DemoSoc Working Paper

Paper Number 2013--51

Changes in Gender Role Attitudes and Fertility: A Macro-Level Analysis

Bruno Arpino, Gøsta Esping-Andersen, Léa Pessin

E-mails:
bruno.arpino@upf.edu;
gosta.esping@upf.edu;
lea.pessin@upf.edu

September 2013

Department of Political & Social Sciences
Universitat Pompeu Fabra
Ramon Trias Fargas, 25-27
08005 Barcelona
http://sociodemo.upf.edu/

DemoSoc Working Paper

Abstract

This study explores whether changes in fertility rates are associated with the diffusion of gender-equitable attitudes. We argue that any positive effect on fertility requires not only that the level of gender-equitable attitudes must be high overall, but also that they are similar for men and women. Our analyses are based on a sample of twenty-seven countries using data from the World Values Surveys and European Values Studies. We find support for a U-shaped relationship between changes in gender role attitudes and fertility: an initial drop in fertility is observed as countries move from a traditional to a more gender symmetric model. Beyond a certain threshold, additional increases in gender egalitarianism become positively associated with fertility. This non-linear relationship is moderated by the difference in attitudes between men and women: when there is more agreement, changes are more rapid and the effect of gender egalitarian attitudes on fertility is stronger.

Acknowledgements

The work has benefited from useful discussions with Arnstein Aassve, Tomas Sobotka, Agnese Vitali, the Demosoc Research Unit, participants at the PAA conference 2013 in New Orleans and at the Family and Fertily Choices conference in Oslo. Gøsta Esping-Andersen gratefully acknowledges financial support from the European Research Council under the European Union's Seventh Framework Programme through the advanced grant FP7-IDEAS-ERC/n°269387 “Family Polarization”.

The second half of the twenty-first century was characterized by major demographic shifts. All developed countries experienced a decline in marriages accompanied by a rise in divorce and cohabitation. Moreover, fertility rates dropped to historically low-levels. However, in a number of countries we now observe a reversal. The Nordic and Anglo-Saxon countries have returned to fertility levels around replacement, whereas Eastern European and Mediterranean countries suffer from seemingly persistent "lowest-low" fertility rates, i.e with TFR's below 1.3 (Billari and Kohler 2004; Kohler, Billari, and Ortega 2002).

Lesthaeghe (1998; 2010) and Van de Kaa (2001) promote a post-modern interpretation of "the second demographic transition" (SDT). They argue that falling marriage rates, more unstable partnerships, and fewer children all represent the emergence of values that promote individualistic life-style orientations, identity-seeking, and self-realization over long-term binding commitments, religiosity, or abidance with conventional norms. Interestingly, the thesis ends up predicting a scenario that echos Becker's (1991; 1993), namely a sustained trend towards 'less family' in general, and fewer children in particular.

Becker's theory predicts that parental child investments will increasingly favour quality as the returns to skills and education increase (Becker and Lewis 1973). It would, more generally, predict a long-term decline in fertility as women gain more human capital and pursue careers. And yet, recent fertility trends seem to contradict the theory since the relationship between levels of female employment and fertility has been reversed. It was negative in the 1960s-1970s but has now turned positive (Ahn and Mira 2002; OECD, 2011). This evidence is consistent with the literature documenting the increase in the TFR for the period 1998-2008 in a majority of European countries (Bongaarts and Sobotka 2012; Goldstein, Sobotka, and Jasilioniene 2009) and also for non-European English-Speaking countries (for example, U.S., Canada, Australia) (World Bank 2010). Indeed, fertility rates have recovered the most in those countries, like France, the Scandinavian, or the US, where female employment has become the norm.

As with Becker's economic theory, recent trends also seem to contradict the postmodernism theory. On almost all key family markers we see a reversal of the 'less family' scenario. This is especially evident in those same societies that spearheaded the post-modern transition to begin with, especially in North America and Scandinavia, where fertility has recovered over the past decades. In contrast, the latecomer nations like Italy, Poland or Spain are now the prototypes of a 'less family' trend.

Chesnais (1996) suggested that fertility levels seem to be positively associated with gender egalitarianism and policies that help reconcile careers with motherhood – although he emphasized that this holds only for the advanced nations. McDonald (2000a, 2000b, 2006) has developed this idea further: we should expect exceptionally low fertility rates where women's roles have changed but where institutions and partnerships have not yet adapted. Clearly, women have made decisive gains both in education and employment. And yet, as Badgett and Folbre (1999) argue, traditional gender-role norms may easily be reproduced by occupational segregation which mirrors the traditional division of labour in the home. Perales and Vidal (2013) find that in regions with prevailing traditional gender-role attitudes occupational sex segregation is more evident.

McDonald argues that the re-alignment of family life and institutions to the new economic role of women is a necessary condition for fertility to rise (2000a, 2000b, 2006). Once societal institutions (especially the welfare state and labour markets) and couples (more gender symmetric relations) adapt themselves to women's new life course preferences, we should see the emergence of a novel and more equitable family model. This, in turn, should stabilize partnerships and induce more fertility (Esping-Andersen and Billari, 2012).

In this article, we explore whether gender role attitudes (focusing on attitudes regarding female employment) are associated with fertility trends within countries. Our core hypothesis is that social environments with a pervasive degree of gender egalitarianism should promote the reconciliation of motherhood and careers. Inspired by gender equity theories (McDonald 2000a, 2000b, 2006; Esping-Andersen and Billari, 2012), we argue that to be positively associated with fertility, gender egalitarianism must not only be strongly present overall, but also similarly diffused among women and men. Our empirical analysis is based on a sample of twenty-seven countries - observed in 1990, 2000 and 2009 - using data from the World Values Surveys and European Values Studies, which allow us to identify degrees of adherence to traditional and egalitarian gender-role norms. We find evidence in support of a U-shaped relationship between changes in gender role attitudes and fertility within countries, which is moderated by the difference in attitudes between men and women.

Alternative explanations of TFR trends

Macro-level fertility research has centred its attention on three types of explanations: structural factors, institutions, and value changes (for a review of the literature see Balbo, Billari, and Mills, 2013).

A number of studies focus primarily on macro-economic conditions. As Balbo, Billari, and Mills (2013) suggest there is no clear association between GDP and TFR. But a different picture emerges with broader measures of socio-economic development, such as the Human Development Index (HDI). Myrskylä, Kohler, and Billari (2009) show that, for a great majority of countries there is a reversal, from negative to positive, in the relationship between the HDI and TFR as countries reach very high HDI levels. Other studies have focused on particular dimensions of the economy, especially on unemployment and female labour force participation (FLP) rates. There is a clear and consistently negative effect of unemployment rates on fertility (see for example Örsal and Goldstein 2010). However, just as for the HDI, also FLP exhibits a U-shaped relationship with fertility: we observe high fertility in countries with either very low or very high rates of female employment (Ahn and Mira 2002; Luci and Thévenon 2010). Brewster and Rindfuss (2000) point to the fact that the *relative* positions of most countries with respect to FLP have changed little. To exemplify, Scandinavian and U.S. participation rates were substantially higher than Italy's or Spain's in the 1970's. But both groups of countries experienced a similar increase in female participation thereafter (around 15 percentage points). In the former countries, fertility rose, in the latter it declined by more than 1 child per woman.

This simple comparison suggests that, in some countries, women encounter ways to combine work and childbearing, and in others not. Where they have not, as in the

Mediterranean countries, fertility has declined substantially. Thus, to understand the fertility-employment relationship one must consider the social, economic, and policy contexts within which women make their work and fertility decisions.

Institutional differences and welfare state characteristics have been widely used to explain fertility rates. Contradictory findings characterize the empirical literature on the effect of specific policies on fertility (Gauthier 2007), also because countries usually combine a "package" of policies that may affect fertility decisions (Thévenon, 2011). A key issue here is the extent to which family and labour market policies facilitate reconciliation of motherhood and careers (Castles, 2003) and, more generally, the degree to which policies help 'de-familialize' household responsibilities and dependencies (Esping-Andersen 1990; Esping-Andersen 1999; Sleebos 2003; Saraceno 2010). The Nordic welfare state model externalizes family caring burdens while, in the Anglo-Saxon liberal-market regime this is primarily relegated to private markets. Most Continental and Southern European welfare states still expect that caring responsibilities are family obligations. Saraceno (2010) finds that the Southern and Eastern European countries have the lowest levels of de-familialization and, as expected, Denmark the highest. When held against prevailing fertility levels one notices a `family paradox': the relationship between more children and family ties is inverted (Dalla Zuanna 2001; Livi-Bacci 2001; Reher 1998). Countries characterized by weaker family ties – such as the Scandinavian and Anglo-Saxon countries – have higher fertility rates compared to countries where family dependencies are strong. As Aassve, Billari, and Pessin (2012) suggest, the market solution favoured in the Liberal regimes seems to promote fertility.

