# Changes in Postindustrial Family Formation:
# An Empirical Examination of Competing Theories*

Mary C. Brinton
Sinn Won Han

Harvard University

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# Changes in Postindustrial Family Formation: An Empirical Examination of Competing Theories

Family formation patterns in the postindustrial world have changed markedly in the past several decades. Fertility rates have declined, cohabitation rates have increased, age at marriage has increased, and non-marital childbearing has become more common in most postindustrial settings. A dominant theoretical explanation for these changes is second demographic transition theory, which posits widespread value change towards individualism and post-materialist concerns. In contrast, gender equity theory emphasizes structural changes in women's participation in the public sphere and the increasing incompatibility between women's domestic and public roles. This incompatibility is posited as a driver of change in family formation patterns, and particularly the decline in fertility. We test the predictions of these two competing theories by analyzing fertility decline in 34 societies. Our findings offer little support for second demographic transition theory and considerable support for the predictions of gender equity theory.

**Introduction**

Postindustrial societies have witnessed a substantial amount of change in family formation patterns in the past several decades. Fertility decline occurred throughout the postindustrial world in the 1970s and beyond, and was accompanied by increases in mean age at marriage, rates of cohabitation, and in the proportion of non-marital births in nearly all postindustrial countries. Together, these changes have been characterized as "the second demographic transition," in contrast to the first demographic transition that involved twin declines in mortality and fertility (Lesthaeghe 2010; Lesthaeghe and Moors 2000; van de Kaa 2001).

Second demographic transition (SDT) theory has been posited as an overarching theoretical framework to explain the cluster of changes considered characteristic of the second demographic transition. SDT proponents trace recent changes in family formation patterns to fundamental value changes accompanying postindustrialism, including a shift away from adherence to the moral authority of religion and family and towards values that are more individualistic.

While SDT theory has garnered considerable attention as an organizing rubric for the widespread changes in family formation patterns that have occurred in postindustrial Western societies, it is not without its detractors. A number of social demographers have questioned the coherence of a theory that includes predictions related to so many behaviors (Zaidi and Morgan 2017). They have also raised the issue of whether the causal order between ideational and family formation changes is appropriately specified (Tsuya and Mason 1995), and have pointed out inconsistencies between the predictions of SDT theory and recent family formation trends in postindustrial societies outside of Europe and North America (Atoh et al. 2004; Raymo et al. 2015; Tsuya and Mason 1995).

One of the central phenomena SDT theory attempts to explain is fertility decline. A major contending theoretical approach to explaining fertility decline focuses on the increased

incompatibility between women's roles in the family and the labor market. Gender equity theory (McDonald 2000, 2006) places principal emphasis not on the transformation of values in postindustrial society but on how the change in women's roles in the public sphere has not been matched by a corresponding increase in support for their responsibilities in the private sphere of the household. While women's education and labor force participation rates have increased, changes in women's domestic role have been slower. McDonald and other advocates of gender equity theory argue that without a more equal division of labor in the family and greater institutional and policy support for dual-earner couples, postindustrial fertility rates are likely to remain very low. Also central to this perspective is the idea, contrasting with SDT theory, that enthusiasm for stable unions, parenthood, and the "two-child norm" remains high in postindustrial societies (Bachrach 2001; Beaujouan and Sobotka 2011; Esping-Andersen and Billari 2016; Goldscheider et al. 2016).

This paper contributes to the literature on postindustrial fertility decline and changes in family formation patterns in three ways. First, we counterpose the two main theoretical frameworks—SDT theory and gender equity theory—and test their predictions for a large number of industrial and postindustrial countries. Utilizing over-time data for 34 countries, we assess the effect of post-materialist values and gender-role attitudes on change in total fertility rates. We employ three different measures of post-materialist values in order to measure the predictive value of separate dimensions. Second, we take the further step of analyzing the possible applicability of each theory to a different phase of the fertility transition. Third, in order to adjust for tempo effects due to changes in childbearing age over time, we use the tempo-adjusted total fertility rate as an alternative dependent variable. This provides a robustness check for our main results.

## Second Demographic Transition Theory: The Ideational Foundations of Demographic Change

Having successfully gone through the first demographic transition from the higher rates of mortality and fertility that characterized early industrialization, countries had not been expected to proceed to a second demographic transition in the final decades of the 20th century that was marked by below-replacement fertility (Coleman and Rowthorn 2013). Nor had very low rates of fertility been predicted by theories of cyclical fertility such as that propounded by Easterlin, who foresaw period fertility rates cycling between higher and lower bounds (1973).[1] In contrast to Easterlin's theory, smaller cohorts in most postindustrial countries have not in fact returned to having more children. On the contrary, many postindustrial societies have now experienced multiple decades of below-replacement fertility rates that have rarely occurred historically in the absence of highly exceptional events such as wars and other major social disruptions (Haskey 2013). While some of these societies have recently experienced a slight uptick in fertility rates, this has not occurred to the extent that Easterlin's cyclical theory would have predicted.

