976. "Toward a Restatement of Demographic Transition Theory." *Population and Development Review* 2 (3/4): 321-66.

Caldwell, John C. 2004. "Social Upheaval and Fertility Decline." *Journal of Family History* 29 (4): 382 – 406.

Caldwell, John C., and Pat Caldwell. 1990. "High Fertility in Sub-Saharan Africa". *Scientific American* 262 (5).

Caldwell, John C. and Lado T. Ruzicka. 1978. "The Australian Fertility Transition: An Analysis." *Population and Development Review* 4 (1): 81-103.

Cleland, John and Christopher Wilson. 1987. "Demand Theories of the Fertility Transition: An Iconoclastic View." *Population Studies* 41 (1): 5-30.

Coale, Ansley J. 1986. "The Decline of Fertility in Europe Since the Eighteenth Century as a Chapter in Human Demographic History," pp. 1 – 30 in *The Decline of Fertility in Europe, Revised Proceedings from a Conference on the Princeton European Fertility Project*, Ansley J. Coale & Susan Cotts Watkins, eds. Princeton, NJ: Princeton University Press.

Coale, Ansley J., and Roy Treadway. 1986. "A Summary of the Changing Distribution of Overall Fertility, Marital Fertility, and the Proportion Married in the Provinces of Europe," pp. 31 – 181 in *The Decline of Fertility in Europe, Revised Proceedings from a Conference on the Princeton European Fertility Project*, Ansley J. Coale & Susan Cotts Watkins, eds. Princeton, NJ: Princeton University Press.

Cutright, Phillips and Lowell Hargens. 1984. "The Threshold Hypothesis: Evidence from Less Developed Latin American Countries, 1950 to 1980." *Demography* 21 (4): 459 – 473.

Davis, Kingsley. 1945. "The World Demographic Transition". *The Annals of the Academy of Political and Social Science* 237:1-11.

Easterlin, Richard A. 1975. "An Economic Framework for Fertility Analysis." *Studies in Family Planning* 6 (3): 54-63.

Freeman, Jo. 1983. "Introduction," pp. 1 – 5 in *Social Movements of the Sixties and Seventies*, ed. by Jo Freeman, New York: Longman.

Gamson, William A. *The Strategy of Social Protest*. Homewood, IL: Dorsey Press.

Gellner, Ernest. 1983. *Nations and Nationalism*. Oxford: Blackwell

Goldstone, Jack A. 1991. *Revolution and Rebellion in the Early Modern World*. Berkeley: University of California Press.

Goldstone, Jack, and Bert Useem. 1999. "Prison Riots as Microrevolutions: An Extension of State-Centered Theories of Revolution." *The American Journal of Sociology* 104 (4): 985-1029.

Goodwin, Jeff. 2001. *No Other Way Out: States and Revolutionary Movements, 1945 – 1991*. New York: Cambridge University Press.

Gorski, Philip S. 1993. "The Protestant Ethic Revisited: Disciplinary Revolution and State Formation in Holland and Prussia". *American Journal of Sociology* 99 (2): 265 – 316.

Gould, Roger V. 1995. *Insurgent Identities: Class, Community, and Protest from 1848 to the Commune*. Chicago: The University of Chicago Press.

Guinnane, T., B. Okun & James Trussel. 1994. "What Do We Know about the Timing of Fertility Transitions in Europe?" *Demography* 31 (1): 1 – 20.

Hacker, J. David. 2003. "Rethinking the "Early" Decline of Marital Fertility in the United States." *Demography* 40 (4): 605-620.

Haines, Michael R. 2000 "The White Population of the United States, 1790 - 1920," chapter 8, pp. 305 - 369 in *A Population History of North America*, Michael R. Haines & Richard H. Steckel, eds. New York: Cambridge University Press.

Hechter, Michael. *Internal Colonialism Study: National Integration in the British Isles, 1851-1966* [Computer file]. ICPSR version. 2001. Seattle, WA: Michael Hechter, University of Washington [producer], 196?. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor].

Hobsbawm, Eric J. 1962. *The Age of Revolution, 1789 – 1848*. New York: Mentor Books.

Hunt, Lynn Avery. 1984. *Politics, Culture, and Class in the French Revolution*. Berkeley: University of California Press.

Jones, Elise F. 1971. "Fertility Decline in Australia and New Zealand, 1861 – 1936." *Population Index* 37 (4): 301 – 338.