A third set of macro-level explanations relate to value and attitude changes. As mentioned previously, the post-modernist Second Demographic Transition thesis argues that the prioritization of individualism and self-realization weakens family commitments (Lesthaeghe 2010). Under such conditions, individuals will postpone or even forego marriage and childbearing, and partnerships are likely to be more unstable. Empirically, there is a broad consensus on the association between the SDT and fertility postponement (Bernhardt and Goldscheider 2006; Liefbroer 2005; Surkyn and Lesthaeghe 2004). But there seems to be little empirical support for the thesis when the actual quantum of fertility is considered. Indeed, the recent move towards 'more family' observed in the most 'post-modernist' countries contradicts the argument. For example, Arpino and Tavares (2013) show that in the last decade the greatest increases in TFR in Europe occurred in regions where individualism with respect to relationships and individual autonomy rose in tandem with diminished individualism regarding children. Their findings also support McDonald's theory (2000a, 2000b) that gender equity in social institutions (i.e. education and labour markets) as well as within partnerships is necessary for fertility to rise. Similarly, Myrskylä, Billari, and Kohler (2011) show that gender equality[1] is a necessary condition for the reversal in the relationship between fertility and high degrees of socio-economic development. This is also consistent with the idea that societies may move into a superior fertility equilibrium once they manage to effectively reconcile motherhood with female labour force participation.

Gender equality, gender equity and fertility

[1]In Myrskylä, Billari, and Kohler (2011), gender equality is measured using the Gender Gap Index (GGI), which is measured by comparing outcomes between men and women in terms of education, labour market participation, political participation and health.

In Gender Equity theory (Fraser 1994; McDonald 2000b, 2013), gender equality and gender equity are defined as two distinct concepts. On the one hand, gender equality measures how outcomes in different domains (i.e. education, labour market, health, etc.) differ between men and women. On the other hand, "gender equity is about perceptions of fairness and opportunity rather than strict equality of outcome" (McDonald 2013, p. 983). As regards fertility, gender equity is considered more relevant than gender equality. Nevertheless, as highlighted by both Mills (2010) and McDonald (2013), gender equity is difficult to measure at the societal level; in fact, measures of gender equality are often used as a surrogate.

Various studies explore the relationship between fertility and gender equity within the household. The idea is that for women to participate in the labour market and also have children, their partners must contribute to domestic work and childrearing. There is some empirical evidence that an equitable division of labour in the household promotes higher fertility intentions and birth parity progression (Cooke 2008; Neyer, Lappegård, and Vignoli 2013; Oláh 2003; Torr and Short 2004). Conversely, when women carry the double burden of domestic and paid work, they tend to have lower fertility intentions (Mills et al. 2008). Also taking a micro-macro approach, Mills (2010) shows that the GDI (Gender-related Development Index) is positively and significantly associated with stronger fertility intentions at the individual level. Mills illustrates how the societal context of gender equality also matters for fertility. Still, as pointed out by McDonald (2013), GDI is not a measure of gender equity but rather of gender equality.

Following McDonald's (2013) equity definition, we focus on what are the 'perceived' proper gender norms rather than on gendered outcomes. In this way, we should be able to capture the by-product of both preferences and perceived constraints regarding gender roles in the workforce. For instance, if we look at indicators of gender equality in the labour force, post-Soviet countries in the 1990s – such as the Balkan countries – reached levels of female participation similar to the Nordic countries of about 70% (World Bank 2010). In terms of outcomes, we could classify these countries as fairly egalitarian. However, in terms of our measures of gender equity, these countries in the 1990s displayed quite traditional gender role attitudes.

Esping-Andersen (2009) expects fertility to be lowest in the early stages of transition from a traditional to a `gender-equality' family model. But once this transition is completed and a new equilibrium is achieved, higher fertility levels are expected. We focus on the societal normative dimension of Esping-Andersen's 'multi-equilibrium' framework – namely, what are the established social norms with respect to gender roles. As Lesthaeghe and Surkyn (1988) argue "although norms do not directly determine behaviour, they frame how households resolve conflicting views and deal with economic constraints, and therefore constitute a salient factor influencing fertility".

First we provide evidence for the hypothesis that there is a non-linear relationship between gender-equitable attitudes and fertility. We then analyze how this is additionally influenced by the nature of its distribution focusing, as mentioned, on attitudinal differentials across the sexes. The idea is that a similar overall change in gender role attitudes might have a different meaning (and impact on fertility) according to their dispersion across gender groups. Changes in gender role attitudes are differently associated with fertility according to the stage in the transition from gender traditionalism to gender equity; also the way that a society experiences these changes

(with more or less agreement between men and women) can magnify or reduce their effects on fertility.

Our hypotheses are summarised in Figure 1. The idea of a U-shaped relationship between TFR and gender values over time and for a given country is directly taken from Esping-Andersen (2009) and Aassve, Billari, and Pessin (2012). In each panel of Figure 1, the intervals A, B and C represent different stages in the transition from traditional to equitable gender roles attitudes: A represents a society dominated by traditional gender role attitudes, B is intermediary, while C means that society has fully embraced equitable views towards gender roles. In the initial stage (A) of women's role revolution an increase in gender equity is expected to be negatively associated with TFR, while in the second stage this relationship is inverted. The three panels in Figure 1 represent three different curves for three hypothetical countries characterised by a different way of making the transition.

INSERT FIGURE 1 ABOUT HERE

Panels I, II and III represent a hypothetical country where the gender equity gap between men and women is, respectively, medium, low and high.[2] While a U-shaped relationship is expected in all countries, we argue that the transition is characterised by a steeper curve for countries where there is more agreement across gender (panel II). For example, in the first stage of the transition the effect of an increase in gender equity on TFR is stronger in a country with a small gap between men and women.

Data and methods

Our analysis is based on data from the World Values Survey and the European Values Study. They consist of repeated cross-sectional individual-level surveys, which are conducted approximately every ten years (five years for some countries). The first wave was conducted in 1981 and the latest in 2008-2009. Both the countries and the questionnaires have changed over the years. We focus on advanced countries, excluding the first wave for lack of information on our Gender Equity indicator. To obtain a balanced data set, we use information on twenty-seven countries for the following three waves: 1990-1993, 1999-2000 and 2006-2009 (See Table A1 in the Appendix for a list of countries).

We focus on one expression of gender equity, namely views regarding the proper role of women in the labour market. Our measure is based on the following question[3]: "When jobs are scarce, men should have more right to a job than women". This question has been used in the literature to measure discriminatory attitudes towards working women as it measures whether respondents think that women are less deserving of employment (Azmat, Guell, and Manning 2006; Fortin 2005). Seguino (2007) used this question as one of her measures of "the degree of adherence to norms and stereotypes about the gender division of labour, gender power, and men's and women's relative rights of access to resources and opportunities". The question offers three possible answers: 1

[2] Of course, at the extremes of the gender equity distribution the gap between men and women is necessarily 0, but during the transition different configurations of the average level and gap between men and women are possible.

[3] The question corresponds to variable c001 in the dataset.

'agree', 2 'disagree' and 3 'neither'. We recode the variable into a binary response: 0 is 'agree' or 'neither' and 1 is 'disagree'. Those who score '1' are classified as having equitable views regarding working women. We limit our sample to respondents between age 14 and 50. The reason for this restriction is that we are interested in measuring values of respondents when they are more likely to be making their fertility decisions. As a first step towards empirical analysis, we construct a variable which measures the percentage of gender equitable respondents by country and by wave. From now on, we will refer to this measure as the Gender Equity[4] indicator:

$Gender\ Equity_{c,t}$ = *% gender equitable respondents in country c and in wave t.*

The Gender Equity indicator measures the percentage of gender equitable respondents by country and by wave. We interpret the aggregated attitudinal indicator as a measure of gender equity in the labour market. Since it is a binary variable, the percentage is also a measure of dispersion/concentration: the closer the percentage is to either 0 or 1, the more similar are the values within a country at a given point in time. However, for values different from 0 and 1 a same level of gender equity in two countries can correspond to different patterns of distribution among groups. So, to better analyse the diffusion of attitudes we also calculate the percentage of gender-equitable respondents by sex and compute the difference to obtain what we label the Gender Gap indicator:

$Gender\ Gap_{c,t}$ = *% gender equitable* $women_{c,t}$ - *% gender equitable* $men_{c,t}$.