Declining family size is but one of a number of changes in family behaviors that diffused across the postindustrial landscape in the late 20th century. These include increased rates of cohabitation, delayed age at marriage and increased rates of non-marriage, the decoupling of marriage and childbearing, and higher divorce rates. SDT theory views these changes as constituting a cluster of behaviors that signal the increasing individualization and destandardization of the life course. In Lesthaeghe's view, the second demographic transition is characterized by "sustained sub-replacement fertility, a multitude of living arrangements other than marriage, the disconnection between marriage and procreation, and no stationary population" (2010: 211). These changes in

[1] Easterlin predicted that large cohorts such as those in the baby boom generation would produce fewer babies, having themselves endured the competition for resources that results from having many contemporaries. Smaller cohorts, experiencing less competition and gaining greater material advantage, would subsequently go on to have larger families. These processes would result in cyclical fluctuations in fertility.

union formation and in the context and extent of childbearing are theorized to be the result of fundamental value shifts associated with advanced industrialization. Such value shifts entail greater emphasis on non-material needs and on self-actualization. These higher-order needs are considered by SDT theorists to lead individuals to accord less value to the achievement of durable marital unions and parenthood (Goldscheider et al. 2016).

Second demographic transition (SDT) theory is ambitious in considering a cluster of family behaviors to be characteristic of late industrialization, regardless of regional and national cultural and economic differences. In its thrust towards generalization, SDT theory has a strong affinity with modernization theory's emphasis on cultural convergence as societies experience economic development, a similarity that SDT theory's proponents note (Lesthaeghe 2010; Van de Kaa 2001). SDT theory's explanatory framework resonates closely with Inglehart's postmaterial values thesis, which emphasizes the increasing value that individuals in postindustrial societies place on self-expression and quality of life (Inglehart 1997). Like modernization theory, SDT theory is explicitly evolutionary, specifying stages through which societies move in their transition to family patterns that are presumed to constitute a new state or equilibrium. SDT theory describes the new family patterns themselves and offers assertions about the ideational changes underlying them.

As a theory of family change, four characteristics distinguish the SDT perspective. First, SDT theory differs from other theories of nuptiality and fertility in postulating the central importance of broad cultural shifts as the underlying driver of change in the occurrence and timing of family formation. Second, Lesthaeghe developed his original arguments within the context of Western Europe (Lesthaeghe and Meekers 1986; Lesthaeghe and Surkyn 1988; Lesthaeghe and Moors 2000), where a number of demographic trends had emerged by the 1980s. In recent years he has extended the theory to other parts of the world including East Asia, thereby making the assumption that the same "developmental" path will be followed as in Western Europe. Third,

SDT theory is both a definition of a cluster of new family behaviors and an explanation of them. Finally, despite widespread discussion and reference to SDT theory in the social demographic literature, debate over the theory's soundness has rarely included explicit tests of its supppositions. This is likely due in part to the unusual status of SDT theory as both a *description* and an *explanation*.

Empirical efforts to test the predicted association between post-materialist/ postmodern values and nuptiality and fertility patterns have generally been conducted at a level of considerable aggregation and have examined (on a bivariate basis) the relationship between a country's proportion of individuals holding post-materialist values and specific demographic indicators such as the proportion of women 25-29 who are cohabiting, the percent of the total fertility rate attributable to births to women over age 30, age at marriage, and the proportion of all births that occur outside of marriage. A less aggregated approach has involved classifying individuals as having postmodern or modern characteristics and then examining the beliefs they hold in relation to various demographic behaviors (van de Kaa 2001). This allows researchers to see whether individuals with postmodern value orientations hold the demographic-related attitudes predicted by SDT theory. Depending upon how one chooses to assess the results, evidence both for and against the presumed relationships can be found, although the results of the more disaggregated analysis (i.e. of individual orientations and demographic-related attitudes) is arguably less convincing. As van de Kaa concedes, for example, very large proportions of individuals across Western postindustrial societies, not only in Europe but also in Canada and the U.S., agree that a child needs two parents to grow up happily; the difference between postmodernists and modernists appears quite insubstantial in many countries. Moreover, in a number of countries the proportion of individuals agreeing that parents' lives are a priority is only slightly higher among postmodernists than modernists. This stands in contradistinction to SDT theory's strong emphasis on individual self-actualization and the pursuit of leisure.

**Gender Inequality and Changes in Family Formation**

The principal contending theoretical perspective on postindustrial change in family formation patterns posits that greater importance should be assigned to the increasing incompatibility of work and family for many women. Rates of female higher educational attainment and subsequent labor force participation have increased without an equivalent increase in men's participation in housework and childcare (England 2010; McDonald 2000, 2006). This asymmetry in women's and men's changing roles results in Hochschild's classic "second shift" for many mothers (2012), exerting downward pressure on fertility rates. From the perspective of gender equity theory, it is not so much that fertility intentions or the desire for stable unions have declined, but that structural changes in women's roles have not been matched by changes in men's roles in the private sphere or by greater institutional accommodations for dual-earner families.