Kiser, Edgar and Yong Cai. 2003. "War and Bureaucratization in Qin China: Exploring an Anomolous Case." *American Sociological Review* 68 (4): 511 – 539.

Kiser, Edgar and Michael Hechter. 1991. "The Role of General Theory in Comparative-Historical Sociology". *American Journal of Sociology* 97 (1): 1-30.

Kiser, Edgar and April Linton. 2002. "The Hinges of History: State-Making and Revolt in Early Modern France." *American Sociological Review* 67 (6): 889 – 910.

Lafort, Remi. 2003. *The Catholic Encyclopedia, Volume III* Copyright © 1908 by Robert Appleton Company. Online Edition Copyright © 2003 by K. Knight.

Leasure, William J. 1989. "A Hypothesis about the Decline of Fertility, Evidence from the United States." *European Journal of Population* 5: 105-117.

Lesthaeghe, Ron. 1980. "On the Social Control of Human Reproduction." *Population and Development Review* 6 (4): 527-548.

Lesthaeghe, Ron. 1983. "A Century of Demographic and Cultural Change in Western Europe: An Exploration of Underlying Dimensions." *Population and Development Review* 9(3): 411-435.

Lesthaeghe, Ron & Chris Wilson. 1986. "Modes of Production, Secularization, and the Pace of Fertility Decline in Western Europe, 1870 – 1930." pp. 261 – 292 in *The Decline of Fertility in Europe, Revised Proceedings from a Conference on the Princeton European Fertility Project*, Ansley J. Coale & Susan Cotts Watkins, eds. Princeton, NJ: Princeton University Press.

Levitt, Jesse. 1977. "Linguistic Pluralism in Switzerland and Belgium." *Geolinguistics* 3: 57–70.

Livi-Bacci, Massimo. 1977. *A History of Italian Fertility during the Last Two Centuries*. Princeton: Princeton University Press.

Markoff, John. 1996. *The Abolition of Feudalism: Peasants, Lords, and Legislators in the French Revolution*. College Park, PA: Pennsylvania State University Press.

Mason, Karen Oppenheim. 1997. "Explaining Fertility Transitions." *Demography* 34(4): 443-54.

Mattheissen, Poul C. & James C. McCann. 1978. "The Role of Mortality in the European Fertility Transition: Aggregate-Level Relations." pp. 47 – 68 in *The Effects of Infant and Child Mortality on Fertility*, Samuel H. Preston, ed. New York: Academic Press.

McAdam, Doug. 1986. "Recruitment to High-Risk Activism: The Case of Freedom Summer." *American Journal of Sociology* 92 (1): 64 – 90.

McInnis, Marvin. 2000. "The Population of Canada in the Nineteenth Century," chapter 9 (pp. 371 – 432) in *A Population History of North America*, Michael R. Haines & Richard H. Steckel, eds. New York: Cambridge University Press.

Meyer, David S. and Nancy Whittier. 1994. "Social Movement Spillover." *Social Problems* 41 (2): 277 – 298.

Mitchell, B. R. 1988. *British Historical Statistics*. New York: Cambridge University Press.

Mitchell, B. R. 1998a. *International Historical Statistics, Africa, Asia & Oceania, 1750 – 1993, Third Edition*. London : Macmillan Reference ; New York : Stockton Press.

Mitchell, B. R. 1998b. *International Historical Statistics, Europe 1750 – 1993, Fourth Edition*. London : Macmillan Reference ; New York, N.Y. : Stockton Press.

Mitchell, B. R. 1998c. *International Historical Statistics, The Americas 1750 – 1993, Fourth Edition*. London : Macmillan Reference ; New York, N.Y. : Stockton Press.

Mooney, Christopher Z., and Robert D. Duval. 1993. *Bootstrapping. A Nonparametric Approach to Statistical Inference*. Newbury Park, CA: Sage Publications.

Notestein, Frank W. 1945. "Population: The Long View." In *Food for the World*. Ed. T.W. Schultz. pp. 36-57. Chicago: University of Chicago Press.

O'Keefe, Michael, and Paul D. Schumaker. 1983. "Protest Effectiveness in Southeast Asia." *The American Behavioral Scientist* 26 (3): 375 – 394.

Perlmann, Joel. 1988. *Ethnic Differences. Schooling and Social Structure Among the Irish, Italians, Jews, and Blacks in an American City, 1880-1935.* New York: Cambridge University Press.