The Gender Gap indicator measures the extent to which gender role attitudes converge across the sexes. In order to adjust for compositional differences across countries and waves, we replace the actual percent of gender equitable respondents by gender/country/wave with the predicted probabilities of being gender-equitable via a simple probit model where we control for age and education. Estimates from these models are used to obtain country/wave specific gender equity measures net of differences in age and educational distributions. The resulting levels and gaps will be referred to as "adjusted".

In a second step, we assess the association between fertility and gender equitable attitude dynamics. To measure fertility levels we use data on the Total Fertility Rate (TFR) taken from the World Bank's Indicators[5] for all countries with the exception of East and West Germany, for which we used the Human Fertility Database (HFD 2013).

We estimate the following panel model:

$$TFR_{c,t} = \beta_0 + \beta_1\, Gender\ Equity_{c,t} + \beta_2\, Gender\ Equity^2_{c,t} + \beta_3\, Gender\ Gap_{c,t} + \beta_4\, Gender\ Gap^2_{c,t} + \beta_5\, Gender\ Equity_{c,t}\, x\ Gender\ Gap_{c,t} + \beta_6\, Gender\ Equity^2_{c,t}\, x\ Gender\ Gap_{c,t} + \alpha_c + \varepsilon_{c,t},$$

where $TFR_{c,t}$ is TFR for country c and at time t, $Gender\ Equity_{c,t}$ is the measure of gender roles attitudes for country c and at time t, $Gender\ Gap_{c,t}$ is the difference between women's and men's gender role attitudes in country c and at time t, and α_c are

[4] For simplicity, we refer to gender equity or gender-equitable attitudes/respondents although we only measure one dimension of gender role attitudes – namely attitudes towards women in the labour market.
[5] TFR data comes from the World Bank Indicators through the STATA module *wbopendata* (Azevedo 2011).

country specific effects. Since we are interested in within-country dynamics in gender equity and TFR, we use country fixed effects instead of random effects. In this way we also avoid the implausible assumption that country-specific effects are uncorrelated with gender attitude dynamics. To test our hypotheses, the model allows for a non-linear effect of gender equity on TFR and for interaction effects between changes in gender equity levels and the gender gap.

Because the TFR can be subject to annual fluctuations, we take a three-year average of TFR around the corresponding survey year instead of the single annual value[6].

Dynamics of gender-equitable attitudes by gender

We start by describing Gender Equity levels and dynamics in the considered countries during the period 1990-2009. Complete information by country and wave on the variables Gender Equity, Gender Gap and TFR is available in table A1 in the appendix. We begin by illustrating the data graphically. Figure 2 shows the average (over waves) Gender Equity indicator by country. As expected, the Nordic countries score highest on Gender Equity with average values higher than 80%. The Anglo-Saxon and some Continental European countries (e.g., France) score somewhat lower, followed by Spain with an average value of 74%. Other Southern European and the German-speaking countries show much lower values and at the bottom of the distribution we find the majority of Eastern European countries with average values below 60%.

INSERT FIGURE 2 ABOUT HERE

Figure 3 shows the dynamics of the Gender Equity index for men and women separately for each country. The countries are sorted in increasing order according to the level of Gender Equity in the first wave of the survey. From Figure 3, it is evident that different patterns are observed: not only the average level at a given time point varies among countries, but also the way countries experience the transition toward an equitable model - in terms of agreement among men and women - is heterogeneous. We focus on two main characteristics: first, how the overall level of Gender Equity is shifting over time, second, whether the change is driven by only one or both genders.

INSERT FIGURE 3 ABOUT HERE

Starting from the top of Figure 3, we can identify countries that are observed in Stage A of Figure 1 – for which Gender Equity starts at a low level in the 1990s. This is where most of the Eastern-European countries are located. These countries have been moving from traditionalism towards a more gender-equitable society but are still characterised by comparatively low average levels of Gender Equity. Nevertheless, when examining the Gender Gap, we observe quite distinctive patterns. Taking some examples, in Bulgaria and Romania women scored higher on the Gender Equity index in 1990, but men have caught up by 2009. In other countries, women clearly outpace men and the Gender Gap is increasing rather than closing – this is the case in Lithuania, the Czech Republic and in Estonia.

[6] To exemplify, in the first wave Austria is surveyed in 1990, so we used the average of the TFRs of year 1989, 1990 and 1991.

Moving to the middle of Figure 3, we observe countries that seem to be transitioning between the traditional and equitable phases (stage B of Fig. 1). At this stage, we have a wider diversity of countries – mostly Continental, Mediterranean and a few Eastern European countries. In countries such as Belgium, Hungary, France, Slovenia and Spain, a steady diffusion of gender equitable attitudes can be observed – with a shift from stage B to C. While other countries – Italy, Portugal, East and West Germany, and Ireland – are changing at a slower pace. Regardless of the speed of change, gender differences in terms of attitudes are noticeable in some countries (e.g. East Germany and Spain) while inexistent in others (e.g. France and Belgium). Similarly to the countries starting in stage A, we observe that women are generally the vanguard of change.

In the bottom of Figure 3 we find the Nordic and Anglo-Saxon countries, all of which adhere to stage C already in the first wave. In Canada, Sweden, Iceland and Denmark gender equity was already widely diffused among the population in 1990 and, moreover, there were hardly any differences between women and men. These countries do not experience significant changes over the period. Indeed, it would seem that they have completed the transition toward a gender equitable society, with the exception of Canada where the level of Gender Equity stagnates around 80%. Finland and The Netherlands show lower percentages of gender equitable respondents in the early Nineties (78%, and 72%, respectively) but moved rapidly toward the completion of the gender role revolution. In The Netherlands, which reaches a similar average as Denmark in the third wave, interestingly, gender role attitudes have spread equally among women and men throughout the decades (the gap is always very close to 0). In contrast, the Gender Equity index in Finland increased more among women than among men (94% and 80%, respectively in the third wave). As a consequence, the Gender Gap widened from 6 to 14 percentage points.

The association between gender role attitudes and fertility

We use the panel model described above to test our overriding hypothesis: namely, that as countries move from a traditional to an equitable model, changes in gender attitudes and TFR are characterized by a U-shaped relationship; and a low gap between women and men makes the effect of changes in gender attitudes stronger. Parameter estimates, reported in Table A2 in the Appendix, are difficult to interpret given the non-linear terms and interactions involving continuous variables. To ease the interpretation of results, in Figure 4 we show predicted values of TFR corresponding to different dynamics of the Gender Equity index. In particular, in the left panel of Figure 4 we use estimates of Model 2 (see table A2 in the Appendix) where only Gender Equity and its squared value are included as covariates, and we predicted TFR values corresponding to changes in the level of Gender Equity from 50% to 95%.

INSERT FIGURE 4 ABOUT HERE

The predicted trajectory of TFR as Gender Equity moves from low to high levels is U-shaped and thus confirms our first hypothesis. The plotted U-shape corresponds, in fact, to a negative estimated coefficient for Gender Equity and a positive one for its squared term, as we can see in Table A2. Both coefficients are statistically significant and indicate that in our sample we observe a predominantly negative relationship between

changes in equitable attitudes and TFR (a negative coefficient for the linear term), but the relationship turns positive for high levels of Gender Equity. This happens around the 75%-level.

In the right panel of Figure 4 we used estimates from the full model (Model 6) which includes also the Gender Gap and its interaction with the Gender Equity index (i.e., the model we presented above). As for the Gender Gap we consider three scenarios: low, medium and high gaps between women and men. In calculating the predicted probabilities we keep constant the gap to show what is the effect of changes in attitudes (i.e., levels of Gender Equity) in different contexts (more or less agreement across genders). The three levels of the gap correspond to the three quartiles of Gender Gap in the pooled dataset (see Table 1).