In contrast to SDT theory, the gender equity perspective has been subject to considerable empirical examination. Researchers have primarily focused on the relationship between liberal gender-role attitudes or men's contribution to household labor on the one hand, and fertility intentions or the transition to a second birth on the other hand (Cooke 2004, 2009; Mizouchi 2010; Nagase and Brinton 2017; Oláh 2003; Torr and Short 2004). Many of these studies have found a statistically significant relationship between greater gender egalitarianism in attitudes or household work and fertility intentions or outcomes. Some country-level studies have also reported such a relationship (Brinton and Lee 2016; de Laat and Sanz 2011; Feyrer et al. 2008).

Following McDonald's seminal formulation of gender equity theory, leading demographers have extended his ideas. Esping-Andersen and Billari (2016) and Goldscheider et al. (2016) have posited that very recent trends in family formation may be signalling a "return to family" in countries where gender-egalitarian attitudes and institutions have continued to develop. Empirical

work has demonstrated an uptick in total fertility, albeit not to population replacement-level, in a number of postindustrial countries (Goldstein et al. 2009; Myrsklä et al. 2011). These countries are hardly returning to the traditional familism outlined by SDT theorists. Rather, they include such cases as Australia, Denmark, Norway, Sweden, and the U.K. that score high on the post-materialism index. As Esping-Andersen and Billari point out, the fertility turnaround is particularly evident in countries that were forerunners in the second demographic transition. Furthermore, higher marriage and fertility rates and lowered propensities towards non-marital childbearing and divorce are now the most evident among the highly-educated in some countries—precisely the group that should show the greatest acceptance of post-materialist values and the highest tendency towards *non-traditional* family behaviors.

The "return to family" posited by Esping-Andersen and Billari (2016) represents what Goldscheider et al. (2016) term the second half of the gender revolution. The first half of this revolution was characterized by fundamental contradictions between married women's work and the weight of their home responsibilities, thus eventually depressing birth rates. But the second half of the gender revolution entails a transformation in gender relations involving greater participation by men in the private sphere. As this progresses, work and family are predicted to become more compatible. Birth rates will therefore experience an increase from the transition phase when they were very low. Based on this theory of a changing relationship between gender dynamics and fertility over the course of industrial and postindustrial development, Esping-Andersen and Billari propose a U-shaped trajectory in the total fertility rate corresponding to the first gender-role revolution, a transitional phase, and emergent gender egalitarianism. The expectation that fertility and gender-egalitarian attitudes and behavior will be positively correlated accords with McDonald's gender equity theory. Arpino et al. (2015) examined this empirically by assessing the correspondence between gender equity (measured as a more positive attitude towards women's role in the labor

market) and the total fertility rate for 27 Western countries. Their study demonstrated that this measure of gender equity as well as the level of attitudinal agreement between men and women predicts the hypothesized U-shaped curve.

Our empirical endeavor tests the relative capability of evolving gender egalitarianism vs. SDT theory to explain fertility change in industrial and postindustrial societies. A particular feature of our analysis is that we examine whether SDT theory might have had greater explanatory power in the earlier than later stages of the fertility transition.

**Data and Methods**

Our data are drawn from countries with a Human Development Index (HDI) of at least 0.7.[2] The sample includes 34 industrial and postindustrial countries chosen on the basis of having comparable data on birth rates, post-materialism values, and gender-role attitudes. Additionally, we restricted our sample to countries with multiple data points in order to capture within-country change in the total fertility rate. Among the 34 countries, 27 are OECD member countries and seven are not.[3] Each of the 34 countries is observed between 3 and 6 times from 1990 through 2013, resulting in a total of 137 country-year observations.

*Dependent variable*. Our dependent variable is the period total fertility rate (TFR).[4] Although TFR is the most commonly used population-level fertility measure, it is well-recognized that changes

[2] The HDI is a composite index measuring average achievement in three fundamental aspects of human development: 1) health, measured by life expectancy at birth, 2) education, measured by the mean of years of schooling for adults and expected years of schooling for children, and 3) a decent standard of living, measured by gross national income per capita. For measurement of the HDI, see http://hdr.undp.org/en/statistics/understanding/indices

[3]We chose not to include several Latin American and Muslim countries in our sample such as Chile, Saudi Arabia, Turkey, and Qatar, even though these countries meet our selection criterion of having an HDI score of at least .70. The SDT framework is likely inapplicable to Latin American and Muslim countries where marriage and fertility rates are still quite high (for instance, the TFR of Saudi Arabia in 2015 was 2.71).