Piven, Frances Fox and Richard A. Cloward. 1977. *Poor People's Movements: Why They Succeed, How They Fail*. New York: Pantheon Books.

Polity IV Project. 2000. *Political Regime Characteristics and Transitions, 1800-2002* (Polity IV) database. [Computer file; version p4v2000] College Park, MD: Center for International Development and Conflict Management, University of Maryland. (http://www.cidcm.umd.edu/inscr/polity)

Preston, Samuel H., Patrick Heuveline and Michel Guillot. 2001. *Demography: Measuring and Modeling Population Processes*. Malden, MA: Blackwell Publishers.

Rochon, Thomas R. and Daniel A. Mazmanian. 1993. "Social Movements and the Policy Process." *Annals of the American Academy of Political and Social Science* 528: 75-87.

Schumaker, Michael. 1975. "Policy Responsiveness to Protest-Group Demands." *The Journal of Politics* 37 (2): 488 – 521.

Sewell, William H., Jr. 1996. "Historical Events as Transformations of Structures: Inventing Revolution at the Bastille." *Theory and Society* 25 (6): 841 – 881.

Sewell, William H., Jr. 1999. "Three Temporalities: Toward an Eventful Sociology," pp. 245 – 280 in *The Historic Turn in the Human Sciences*, Terrence J. McDonald, editor. Ann Arbor: The University of Michigan Press.

Sharp, Elaine B. and Steven Maynard-Moody. 1991. "Theories of the Local Welfare Role." *American Journal of Political Science* 35 (4): 934 – 950.

Skocpol, Theda. 1979. *States and Social Revolutions: A Comparative Analysis of France, Russia and China*. Cambridge: Cambridge University Press.

Sperber, Jonathan. 2000. *Revolutionary Europe, 1780-1850*. Longman, San Francisco.

Sperber, Jonathan. 1994. *The European Revolutions, 1848 – 1851*. New York: Cambridge University Press.

Spiegelman, Mortimer. 1950. “The Reproductivity of Jews in Canada, 1940 – 1942.” *Population Studies* 4 (3): 299 – 313.

Tarrow, Sidney G. 1989. *Democracy and Disorder: Protest and Politics in Italy, 1965 – 1975*. New York: Oxford University Press.

Teitelbaum, Michael. 1975. "Relevance of Demographic Transition Theory for Developing Countries." *Science* 188:420-425.

Thornton, Arland. 2001. “The Developmental Paradigm, Reading History Sideways, and Family Change.” *Demography* 38 (4): 449 – 465.

Tilly, Charles. 1993. *European Revolutions, 1492 – 1992*. Cambridge, MA: Blackwell.

Tolnay, Stewart E. 1996. “Structural Change and Fertility Change in the South, 1910 to 1940.” *Social Science Quarterly* 77 (3): 559-576.

Treadway, Roy. 1980. *European Fertility Project Master Data File*. Princeton, NJ: Office of Population Research, Pinceton University.

Tyack, David and Elisabeth Hansot. 1990. *Learning Together: A History of Coeducation in American Schools*. New York: The Russell Sage Foundation.

Van de Walle, Etienne and John Knodel. 1980. “Europe’s Fertility Transition: New Evidence and Lessons for Today’s Developing World.” *Population Bulletin* 34 (6): 3-38.

Van de Walle, Francine. 1980. “Education and Demographic Transition in Switzerland.” *Population and Development Review* 6 (3): 463 – 472.

Van de Walle, Francine. 1986. “Infant Mortality and the European Demographic Transition”, pp. 201 – 233 in *The Decline of Fertility in Europe, Revised Proceedings from a Conference on the Princeton European Fertility Project*, Ansley J. Coale & Susan Cotts Watkins, eds. Princeton, NJ: Princeton University Press.

Watkins, Susan Cotts. 1986. "Conclusions," pp. 420 – 449 in *The Decline of Fertility in Europe, Revised Proceedings from a Conference on the Princeton European Fertility Project*, Ansley J. Coale & Susan Cotts Watkins, eds. Princeton, NJ: Princeton University Press.

Watkins, Susan Cotts. 1991. *From Provinces to Nations: Demographic Integration in Western Europe, 1870 – 1960*. Princeton, New Jersey: Princeton University Press.