The right panel of Figure 4 confirms our second hypothesis, which is that the effect of changes in attitudes on TFR is stronger the smaller is the Gender Gap. In the first stage of the transition from a traditional to an equitable society, the effect of an increase of Gender Equity on TFR is negative for all considered scenarios. But the effect is stronger in countries where women and men are more in agreement (low Gender Gap). In stage B, the moderator effect of the Gender Gap is almost absent. We observe again a strong interaction between Gender Gap and Gender Equity when the gender role revolution is mature (stage C). In fact, we observe a positive relationship between Gender Equity and TFR for countries with low and medium levels of the Gender Gap, with a stronger relationship for more homogeneous countries (low Gap). For a very high Gender Gap (15 percentage points) it seems that the relationship remains negative also for very high levels of Gender Equity. However, these results can be due to extrapolations over combinations of levels and gaps not observed in the data. In fact, for very high levels of Gender Equity and balanced gender distributions, it is almost impossible to observe levels of the Gender Gap as high as 15 percentage points or so. However, the fact that for very high levels of the gap the effect of increasing Gender Equity on TFR is strongly and persistently negative is consistent with the hypothesis that homogeneity of attitudes by gender is important in order to create favourable conditions for fertility.

The predicted TFR dynamic in Figure 4 refers to a hypothetical country that experiences a transition from low to high levels of Gender Equity while maintaining a constant Gender Gap. As we saw from the descriptive statistics in Figure 3, we are not able to observe any of the countries in the considered period doing the whole transition from stage A to C and not all the countries experience changes in Gender Equity while maintaining a constant Gender Gap. With the aim of interpreting dynamics closer to those that we are actually able to observe, in Figures 5 and 6 we consider predicted values of TFR for dynamics of Gender Equity and Gender Gap that resemble those of some selected countries that are observed in different stages of the transition in the first wave[7]. Figure 5 plots the predicted TFR corresponding to values of Gender Equity and Gender Gap observed for Poland, Italy and the Netherlands, which in the Nineties can be classified into the stages A, B and C, respectively. We can see that no country is observed in the whole range of the Gender Equity distribution and so for a specific country we cannot predict the U-shaped relationship. However, the relationship between TFR and Gender Equity predicted for each country is consistent with our first

[7]In Figure A1 in the Appendix, we report the predicted TFRs vs. the observed TFRs for each country using the country's Gender Equity and Gender Gap observations and Model 6 estimates.

hypothesis: if a country is in the stage A (as Poland) an increase in Gender Equity has negative effects on TFR, while for countries in stage C (as the Netherlands) Gender Equity and TFR variations are positively associated.

INSERT FIGURE 5 ABOUT HERE

Figure 6 compares pairs of countries with different average levels of Gender Gap observed in each of the stage of the transition toward a gender equitable society. In the left panel, the predicted TFR trajectories of Poland and Romania are plotted. Both countries are observed in stage A in the first wave and experience an increase in the Gender Equity index over the three observed waves. However, while in Poland the Gender Gap remains high (between 11 and 17 percentage points), in Romania the Gender Gap narrows from 15 to 3 percentage points in the last wave. We can notice that in Poland the relationship between TFR and Gender Equity remains negative, whereas in Romania the slope flattens as Gender Equity increases.

INSERT FIGURE 6 ABOUT HERE

In the central panel of Figure 6, we compare France and Spain, which are both initially observed in Stage B with starting Gender Equity levels of, respectively 65% and 70%. Equitable gender role attitudes spread at a faster rate in France than Spain. Also, in France, men and women share similar levels of Gender Equity while in Spain the increase in Gender Equity is led by women and as a consequence the Gender Gap widens between the 1990s and the last wave. When comparing both predicted trajectories of TFR, we can see that France experiences the transition from a negative to a positive effect of increasing levels of Gender Equity while for Spain it remains negative.

Finally, in the right panel of Figure 6, we compare two countries that in the first wave are already observed in Stage C, namely Finland and the Netherlands. In terms of Gender Equity, both countries follow similar trajectories increasing from levels of about 70% in the first wave and up to about 90% in the final wave. However, the Netherlands exhibit a low Gender Gap while in Finland it increases from 5 to 13 percentage points in the observed period. In fact, when looking at the predicted TFR trajectories, we can notice that in the Netherlands the relationship between TFR and Gender Equity is positive while in Finland the lack of agreement between men and women hinders the positive effect of Gender Equity on TFR.

Robustness checks

We employ several checks to assess the robustness of our final model (Table A2 – Model 6). First, we investigate whether the timing of fertility could affect our results. Second, we consider possible confounding variables such as the Human Development Indicator (HDI) and FLP. Finally, we assess the robustness of our results with regard to influential data points or any single country.

Ryder (1956, 1980) showed that TFR trends are affected by a tempo distortion as the timing of childbearing changes, and that this distortion depends on the pace of change in the mean age at childbearing. Several measures of period TFR that adjust for the tempo

effect have been proposed (see Bongaarts and Sobotka 2012 for an overview) but the TFR is the only behavioural measure of fertility available for a large number of countries and for many years (Myrskylä, Kohler, and Billari 2011). Unfortunately, tempo-adjusted TFRs are not available for all the countries and waves in our dataset.
Following a similar approach by Myrskylä, Kohler, and Billari (2011), we test whether our results are robust to tempo distortions by including in our final regressions different measures of the change in the mean age at childbearing around the survey year. In particular, we consider:

$\Delta 1MAB1(t) = [MAB1(t+1) - MAB1(t-1)] / 2;$
$\Delta 2MAB1(t) = [MAB1(t+2) - MAB1(t-2)] / 2;$
$\Delta 1MAB(t) = [MAB(t+1) - MAB(t-1)] / 2;$
$\Delta 2MAB(t) = [MAB(t+2) - MAB(t-2)] / 2.$

where *MAB1* and *MAB* represent the mean age at first birth[8] and mean age at childbearing, respectively. $\Delta 1MAB1(t)$ and $\Delta 2MAB1(t)$ measure the pace with which the mean age at first birth is increasing around year t. Similarly, for $\Delta 1MAB(t)$ and $\Delta 2MAB(t)$. The higher are these values, the more tempo-distorted would be the TFR. As expected, we find a negative association between these measures and TFR. Similarly to Goldstein, Sobotka, and Jasilioniene (2009) and Myrskylä, Kohler, and Billari (2011), we deduce that period fertility decreases in the presence of postponement. The results in the first four columns in Table A3 show that our estimates are fairly robust to the correction for tempo-effects. The estimated model coefficients are stable and usually they remain significant but in some cases to a lesser extent with respect to the initial model. In particular, the finding of a U-shaped relationship between Gender Equity and TFR remains unaltered in this robustness analyses (negative and positive effects of Gender Equity and its square, respectively, and statistically significant in both cases).

As a second robustness check, we assess whether the association between gender equitable values and the TFR might be confounded by other important macro-level determinants of fertility. In Table A3 we estimate regression models that include, separately, FLP and HDI[9] (columns 5 and 6 of Table A3, respectively). Both variables have been found to be strong predictors of fertility levels (see Myrskylä, Kohler, and Billari (2009) for HDI, and Balbo, Billari, and Mills (2013) for a review of the effect of FLP). We find that the non-linear relationship between Gender Equity and fertility is fairly robust and that the interaction between Gender Equity and the Gender Gap remains significant, although only at the 10% level.
Finally, we assess whether our preferred results are robust to influential data points or single countries. We estimate our selected model (Table A2 – Model 6) by excluding

[8] Data on mean age at first birth (MAB1) are based on the following sources: Human Fertility Database, Council of Europe, Eurostat, and national statistical offices. They were kindly provided by Tomas Sobotka (Vienna Institute of Demography). Data on mean age at childbearing (MAB) is taken from the GGP (2013) Contextual database, the Human Fertility database (HFD 2013), and Eurostat (2013).
[9] Data for the Human Development Indicator is taken from the UNDP (2013). Since the HDI is not available every year, we used the nearest available year when necessary. Also, in the 1990 UNDP report no data is available for Czech Republic, Poland and Slovenia. For these three cases, we used HDI values provided and calculated by Myrskylä, Kohler, and Billari (2009). We could not find HDI data for East and West Germany separately so we re-grouped the observations into a single country. We also re-run our model 6 (Table A2) with united Germany for comparison purposes. We observed that when Germany is treated as one country the results remain very similar.

one country at a time. Then we calculate DFBETA, leverage and Cook's D statistics for the final model. Based on these statistics, we identify one single observation (Lithuania, wave 1 – 1990) that looks like an outlier[10]. Excluding Lithuania or only the single observation for Lithuania does not substantially change the results.