[4] We use fertility data collected by the Human Fertility Database (https://www.humanfertility.org/cgi-bin/main.php).

in the timing of births (the tempo effect) can distort the TFR (Bongaarts and Feeney 1998, 2003; Goldstein et al. 2009). For this reason, it would be ideal to use the tempo-adjusted TFR (*adj*TFR) as the dependent variable. But the *adj*TFR is unavailable for every observation over the time span of our analysis. Accordingly, after using the TFR as our dependent variable we conduct robustness checks with the available data to see if our findings remain robust even when the *adj*TFR is the dependent variable.[5]

*Explanatory variables*. Post-materialist values and gender-role attitudes are the two major sets of explanatory variables. Data on both variables come from the *Integrated Values Surveys* (1990-2013). We use the 4-item post-materialist index devised by Inglehart (1971, 1977) to measure a country's level of post-materialist values. The value of the index ranges between 1 and 3, with a higher value indicating a stronger post-materialist orientation (e.g., freedom, autonomy, self-fulfillment, etc). Gender-role attitudes are measured by averaging individual responses to two questions, one involving gender roles in the workplace and one involving gender roles at home. Respondents were asked to indicate their agreement or disagreement with the following questions: "When jobs are scarce, men have more right to a job than women" and "Being a housewife is just as fulfilling as working for pay." The values of the composite index range between 1 and 2, with a higher value signifying more gender-egalitarian attitudes.

*Control variables*. Previous studies have shown that a country's birth rate is associated with the level of economic and social development, the female labor force participation rate, and labor market conditions for young adult males (Ahn and Mira 2003; Brinton and Lee 2015; Luci-Greulich and Thevenon 2014; Mills and Blossfeld 2005; Rindfuss et al. 2003). Since our main interest lies in

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[5] Another way to adjust for the tempo effect is to control for mean age at childbirth in regression analyses that use the unadjusted TFR as the dependent variable. We also employ this technique.

examining the relative influence of our explanatory variables, we control these other variables in our analytical model.

*Statistical method*. We use country fixed-effects regression models to assess the impact of the explanatory variables on countries' TFR. The fixed-effects framework eliminates the confounding effects of time-invariant characteristics of countries that could affect the overall fertility rate. This allows us to capture the net effects of the predictor variables. The following equation represents the fixed-effects regression model:

$$y_{it} = \alpha_0 + \beta_1 PMI4_{it} + \beta_2 GRA_{it} + \beta_3 GRA^2{}_{it} + \beta_4 \ln GDP_{it} + \beta_5 \ln GDP^2{}_{it}$$

$$\beta_6 EMP\_M_{it} + \beta_7 LFP\_F_{it} + \beta_8 MAB_{it} + \alpha_i + \mu_t + \varepsilon_{it},$$

where $y_{it}$ denotes the TFR for country *i* at time *t*; *PMI4* (the post-materialist index) and GRA (gender-role attitudes) with its quadratic term are the two major explanatory variables; the control variables are ln*GDP* (natural-logged gross domestic product) and its quadratic term, *EMP_M* (unemployment rate for young adult males), *LFP_F* (female labor force participation rate), and *MAB* (mean age of women at childbirth); $\alpha_0$ represents the general intercept and $\varepsilon_{it}$ is the error term; $\mu_t$ is a period dummy capturing time fixed-effects using five-year intervals starting from 1990; and $\alpha_i$ represents the country-specific intercepts summarizing the effects of unobserved time-invariant variables. Table 1 shows summary statistics for all variables.

**Results**

The graphs in Figure 1 show that the period fertility rate in most developed countries fell between 1990 and 2000. During this period, the TFR in several countries (e.g., Germany, Czech Republic, Russia, Bulgaria, Spain, Italy, Japan, Korea, and etc.) either reached or fell below 1.3, defined as lowest-low fertility (dashed red line in each graph). Aside from these countries, the TFR also fell in most of the other countries, and almost no country in this period managed to maintain

replacement-level fertility. However, an opposite trend has been observed since the early 2000s: many countries began to experience a recovery in their TFR, although in very few countries did it bounce back to replacement level.

Table 2 presents the results of multivariate regression analysis. A country fixed-effects estimation with robust standard errors is applied to each model. Using a fixed-effects estimation is desirable in that it nets out the effect of unobserved time-invariant variables which may affect fertility. Eliminating these time-constant and country-specific characteristics allows us to focus on within-country variation so that we can estimate the uncontaminated effects of the two competing predictors (post-materialism and gender-role egalitarianism) on fertility. Fertility rates may also depend on unmeasured *time-varying* factors other than post-materialism, gender-role egalitarianism, and the control variables. Though a fixed-effects framework cannot eliminate the effect of unobserved time-varying factors, we attempt to control for this by adding country-specific dummies for each five-year period. By doing so, the influence of unobserved time-varying factors can be approximated by country-specific time trends and thus we can estimate causally-sound effects of post-materialism and gender-role egalitarianism.