Weber, Max. 1930. *The Protestant Ethic and the Spirit of Capitalism*. Talcott Parsons, translator. New York: Charles Scribner's Sons.

Weir, David R. 1994. "New Estimates of Nuptuality and Marital Fertility in France, 1790 – 1911." *Population Studies* 48 (2): 307-331.

Wuthnow, Robert. 1989. *Communities of Discourse. Ideology and Social Structure in the Reformation, the Enlightenment, and European Socialism*. Cambridge, Mass.: Harvard University Press.

**Table 1. Values for Political, Demographic, Cultural & Socioeconomic Variables for 22 European World Countries**

| Country | Year of Revolution | Year of Fertility Decline | Percent Urban | Infant Mortality Rate | Adult Literacy Rate | Percent Speaking Official Language | Percent Catholic | Percent Women in Labor Force | Year Women Attained Vote | Percent Enrolled Primary 1905 | Year Polity Score ≥ 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | 1848 | 1908 | 37 | 207 | 80 | 35 | 91 | 63 | 1918 | 84 | 1920 |
| Belgium | 1830 | 1882 | 44 | 158 | 70 | 52 | 99 | 48 | 1948 | 75 | 1853 |
| Bulgaria | 1899 | 1912 | 18.5 | 146 | 41 | 81 | ≤ 1 | 66 | 1945 | 42 | 1990 |
| Denmark | 1848 | 1899 | 31 | 127 | 94 | 98 | 2 | 41 | 1915 | 90 | 1915 |
| England | 1832 | 1892 | 72 | 146 | 92.5 | 100 | 5 | 42 | 1928 | 71 | 1880 |
| Finland | 1905 | 1911 | 15 | 111 | 56 | 88 | ≤ 1 | 43 | 1906 | 27 | 1917 |
| France | 1789 | 1814 | 19 | 185 | 46 | 52 | 98 | 33 | 1945 | 100 | 1848 |
| Germany | 1848 | 1889 | 30 | 220 | 94 | 92 | 36 | 27 | 1918 | 93 | 1919 |
| Greece | 1909 | 1913 | 25 | 203 | 35 | 80 | 2 | 25 | 1952 | 46 | 1864 |
| Hungary | 1848 | 1900 | 16 | 227 | 51 | 51 | 52 | 27 | 1945 | 68 | 1990 |
| Ireland | 1829 | 1926 | 24 | 69.5 | 88 | 77 | 90 | 33 | 1922 | 95 | 1921 |
| Italy | 1848 | 1912 | 67 | 142 | 54 | 97 | 97 | 41 | 1945 | 49 | 1948 |
| Netherlands | 1848 | 1897 | 54 | 151.5 | 94 | 98 | 35 | 24 | 1919 | 84 | 1917 |
| Norway | 1836 | 1904 | 28 | 77 | 95 | 98 | ≤ 1 | 34 | 1913 | 84 | 1898 |
| Portugal | 1910 | 1916 | 23 | 154 | 33 | 100 | 100 | 44 | 1968 | 24 | 1911 |
| Russia | 1905 | 1922 | 16 | 198 | 25 | 43 | 11 | 72 | 1917 | 13 | 1992 |
| Scotland | 1832 | 1894 | 54 | 120.5 | 94 | 94 | 11 | 28 | 1928 | 86 | 1880 |
| Spain | 1854 | 1919 | 55 | 136 | 43 | 66 | 100 | 14 | 1931 | 45 | 1890 |
| Sweden | 1866 | 1897 | 19 | 94 | 81 | 99 | ≤ 1 | 33 | 1921 | 86 | 1917 |
| Switzerland | 1831 | 1886 | 22 | 163.5 | 95 | 70 | 42 | 39 | 1971 | 92 | 1948 |
| United States | 1776 | 1848 | 14 | 217 | 68 | 96 | 16 | 13 | 1920 | 77 | 1809 |
| Wales | 1832 | 1892 | 16 | 127.5 | 85 | 49 | 5 | 14 | 1928 | 85 | 1880 |

Notes: Variables calculated within 1-2 years of onset of fertility decline except percent Catholic, which is measured in 1905.