Concluding remarks

Our study builds upon existing cultural and gendered explanations of fertility in advanced economies. Differently from previous studies, we construct an attitudinal indicator of Gender Equity which measures the country-level normative context with respect to women's participation in the labour market. We test empirically whether this expression of gender values is associated with aggregate country-level fertility trends in developed countries.

By and large, the analyses provide support for our hypotheses: both the level of Gender Equity and the homogeneity of its diffusion matters for fertility. We find evidence in support of a U-shaped relationship between changes in Gender Equity values and TFR: as countries start the transition from a traditional to a more gender symmetric partnership model, the diffusion of gender equitable attitudes has a negative impact on fertility until these attitudes are sufficiently spread in the society. Unsurprisingly, women seem everywhere to pioneer the diffusion of equitable views towards gender roles. In some countries men catch up quite rapidly but in others they remain well behind. The more women and men agree on equitable values, the more "dramatic" is the transition in the sense that its effects are more evident on fertility.

We conducted several checks to test whether the empirical findings are robust to fertility tempo distortions, confounding variables, and outliers. Throughout the empirical finding of a non-linear relationship between the level of Gender Equity and TFR is confirmed.

Our analyses have some important limitations. Firstly, we cannot observe the full transition from a traditional to a gender egalitarian equilibrium for the countries in our sample. Our observation window is limited to only a couple of decades. Hence, we can only speculate about trends in gender attitudes prior to the 1990s. However, to our knowledge, the World Values Survey and European Values Study provide the oldest source of data with a sample of countries large enough for cross-national analysis. As an alternative, the International Social Survey Program (ISSP) has a first rotating module in 1988 on gender but again very few countries are included in the survey for the first wave.

[10]Results are not shown for sake of brevity but are available upon request.

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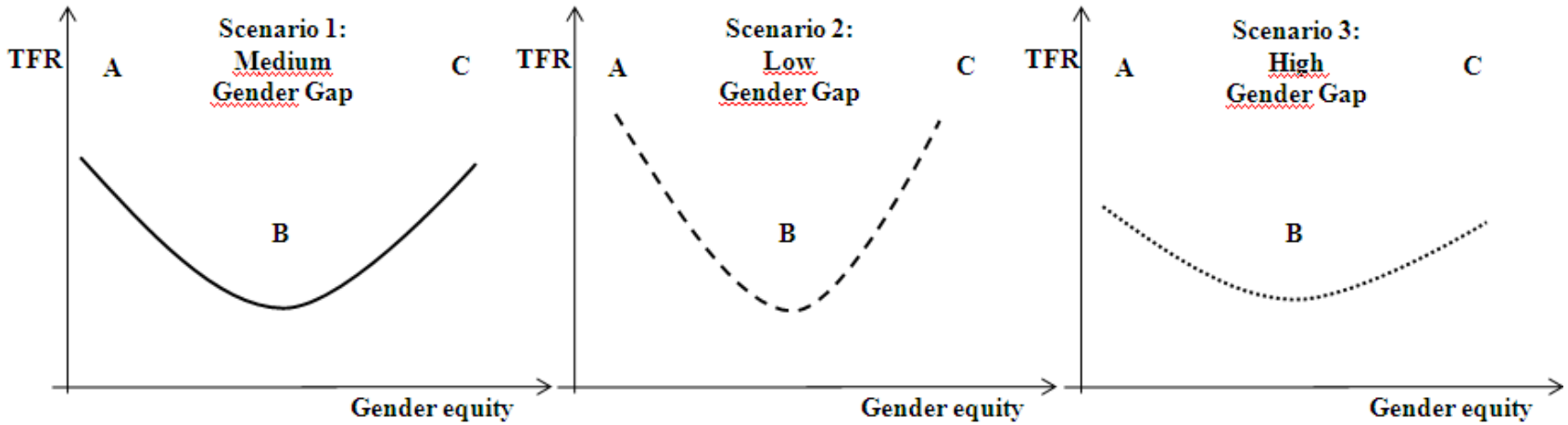
Tables

TABLE 1 – Mean, standard deviation, minimum, maximum, 1st quartile, median and 3rd quartile for Gender Equity and Gender Gap by wave and across all waves

	Mean	Std. dev.	Minimum	Maximum	1st quartile	Median	3rd quartile
Gender Equality							
Wave 90-93	63.28	16.57	25.96	94.16	50.71	65.07	71.87
Wave 99-00	73.69	12.73	52.53	95.14	64.39	72.99	84.46
Wave 06-09	77.84	12.84	56.45	98.02	66.36	75.79	88.68
Total	71.60	15.28	25.96	98.02	62.52	71.87	84.46
Gender Gap							
Wave 90-93	7.85	7.36	-4.36	25.04	2.55	5.82	13.39
Wave 99-00	10.02	7.22	0.57	29.32	5.37	7.52	13.99
Wave 06-09	10.77	8.68	-2.63	35.73	2.12	10.59	17.28
Total	9.55	7.78	-4.36	35.73	3.54	7.96	14.75

Figures

FIGURE 1 – Fertility and gender equity: three hypothetical dynamics according to the level of the Gender Gap



Note: the three scenarios differ for the level of Gender Gap (assumed to be constant): medium, low and high, respectively.