Model 1 tests SDT theory by including only post-materialism along with the control variables. The coefficient of post-materialist attitudes suggests that the transition from materialist to post-materialist ideology is associated with a decrease in TFR (b=-.064), but this association is not statistically significant at conventional levels.[6] Model 2 tests gender equity theory to see whether the shift towards more egalitarian gender-role attitudes has played a role in determining population-level trends in fertility rates. Both the linear and quadratic terms for gender-egalitarian attitudes are highly significant ($p$<.001) and the sign of the quadratic term is positive (b=3.004). This suggests that a

[6] We also checked the sensitivity of the original 4-item index (PMI4) by using a more comprehensive indicator, the 12-item post-materialism index. Regression results using the 12-item index are very similar to results based on the original 4-item index.

transition from gender-role traditionalism to egalitarianism has a U-shaped impact on TFR, even after controlling for the impact of birth postponement and macro-economic factors. These findings hold in Models 5 and 6 in Table 3, where we further adjust for the impact of birth postponement by using the tempo-adjusted TFR (*adj*TFR) as the dependent variable for the countries for which it is available.

The graphs in Figure 2 are plotted based on Models 2 and 6. These clearly show a U-shaped relationship between egalitarian gender-role attitudes and the TFR (whether tempo-adjusted or not). According to the graphs, the replacement-level TFR is maintained when attitudes reflect a rigid definition of gender roles. In the transition from gender-role traditionalism to egalitarianism, the TFR initially declines. The further development of gender egalitarianism is clearly associated with a recovery in the TFR. Our findings are robust to alternative specifications of the regression models using one- and two-year lagged variables (results available upon request). While the confidence intervals increase at the extremes of the TFR, the U-shaped relationship is strikingly similar to Esping-Andersen's and Billari's theoretical prediction (2015) and Arpino et al.'s empirical analysis (2015) of three stages through which societies move: a period based on gender-role traditionalism, a period marked by more heterogeneous gender-role attitudes and behaviors, and the rise of more fully gender-egalitarian attitudes.

Our findings thus far suggest little support for SDT theory's thesis that declining birth rates in postindustrial countries result from a shift in the value system that reflects greater support for individualization. We further investigated whether SDT theory's thesis holds when different measures are used. Given the theory's thesis that continued low fertility trends are intertwined with changing ideologies supporting the importance of religion and marriage, we employ secularization

and pro-marriage attitudes as alternative indicators of SDT theory.[7] Models 3 and 4 in Table 2 show that the decline of traditional ideologies supporting religion and marriage are indeed generally associated with a decline in the TFR. However, only the decline in religious adherence is statistically significant ($p<.05$), and it becomes insignificant in models using the *adj*TFR as the dependent variable (Models 7 and 8 in Table 2).

*Explanations for Different Phases of the Fertility Transition.* Although our analysis indicates that gender equity theory is arguably more relevant than SDT theory in terms of explaining macro-level trends in fertility, we nevertheless cannot rule out the possibility that each theory is responsible for explaining a different phase of the fertility transition since 1990. For instance, a shift in values towards individualism and self-actualization could have been the main contributor to reducing fertility rates during the 1990s, while the fertility rebound from the mid-2000s to the present could have been due mainly to greater progress towards gender egalitarianism. If this were the case, the validity of SDT theory could not be entirely rejected. We therefore explore the possibility that the two competing mechanisms may have been responsible for *different phases* of the fertility transition. We do so by assessing the relative contribution of changes in post-materialism and gender egalitarianism on the TFR between 1990 and 2013. The results of this analysis are presented in Table 4.

As a first step, only time dummies for each five-year period are included in Model 9, so that raw time trends in the TFR are modeled in a fully flexible way. We then compare the degree to which each time dummy is reduced by alternatively introducing the post-materialism index and gender egalitarianism.

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[7] Our measure for secularization is based on the question: "How important is religion in your life?" The value of this measure ranges between 1 and 4, with higher values signifying higher degrees of secularization. Pro-marriage is also based on a single-item measure: "Do you agree or disagree with the following statement– Marriage is an outdated institution?" This question has a score ranging from 1 to 2, with a higher value meaning less traditional attitudes towards marriage.

Table 4 shows that the sizes of the coefficients for the 1994-98 and 1999-03 time dummies are not reduced when the post-materialism index is introduced in Model 10. This suggests that the rise of individualistic values was not the reason for TFR decline during the 1990s. In contrast, the coefficients for the 1999-03 time dummy and for the succeeding two periods are meaningfully reduced when gender egalitarianism is introduced in Model 11. For instance, the coefficient for the period 2009-13 is reduced by almost 26% [{-.099-(-.134)}/-.134] * 100 = -26.1194] when gender egalitarianism is included in the model. This implies that as much as 26% of a country's TFR in 2009-13 can be explained by the transition from gender-role traditionalism to egalitarianism. There is no noticeable change in Model 12, when the post-materialism index is added back in. These results offer further support for our argument supporting the theoretical applicability of gender equity theory over SDT theory.