**Table 2. Bivariate Correlations Between Demographic, Socioeconomic, and Cultural Factors for 22 European World Countries**

| | Cultural Factors | | Value of Children | | Intra-Family Wealth Flows | | | |
|---|---|---|---|---|---|---|---|---|
| | Percent Catholic | Percent Speaking Dominant Language | Percent Living in Urban Areas | Infant Mortality Rate | Percent Women in Paid Labor Force | Adult Literacy Rate | Year of Revolutionary Event | Year of Onset of Fertility Decline |
| Percent Catholic | | -0.35 | 0.25 | 0.14 | 0.03 | -0.24 | -0.21 | -0.07 |
| Percent Speaking Dominant Language | | | 0.28 | -0.40 † | -0.26 | 0.31 | 0.06 | 0.09 |
| Percent Living in Urban Areas | | | | -0.15 | -0.06 | 0.27 | -0.16 | 0.15 |
| Infant Mortality Rate | | | | | 0.05 | -0.36 | -0.04 | -0.32 |
| Percent Women in Paid Labor Force | | | | | | -0.27 | 0.47 * | 0.31 |
| Adult Literacy Rate | | | | | | | -0.52 * | -0.13 |
| Year of Revolutionary Event | | | | | | | | 0.73 *** |

Notes: *** $p \leq .001$; * $p \leq .05$; † $p \leq .10$.

**Table 3. Effect of Demographic Variables and Revolutions on Timing of Fertility Decline**

| | Demographic Model | | Revolutions Model | |
|---|---|---|---|---|
| | All Countries | Excluding US & France | All Countries | Excluding US & France |
| Women's LFP | .509 | .160 | -.086 | -.009 |
| | (.348) | (.187) | (.227) | (.169) |
| Percent Catholic | -.081 | .087 | .017 | .106 |
| | (.136) | (.073) | (.098) | (.062) |
| Percent Urban | .279 | -.163 | .371 | -.003 |
| | (.320) | (.171) | (.225) | (.155) |
| Year of Revolution | | | .557*** | .269* |
| | | | (.125) | (.098) |
| Intercept | 1872.641*** | 1899.427*** | 857.060*** | 1399.265*** |
| | (17.507) | (10.010) | (229.148) | (181.294) |
| Adjusted R-Square | -.007 | -.007 | .506 | .288 |
| F-statistic | .953 | .954 | 6.382** | 2.919† |

Notes: Coefficients presented are unstandardized. Standard errors are in parenthesis.
*** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; † $p \leq .10$.

**Table 4. Relationship between Fertility Decline, Institutional Political Factors, and Demographic Variables**

| | Demographic Model | Political Institutions Model | | | Combined Political Model | |
|---|---|---|---|---|---|---|
| | All Countries | All Countries | Revolutionary Countries | Excluding US & France | Revolutionary Countries | Excluding US & France |
| Women's LFP | .476† | -.074 | -.027 | .004 | -.265 | -.111 |
| | (.272) | (.286) | (.346) | (.194) | (.279) | (.172) |
| Percent Catholic | -.069 | -.042 | -.053 | .085 | .014 | .102 |
| | (.120) | (.102) | (.115) | (.068) | (.092) | (.059) |
| Percent Urban | .243 | .295 | .308 | -.091 | .369† | .035 |
| | (.280) | (.236) | (.269) | (.164) | (.211) | (.149) |
| Year of Institutional | | .326** | .336** | .137† | .183† | .106 |
| Democracy Threshold | | (.102) | (.116) | (.074) | (.101) | (.064) |
| | | | | | .451** | .240* |
| Year of Revolution | | | | | (.131) | (.094) |
| Intercept | 1874.408*** | 1271.088*** | 1249.773*** | 1640.088*** | 710.860** | 1253.115*** |
| | (14.370) | (189.460) | (214.869) | (139.850) | (229.869) | (193.115) |
| Adjusted R-Square | .031 | .316 | .288 | .127 | .564 | .361 |
| F-statistic | 1.266 | 3.891* | 3.121* | 1.689 | 6.444** | 3.149* |

Notes: Coefficients presented are unstandardized. Standard errors are in parenthesis. *** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; † $p \leq .10$.