FIGURE 2 - Average level of Gender Equity by country and across waves

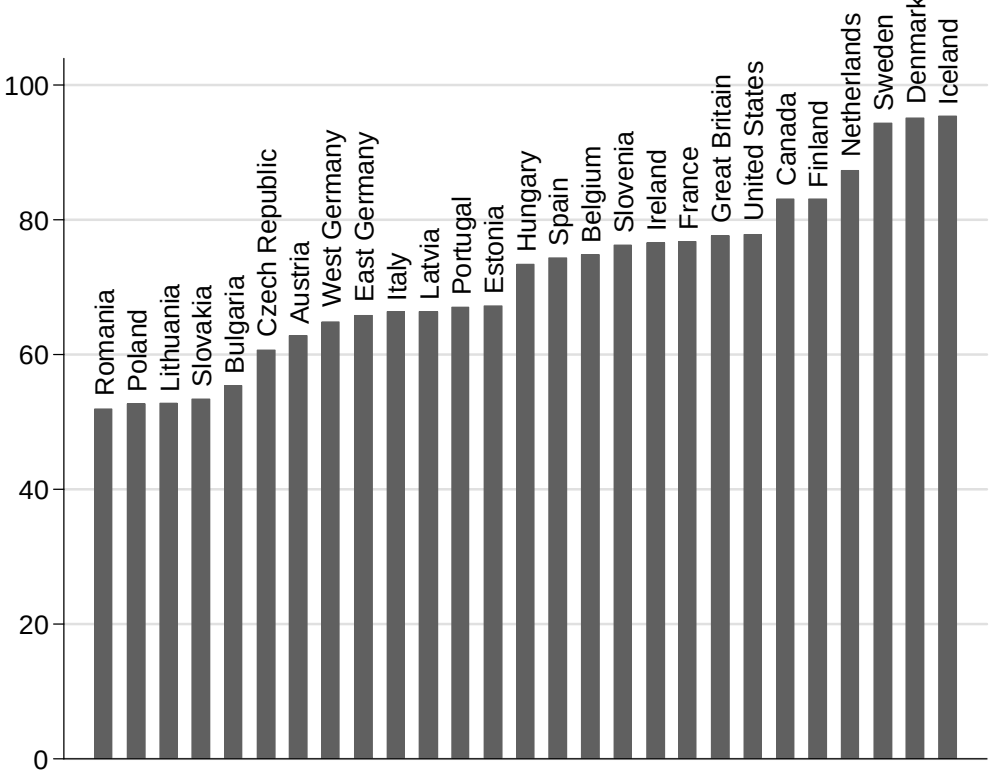
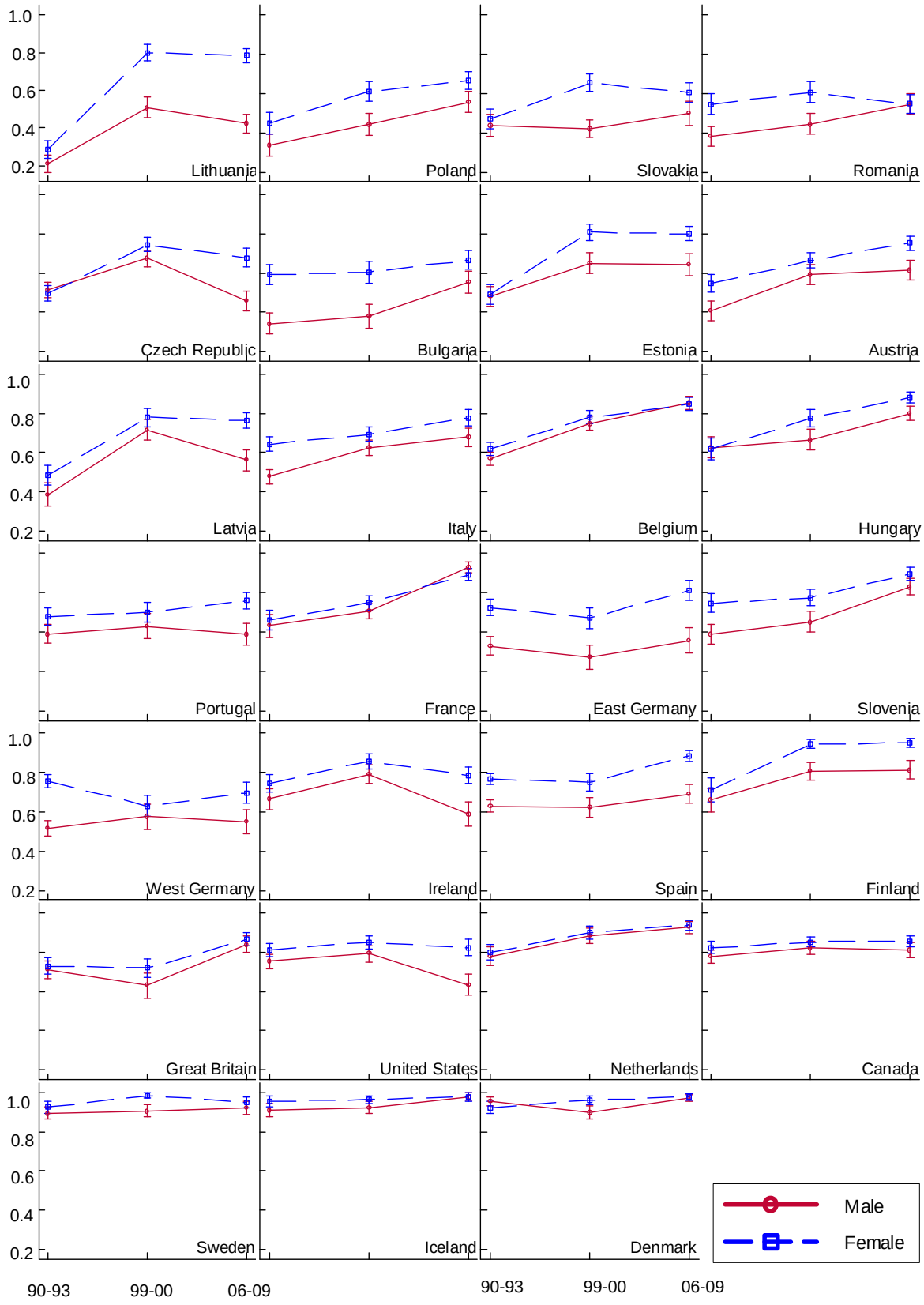
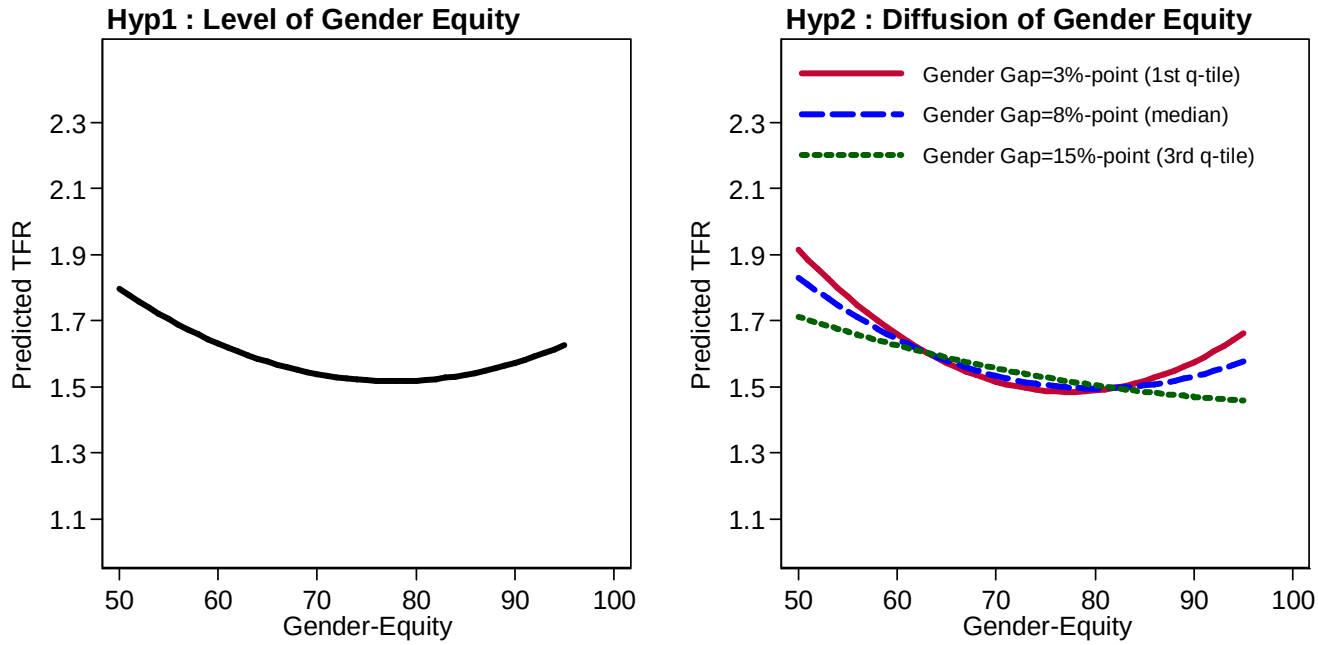


FIGURE 3 – Dynamics of adjusted Gender Equity index by gender for each country



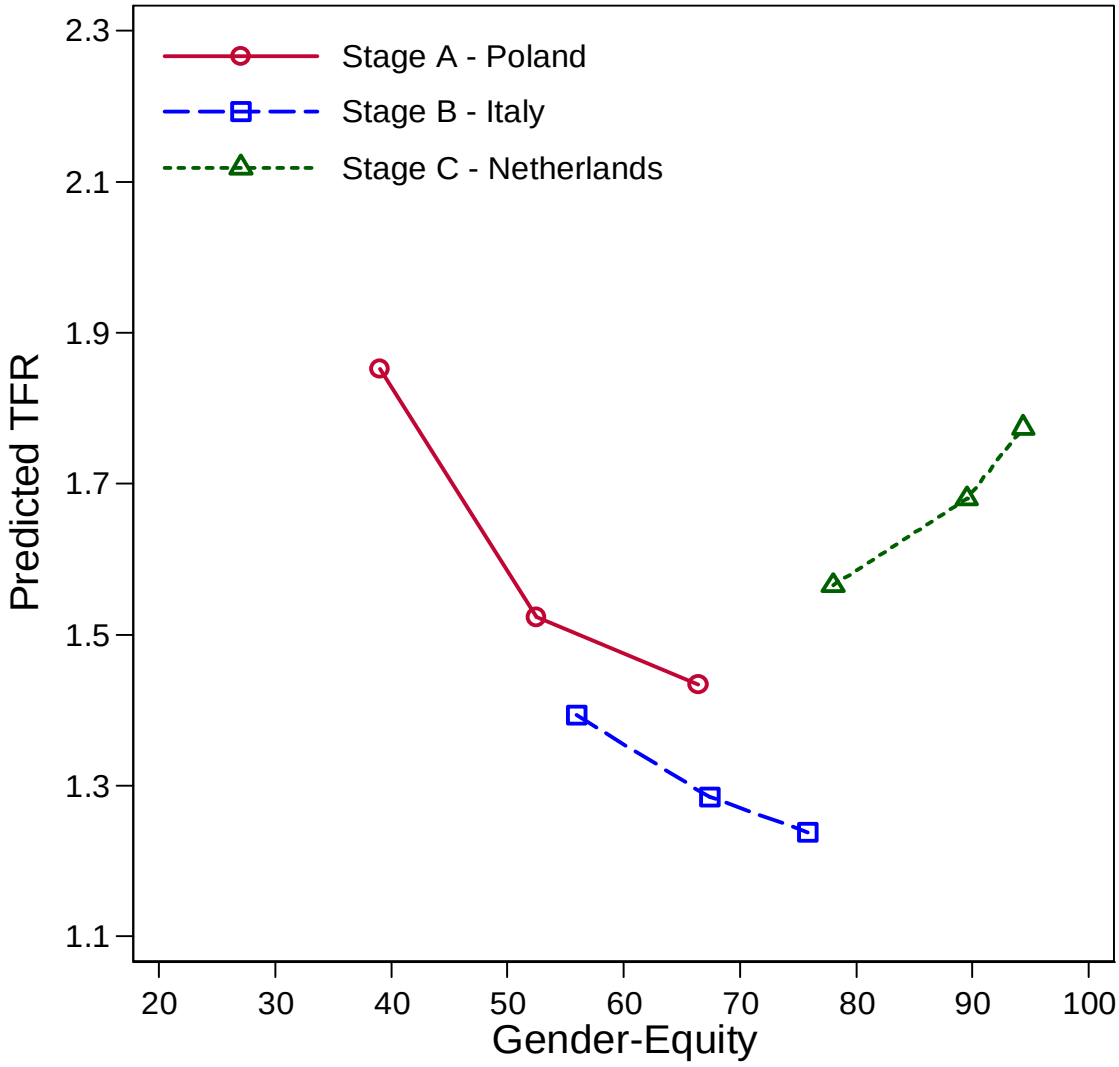
NOTE: Countries are placed in increasing order by the average value of Gender Equity in the first wave of our sample. The percentage of gender equitable men and women are referred to as adjusted because they are estimated using a probit model with controls for age and education.