**Conclusion**

Our empirical examination of SDT theory fails to demonstrate a significant association between ideational changes with regard to the rise of individualism and secularization and recent fertility trends in developed countries. At the same time, we recognize that SDT theory was created to account not just for fertility decline but for various other demographic phenomena such as increases in divorce, extra-marital births, and pre-marital cohabitation. Accordingly, we examined whether SDT theory does a better job of explaining any of these other phenomena compared to fertility. To do so, we conducted additional analyses that regressed the crude marriage rate (marriages per 1,000 people), the crude divorce rate (divorces per 1,000 people), and the share of births outside of marriage (% of all births) on the SDT measures. These analyses also failed to demonstrate support for SDT theory.

In sum, our results demonstrate striking consistency with the tenets of gender equity theory and its recent theoretical and empirical elaboration by leading social demographers. Further work

might pursue SDT's hypothesized link between individualism and the rise of new family formation patterns, hopefully at a disaggregated level. Such research may fruitfully complicate our understanding of the relationships between individual self-actualization, gender egalitarianism, and family formation in the 21st century.

**Table 1**. Descriptive Statistics

| Variable | Description | Mean (S.D.) | MIN | MAX |
|---|---|---|---|---|
| TFR | Period total fertility rate | 1.594 (.289) | 1.08 | 2.31 |
| *adj*TFR | Tempo-adjusted TFR | 1.812 (.262) | 1.30 | 2.92 |
| GDP | GDP per capita (constant 2010 US $) | 27,947 (17,924) | 3,782 | 90,917 |
| EMP_M | Unemployment rate of young adult males (aged 25-29)[a] | .082 (.048) | 0 | .311 |
| LFP_F | Female labor force participation rate (aged 25-34) | 74.98 (9.44) | 31.9 | 93 |
| MAB | Mean age of women at childbirth | 28.38 (1.78) | 23.9 | 31.4 |
| POST-MATERIALISM | Inglehart's post-materialist index (4-item)[b] | 1.910 (.216) | 1.43 | 2.40 |
| GRA | Gender-egalitarian attitudes[c] | 1.588 (.129) | 1.12 | 1.82 |

[a] Ratio of the number of unemployed men aged 25-29 to the total male labor force in that age group.

[b] High values signify higher levels of post-materialist attitudes.

[c] High values signify more egalitarian gender-role attitudes.

**Table 2**. Multivariate Analysis of Total Fertility Rate: Fixed-Effects Model

| | Country fixed-effects model with time dummies & robust SE | | | |
|---|---|---|---|---|
| | Period total fertility rate (TFR) | | | |
| | Model 1 | Model 2 | Model 3 | Model 4 |
| *SDT and gender-role attitudes* | | | | |
| Post-materialism | -.064<br>(-0.59) | .002<br>(0.02) | _ | _ |
| Secularism | _ | _ | -.406*<br>(-2.60) | -.326*<br>(-2.31) |
| Familism | _ | _ | -.208<br>(-0.42) | -.225<br>(-0.51) |
| Gender-role egalitarianism | _ | -9.838***<br>(-5.83) | _ | -10.959***<br>(-5.22) |
| Gender-role egalitarianism$^2$ | _ | 3.004***<br>(5.25) | _ | 3.371***<br>(4.71) |
| *Control variables* | | | | |
| Logged GDP | -2.771<br>(-1.69) | -1.867<br>(-1.21) | -4.121**<br>(-2.85) | -2.819*<br>(-2.07) |
| Logged GDP$^2$ | .163+<br>(1.89) | .111<br>(1.39) | .238**<br>(3.09) | .171*<br>(2.37) |
| Unemployment rate of young adult males | -.790+<br>(-2.57) | -.632<br>(-1.43) | -1.448*<br>(-2.40) | -.772<br>(-1.42) |
| Female labor force participation rate | -.007<br>(-1.32) | -.001<br>(-0.15) | -.006<br>(-1.04) | .001<br>(0.16) |
| Mean age at first birth | -.025<br>(-0.51) | .007<br>(0.17) | -.021<br>(-0.43) | -.009<br>(-0.19) |
| Constant | 14.589+<br>(1.92) | 17.188*<br>(2.40) | 21.553**<br>(3.09) | 23.132**<br>(3.55) |
| Number of observations | 137 | 137 | 117 | 117 |
| Number of countries | 34 | 34 | 34 | 34 |
| Time period | 1990~2013 | 1990~2013 | 1990~2013 | 1990~2013 |
| $R^2$ (within) | 0.401 | 0.533 | 0.478 | 0.593 |

*Note*: T-statistics are presented in parentheses. + $p<0.10$; * $p<0.05$; ** $p<0.01$; *** $p<0.001$
Country-specific dummies for each five-year period are included to control for the time effect; for simplicity, these coefficients are not shown here.