**Table 5. Relationship between Primary School Enrollment, Political and Socioeconomic Characteristics for 22 Countries**

| | Demographic Model | | Political Institutions Model | | Revolutions Model | |
|---|---|---|---|---|---|---|
| | 22 Countries w/ Revolution | Excluding US & France | 22 Countries w/ Revolution | Excluding US & France | 22 Countries w/ Revolution | Excluding US & France |
| Percent Catholic | .038 | -.040 | .026 | -.034 | -.064 | -.091 |
| | (.143) | (.154) | (.141) | (.154) | (.100) | (.076) |
| Percent Living in | .006 | .113 | -.022 | .002 | -.103 | -.446* |
| Urban Areas | (.359) | (.385) | (.355) | (.399) | (.246) | (.206) |
| Women's Labor Force | -.668† | -.656 | -.388 | -.459 | -.026 | -.083 |
| Participation | (.361) | (.385) | (.422) | (.431) | (.282) | (.207) |
| Year Polity Score | | | -.174 | -.169 | | |
| Attained 5 | | | (.141) | (.166) | | |
| Year of Revolution | | | | | -.591*** | -.849*** |
| | | | | | (.127) | (.120) |
| Intercept | 91.618*** | 89.734*** | 414.975 | 409.452 | 1169.507*** | 1664.516*** |
| | (17.340) | (19.899) | (262.077) | (314.709) | (231.958) | 222.214 |
| Adjusted $R^2$ | .022 | .007 | .050 | .010 | .545 | .757 |
| F-statistic | 1.159 | 1.048 | 1.277 | 1.047 | 7.279*** | 15.789*** |

Notes: Coefficients presented are unstandardized. Standard errors are in parenthesis. *** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$; † $p \leq .10$.

| Table A-1: Revolutionary Events Identified for Each of 26 European-Origin Countries | | |
|---|---|---|
| **Country** | **Year** | **Event/Notes** |
| Austria | 1848 | Urban protests demanded democratic reform. Serfdom abolished. Constitutional reforms short-lived. |
| Belgium | 1830 | Nationalist revolution won independence from Netherlands as well as guaranteed civil rights. |
| Bulgaria | 1899 | Bulgarian Agricultural National Union united peasants and intelligentsia, pushed for lower-class policy concerns. Violence ended with government concessions. |
| Denmark | 1848 | Society of Friends of the Farmers expanded constitutional civil rights, limited powers of monarchy. |
| England | 1832 | Great Reform Law expanded suffrage, eliminated tithe tax, allowed proportional representation. |
| Finland | 1905 | Broad coalition of elites and workers gained national independence, universal suffrage (men and women). |
| France | 1789 | Multi-class coalition unseated monarchy, gained Declaration of the Rights of Man and of Citizen and constitution. |
| Germany | 1848 | Revolutions in several states. Friedrich Wilhelm ultimately crushed movement, but monarchs instituted constitutional reforms, abolished serfdom, and National Assembly drafted democratizing constitution. |
| Greece | 1909 | Popular movement for democratic reform, military opportunities for non-elites. Prime minister resigned. |
| Hungary | 1848 | Mass demonstrations demand civil rights. Initial reforms reversed following Russia's intervention. |
| Ireland | 1829 | National movement for Catholic Emancipation won political rights for majority Catholics. |
| Italy | 1848 | Popular unrest overwhelmed every ruler in Italy, including the Pope, and all granted limited constitutions. |
| Netherlands | 1848 | King avoided revolution with constitutional reform; multi-class coalition forced additional concessions. |
| Norway | 1836 | Peasantry mobilized for reforms including local self-government, reorganization of state fiscal functions. |
| Portugal | 1910 | King deposed and democratic political structures installed, although nationalistic rhetoric was also used. |
| Russia | 1905 | Multi-class coalition gained reforms, including constitutionally-guaranteed rights. Political maneuvering sabotaged reforms, deepening class divisions and laying the foundation for the revolutions of 1917. |
| Scotland | 1832 | Great Reform Law expanded suffrage, eliminated tithe tax, allowed proportional Parliamentary representation. |
| Spain | 1854 | Urban proletariat, joining with lower-middle-class Progressives, revolted to form two-year coalition government; reforms included a constitution (never implemented) and universal manhood suffrage. |
| Sweden | 1866 | Riksdag Reform Bill admitted adult males to the ballot on the basis of property qualification, shifting participation from a caste-based to a individualized class-based system. |
| Switzerland | 1831 | Revolutionaries forced reforms, including universal manhood suffrage and limits on power of the clergy. |
| United States | 1776 | Originally a bourgeois, nationalist battle, with economic issues at the forefront, the incorporation of civil liberties and democratic principles into public discourse successfully recruited participation of the masses. |
| Wales | 1832 | Great Reform Law expanded suffrage, eliminated tithe tax, allowed proportional Parliamentary representation. |