FIGURE 4 – Predicted TFR based on *Gender Equity* dynamic (Model 2) and for three hypothetical scenarios for the *Gender Gap* (Model 6)



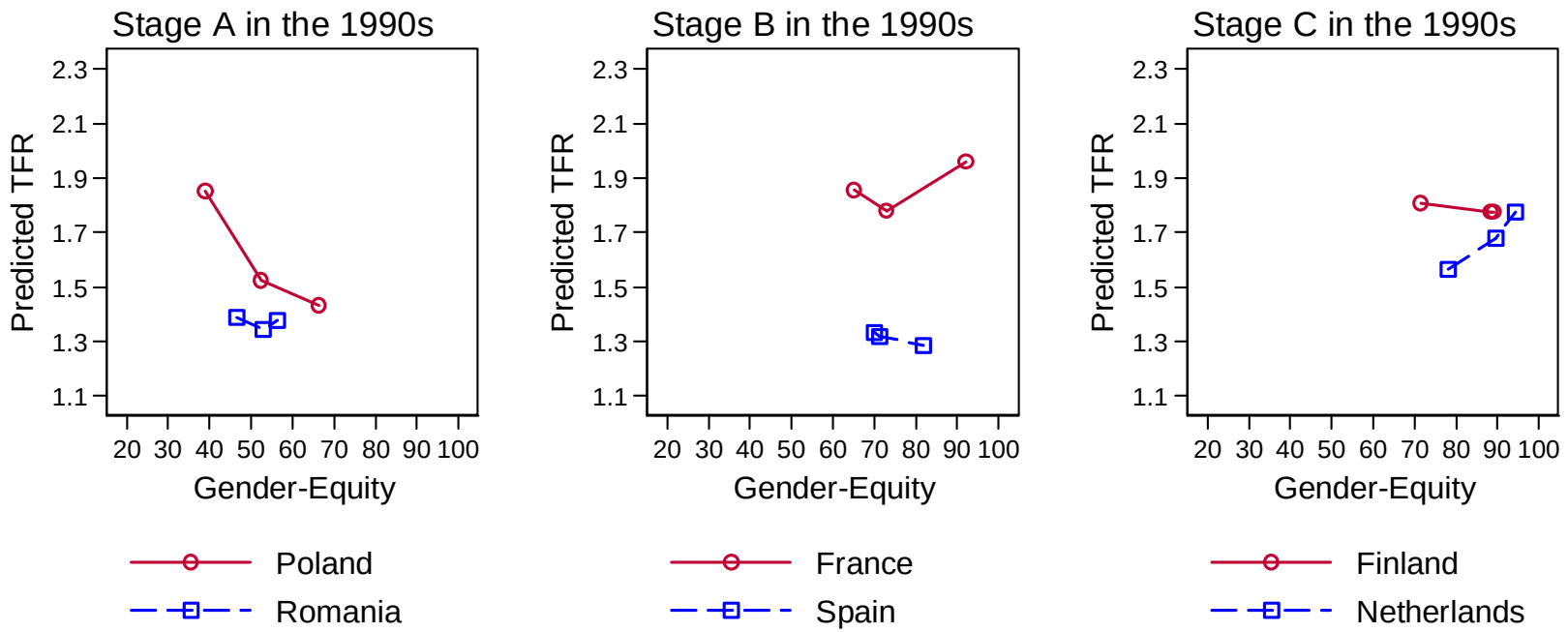
NOTE: The graphs are constructed using estimates of models 2 and 6, which can be found in Table A2 in the Appendix.

FIGURE 5 – Predicted TFR using *Gender Equity* and *Gender Gap* values of selected countries observed at different stages of the transition in the first wave



SOURCE: Own calculations from World Values Survey, European Values Study and World Bank Indicators.
NOTE: The values for Gender Equity and Gender Gap used for the predictions can be found in table A2 in the Appendix for each of the selected countries.

FIGURE 6 – Predicted TFR using Gender Equity and Gender Gap values of selected countries observed at different stages of the transition in the first wave



SOURCE: Own calculations from World Values Survey, European Values Study and World Bank Indicators.
NOTE: In each panel we represent a pair of countries corresponding to different patterns of Gender Gap: low (in blue) or high (in red). The values for Gender Equity and Gender Gap used for the predictions can be found in table A2 in the Appendix for each of the selected countries.

Appendix

TABLE A1 – Values of Gender Equity, Gender Gap and TFR, by waves, for the twenty-seven countries analyzed

	Wave 1990-1993			*Wave 1999-2000*			*Wave 2006-2009*		
	Gender Equity	**Gender Gap**	**TFR**	**Gender Equity**	**Gender Gap**	**TFR**	**Gender Equity**	**Gender Gap**	**TFR**
Austria	50.76	13.39	1.47	64.39	6.10	1.36	73.30	9.71	1.39
Belgium	59.13	4.75	1.59	78.50	2.81	1.63	86.79	0.18	1.85
Bulgaria	50.39	25.04	1.79	52.56	22.29	1.20	63.17	13.31	1.49
Canada	79.40	4.27	1.77	84.66	2.40	1.50	85.19	3.87	1.60
Czech Republic	48.81	-0.61	1.82	72.59	6.91	1.14	60.62	20.16	1.48
Denmark	94.16	-4.36	1.66	93.51	5.37	1.74	97.57	1.87	1.86
East Germany	65.61	17.11	1.36	59.70	21.37	1.17	72.17	21.15	1.40
Estonia	50.71	1.63	2.01	76.47	15.29	1.33	74.51	17.28	1.63
Finland	71.62	5.82	1.76	88.47	13.99	1.73	89.26	13.94	1.86
France	65.07	4.98	1.77	72.99	3.25	1.83	92.23	-2.63	2.00
Great Britain	71.87	1.15	1.82	74.06	7.41	1.68	86.93	1.52	1.95
Hungary	60.39	-2.19	1.82	73.76	8.31	1.31	86.02	7.70	1.33
Iceland	93.06	3.54	2.23	95.14	2.58	2.04	98.02	0.88	2.19
Ireland	69.43	9.11	2.10	84.46	7.52	1.91	75.86	15.48	2.06
Italy	55.92	14.41	1.27	67.42	7.96	1.23	75.79	10.02	1.41
Latvia	51.86	11.88	1.98	74.51	8.83	1.16	72.75	16.13	1.39
Lithuania	25.96	9.13	1.99	68.28	29.32	1.44	63.93	35.73	1.46
Netherlands	78.00	-1.48	1.59	89.53	0.57	1.67	94.38	0.92	1.76
Poland	39.02	11.07	2.06	52.53	17.07	1.39	66.36	12.30	1.37
Portugal	62.52	7.45	1.44	68.96	5.65	1.51	69.48	17.70	1.34
Romania	46.53	15.06	1.46	52.83	13.61	1.31	56.45	3.26	1.34
Slovakia	43.47	4.59	2.02	58.25	22.43	1.33	58.51	10.59	1.33
Slovenia	67.68	15.68	1.36	72.31	11.39	1.23	88.68	6.79	1.48
Spain	70.04	11.90	1.33	71.32	10.02	1.19	81.78	18.42	1.42
Sweden	91.10	2.55	2.09	94.88	7.12	1.51	97.19	2.12	1.94
United States	77.91	4.19	2.05	84.25	6.09	2.02	71.24	17.74	2.09
West Germany	68.14	21.85	1.43	63.18	4.74	1.42	63.41	14.75	1.37