**Table 3**. Multivariate Analysis of Tempo-Adjusted Total Fertility Rate: Fixed-Effects Model

| | Country fixed-effects model with time dummies & robust SE | | | |
|---|---|---|---|---|
| | Tempo-adjusted TFR (*adj*TFR)[a] | | | |
| | Model 5 | Model 6 | Model 7 | Model 8 |
| *SDT and gender-role attitudes* | | | | |
| Post-materialism | -.148<br>(-1.51) | -.117<br>(-1.15) | _ | _ |
| Secularism | _ | _ | -.129<br>(-0.92) | -.118<br>(-0.85) |
| Familism | _ | _ | .384<br>(1.16) | .459<br>(1.34) |
| Gender egalitarianism | _ | -3.603*<br>(-2.71) | _ | -2.735*<br>(-1.80) |
| Gender egalitarianism$^2$ | _ | 1.090*<br>(2.34) | _ | .810+<br>(1.51) |
| *Control variables* | | | | |
| Logged GDP[b] | .155<br>(1.26) | .164<br>(1.43) | .355<br>(2.06) | .382<br>(2.27) |
| Unemployment rate of young adult males | .139<br>(0.38) | .222<br>(0.58) | -.046<br>(-0.09) | .147<br>(0.26) |
| Female labor force participation rate | -.008*<br>(-2.16) | -.007*<br>(-2.34) | -.008+<br>(-1.85) | -.007+<br>(-1.73) |
| Constant | 1.288*<br>(1.05) | 3.995*<br>(2.65) | -.989<br>(-0.56) | .849<br>(0.46) |
| Number of observations | 104 | 104 | 90 | 90 |
| Number of countries | 26 | 26 | 26 | 26 |
| Time period | 1990~2013 | 1990~2013 | 1990~2013 | 1990~2013 |
| $R^2$ (within) | 0.396 | 0.431 | 0.482 | 0.499 |

*Note*: T-statistics are presented in parentheses. + $p<0.10$; * $p<0.05$; ** $p<0.01$; *** $p<0.001$
Country-specific dummies for each five-year period are included to control for the time effect.

[a] The tempo-adjusted TFR is computed using the Bongaarts & Feeney formula (1998).
[b] A quadratic term is not fitted here because the relationship between GDP and *adj*TFR was found to be linear.

**Table 4**. Relative Explanatory Power of Post-Materialism and Gender-Role Attitudes: Total Fertility Rate Trends in 34 Countries

| | Country fixed-effects model with time dummies & robust SE | | | |
|---|---|---|---|---|
| | Period total fertility rate (TFR) | | | |
| | Model 9 | Model 10 | Model 11 | Model 12 |
| *Net time trend* | | | | |
| (1990-1993) | -- | -- | -- | -- |
| 1994-1998 | -.212** | -.214** | -.238*** | -.238*** |
| | (-3.62) | (-3.61) | (-5.20) | (-5.17) |
| 1999-2003 | -.263*** | -.266*** | -.245*** | -.246*** |
| | (-5.20) | (-5.23) | (-5.38) | (-5.40) |
| 2004-2008 | -.167** | -.174** | -.146** | -.147** |
| | (-2.95) | (-3.03) | (-2.80) | (-2.77) |
| 2009-2013 | -.134* | -.134* | -.099+ | -.102+ |
| | (-2.41) | (-2.53) | (-2.07) | (-2.00) |
| *SDT and gender-role attitudes* | | | | |
| Post-materialism | _ | -.102 | _ | -.020 |
| | | (-1.00) | | (-0.19) |
| Gender egalitarianism | _ | _ | -11.124*** | -11.115*** |
| | | | (-7.48) | (-7.51) |
| Gender egalitarianism$^2$ | _ | _ | 3.449*** | 3.448*** |
| | | | (6.85) | (6.89) |
| Constant | 1.746*** | 1.944*** | 10.651*** | 10.678*** |
| | (44.32) | (9.44) | (9.60) | (9.57) |
| Number of observations | 137 | 137 | 137 | 137 |
| Number of countries | 34 | 34 | 34 | 34 |
| $R^2$ (within) | 0.301 | 0.305 | 0.479 | 0.479 |

*Note*: T-statistics are presented in parentheses. + $p<0.10$; * $p<0.05$; ** $p<0.01$; *** $p<0.001$