TABLE A2 – Regression results of fixed effects models

Dependent variable: TFR	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Gender Equity	-0.00985 ***	-0.05686 ***		-0.00826 **	-0.00728 *	-0.10648 ***
	(0.00261)	(0.01168)		(0.00258)	(0.00361)	(0.02866)
Gender Equity^2		0.00037 ***				0.00070 ***
		(0.00009)				(0.00020)
Gender Gap			-0.01440 **	-0.01085 *	-0.00230	-0.20979 *
			(0.00462)	(0.00441)	(0.02236)	(0.09425)
Gender Equity x Gender Gap					-0.00013	0.00589 *
					(0.00033)	(0.00274)
Gender Equity^2 x Gender Gap						-0.00004 *
						(0.00002)
Constant	2.02436 ***	3.50182 ***	1.54567 ***	2.02985 ***	1.96210 ***	5.34598 ***
	(0.19855)	(0.39995)	(0.12439)	(0.18970)	(0.25831)	(1.01732)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	81	81	81	81	81	81
Adjusted R-sq	0.56421	0.66449	0.53265	0.60224	0.59565	0.68466

NOTE: Standard errors in parenthesis; + p<0.10 * p<0.05 ** p<0.01 *** p<0.001.

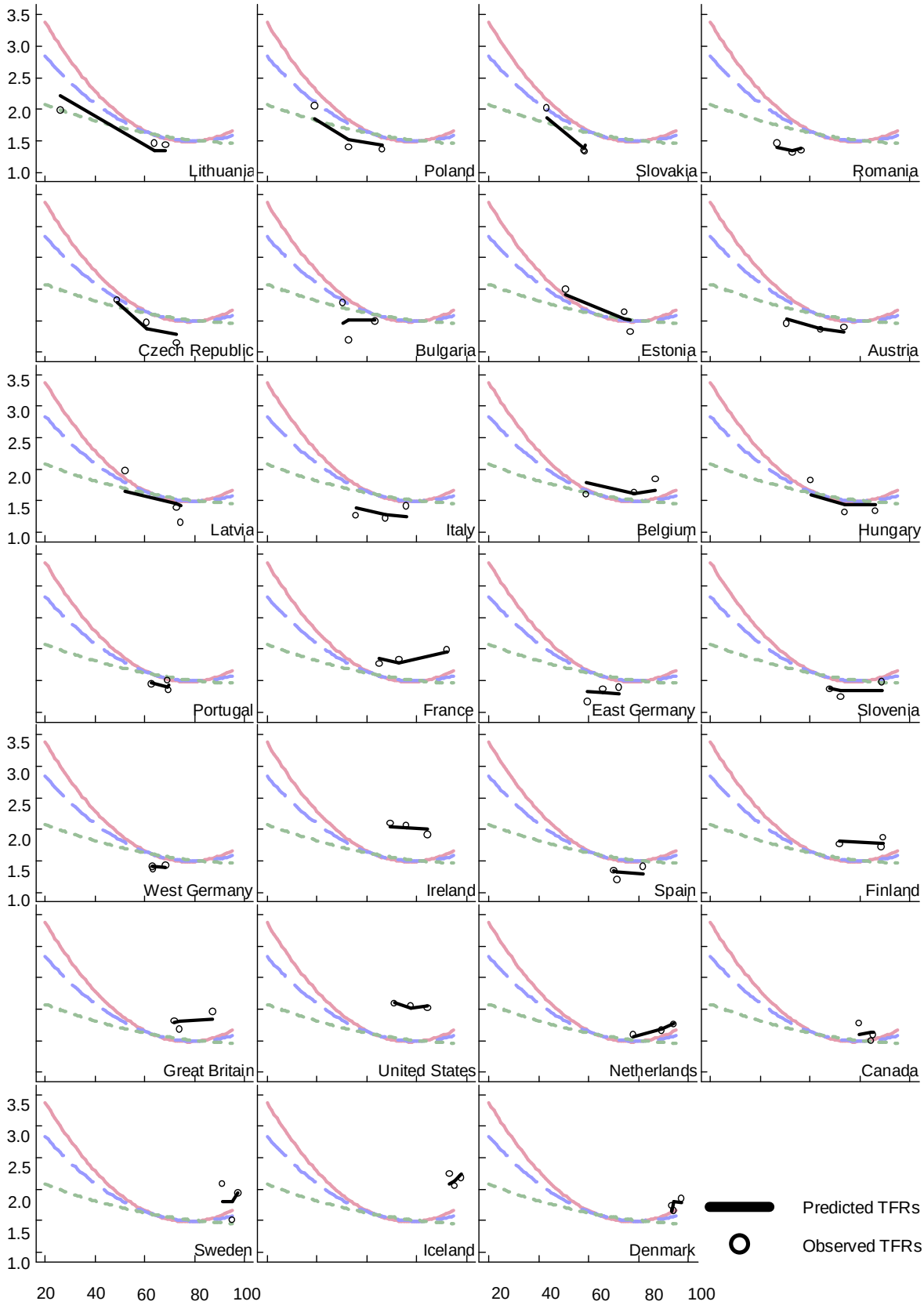
TABLE A3 – Robustness checks of fixed effects model

Dependent variable: TFR	**(1)**		**(2)**		**(3)**		**(4)**		**(5)**		**(6)**	
Gender Equity	-0.06546	*	-0.05774	*	-0.07049	**	-0.06763	*	-0.07558	**	-0.10644	**
	(0.02816)		(0.02619)		(0.02557)		(0.02684)		(0.02793)		(0.03208)	
Gender Equity^2	0.00044	*	0.00039	*	0.00047	**	0.00044	*	0.00046	*	0.00070	**
	(0.00019)		(0.00018)		(0.00017)		(0.00018)		(0.00019)		(0.00023)	
Gender Gap	-0.12967		-0.13541	+	-0.16914	*	-0.18965	*	-0.15438	+	-0.20520	+
	(0.08750)		(0.08058)		(0.08080)		(0.08280)		(0.08798)		(0.10194)	
Gender Equity x Gender Gap	0.00391		0.00405	+	0.00488	*	0.00535	*	0.00431	+	0.00582	+
	(0.00252)		(0.00233)		(0.00234)		(0.00240)		(0.00255)		(0.00295)	
Gender Equity^2 x Gender Gap	-0.00003		-0.00003	+	-0.00003	*	-0.00004	*	-0.00003		-0.00004	+
	(0.00002)		(0.00002)		(0.00002)		(0.00002)		(0.00002)		(0.00002)	
Δ1MAB1(t)[a]	-0.79796	***										
	(0.22285)											
Δ2MAB1(t)[a]			-0.60577	***								
			(0.12985)									
Δ1MAB(t)					-0.82013	***						
					(0.19646)							
Δ2MAB(t)							-0.47570	***				
							(0.12883)					
Female Labor Force Participation									0.01482	**		
									(0.00458)			
Human Development Indicator											-0.15704	
											(0.81395)	
Constant	3.87006	***	3.64553	***	4.04367	***	4.02272	***	3.42790	**	5.45239	***
	(1.00184)		(0.92725)		(0.90926)		(0.94746)		(1.10429)		(1.46676)	
Country dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	81		81		80		80		81		78	
Adjusted R-sq	0.74595		0.77851		0.76914		0.75470		0.73566		0.67366	

NOTE: Standard errors in parenthesis; + p<0.10 * p<0.05 ** p<0.01 *** p<0.001. [a] When mean age at first birth is missing we use mean age at childbearing.

Figures

FIGURE A1 – Predicted and observed TFRs by country



NOTE: Countries are placed in increasing order by the value of *Gender Equity* in the first wave of our sample.