**Figure 1**. Trends in Total Fertility Rates in 34 Industrial and Postindustrial Countries, by Region: 1990-2013

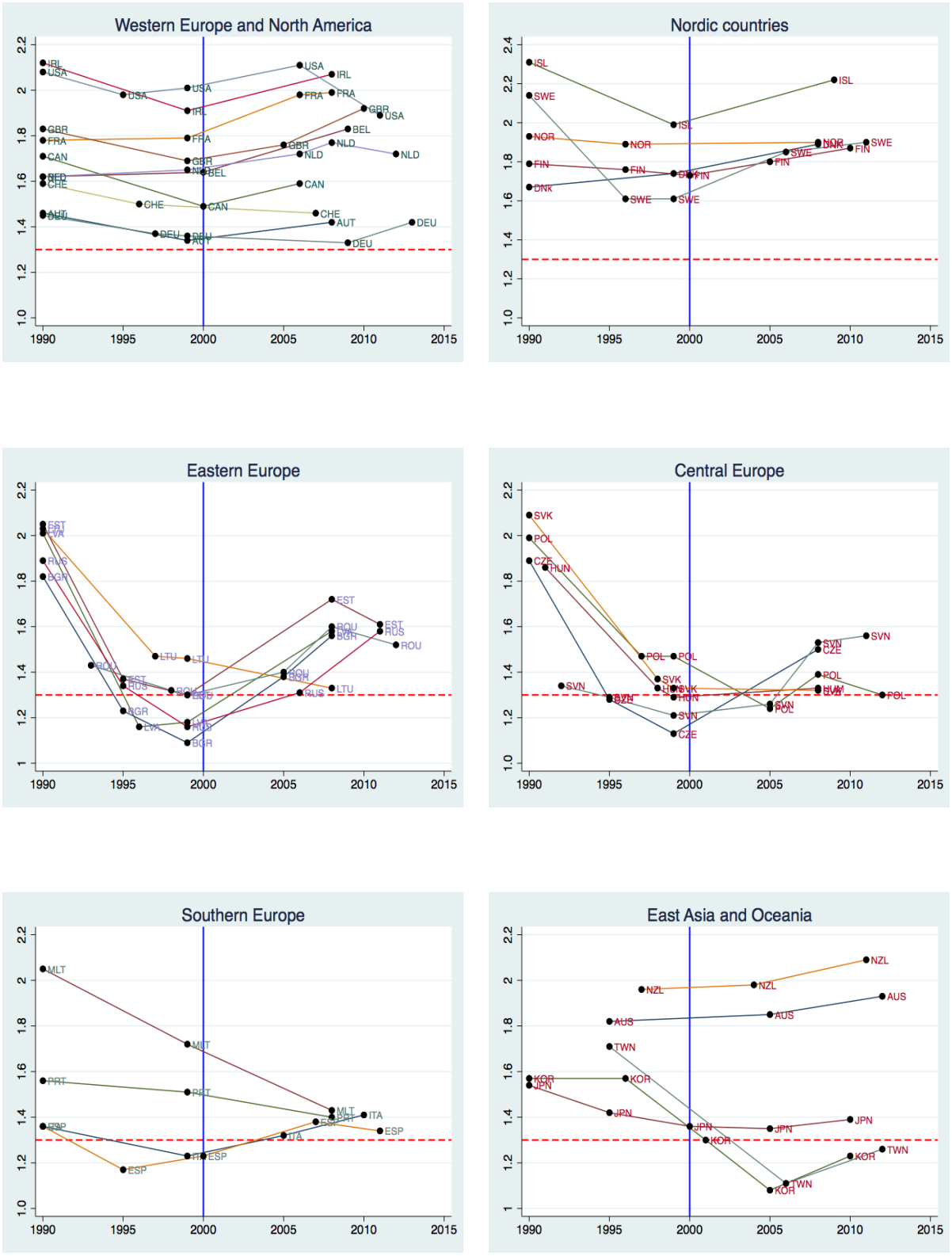
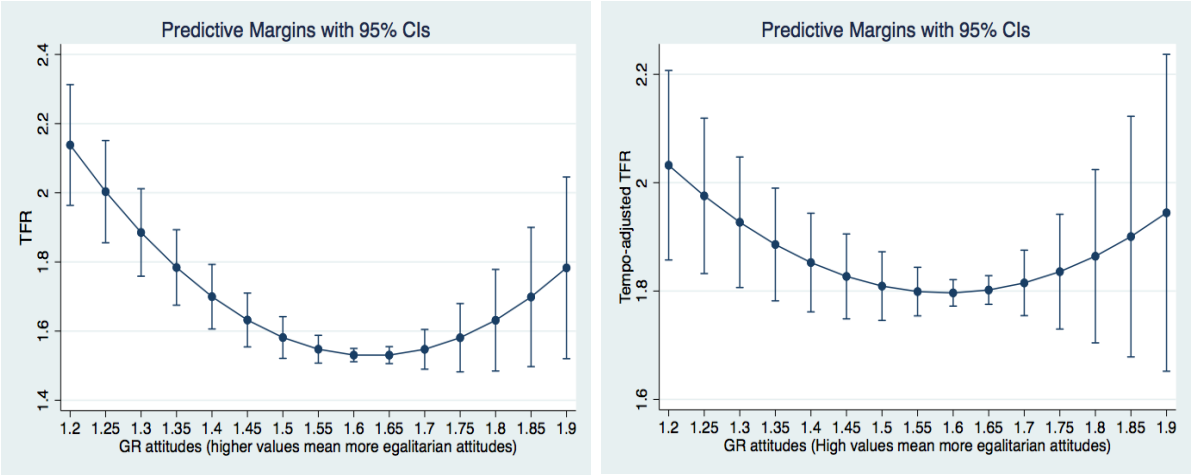


**Figure 2.** Predicted Relationship between Gender-Egalitarian Attitudes and TFR and *adj*TFR




TFR *adj*TFR

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