Weak support for a U-shaped pattern between societal gender equality and fertility when comparing societies across time

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Abstract: A number of recent theories in demography suggest a U-shaped relationship between gender equality and fertility. Fertility is theorized to be high in societies with low levels of gender equality, as well as societies with high gender equality, with lower fertility in a transition phase. This study estimates the relationship between gender equality (as operationalized through female political empowerment) and fertility within societies over time, using yearly information on gender equality and fertility for 35 countries. When examining societies across time there is no evidence of a U-shaped relationship between gender equality and fertility. In cross-sectional analyses across countries for recent periods such a U-shaped relationship can be observed. For within-society analyses a negative relationship is clear at lower levels of gender equality, while no pattern can be observed in more gender equal societies. Theories that fertility would increase following increasing gender equality are not supported for changes over time within countries. Implications and robustness of the findings are discussed.

Keywords: Fertility, Gender Equality, International comparision

Introduction

Several recent theories in demography suggest that while initially societies that become more gender equal also have falling fertility levels, at higher levels of fertility this relationship reverse. The macro relationship between gender equality in a society and fertility therefore have a U-shape. Several articles suggesting a U-shaped pattern are among the most cited articles in social demography the last decade, and are increasingly important when family demographers theorize about current and future fertility developments.

In most countries of the world there has been a strong shift towards gender egalitarian preferences and behavior the last few decades (Inglehart & Norris, 2003; Knight & Brinton, 2017). Peter McDonald (2000a, 2000b) suggests that increases in gender equality will reduce fertility in gender-unequal societies, but that with higher gender equality intuitions will develop that can support increasing fertility in a society (resulting in an overall U-shape). Chesnais (1996) compared Italy and Sweden to make a similar argument. In a later article, McDonald (2013) is explicit in that this theories are predictive for the macro level association between fertility and gender equality, and not in couple level measures of gender equality. A theoretical account of a U-shaped fertility-gender equality relationship is given by Esping-Andersen (2016). Esping-Andersen and Billari (2015) argues similarly for a U-shaped relationship between fertility and gender equality. Goldscheider, Bernhardt, and Lappegård (2015) makes similar predictions in their theories of a gender revolution, stressing the role of male involvement in family life.

I will refer to this cluster of theories as "fertility-equality reversal" theories, and use this term consistently throughout the manuscript. I will focus on the overall main prediction of a curvilinear relationship between fertility and gender equality as the theories share substantive overlap, and not focus on other predictions (e.g. union stability, multiple equilibria, or the gradient within educational categories) in these theories. There has been some cross-sectional analysis of the relationship between fertility and gender equality, though longitudinal research is scarce. Fertility-equality reversal theories makes macro-level predictions for how fertility will respond to changes in gender equality in a society. Such theories give a causal account in which changes in gender equality within a country causes rising fertility, therefore a within-country comparison is the right level of analysis to test such theories.

Theorizing on fertility-equality reversal have likely been spurred by that the most developed and gender equal countries in the world have had higher fertility than slightly less affluent

societies (Myrskylä, Kohler, & Billari, 2009). This pattern is most apparent when making cross-sectional comparisons across countries, and gender equality has been argued to explain a U-shaped pattern (Myrskyla, Kohler, & Billari, 2011). Mills (2010) examined the relationship between gender equality and fertility for several different indicators of gender equality. She used individual level data, but relied on country-level measures of gender equality, and found only weak support an association with fertility for most measures. The research design analyses between-country variation in how gender equality is related to fertility. One study has taken a more longitudinal perspective on the relationship between fertility and attitudes towards female labor force participation (Arpino, Esping-Andersen, & Pessin, 2015). They have measured gender egalitarian views across three waves (1990/93-2006/09) of the World Value Survey, and examine how relative change in gender equality (rather than absolute levels) is associated with fertility. They find an ambiguous relationship overall, but that some countries display a U-shaped pattern that is driven by countries with intermediate levels of gender equality. In the most gender equal countries, everyone express gender equal attitudes across the waves, and WWS can therefore not test the effect of gender equality at high levels of gender equality.

A large number of studies have also examined if gender equality within relationships with divergent findings (e.g. Goldscheider, Bernhardt, & Brandén, 2013; Kaufman, 2000; Neyer, Lappegård, & Vignoli, 2013). Such theories are outside the scope of this article, and just as the fertility gradient between rich and poor individuals within a society can be different from the fertility gradient between rich and poor countries, there is no reason to assume the societal and individual level traits display the same gradient.

Data and Methods

The data is based on two primary data sources; the Human Fertility Database (2018), and the Varieties of Democracy dataset (Coppedge et al., 2017). In addition to the 29 countries available in the human fertility database, TFR for Australia, Belgium, Denmark, Ireland, New Zeeland, and South Korea were added using the World Bank "World Development Indicators" to get a comprehensive selection of developed countries. The measure of gender equality, Women's Political Empowerment Index (WPEI), is based yearly information and is a multifaceted measure on women's civil liberties, civil society participation, and political participation across the world. For a further description of the index, see Sundström, Paxton, Wang, and Lindberg (2017). For the countries in the study, the measures correlates well with public and scholarly

accounts of gender equality, as well as other measures of gender equality across the world (e.g. Matysiak & Węziak-Białowolska, 2016; Therborn, 2004). The variable is available for a long period of time, is carefully constructed, and has a meaningful interpretation and appropriate amount of variation also for more gender equal societies, something not always applicable to other gender equality indices (cf. Klasen, 2006; Sundström et al., 2017). A comparison with other common non-longitudinal gender equality indices are available in supplemental figure S1, and shows a strong correspondence for year 2010. All input data, code to produce figures and regressions, as well as some further discussion of how the data was constructed are available in supplemental materials.

The unit of analysis in the examination is a country-year, with yearly information available for most countries from 1960-2015 with some countries having earlier information. In total, the data for the study includes 35 countries and 1970 country-years. This data is analyzed using bivariate scatter plots examining the association of TFR, WPEI, and year, within and across countries. This is followed by OLS-regressions with controls for year and country. The distribution of person-years and WPEI is available in supplemental figures S2 and S3.

Results

When examining the cross-sectional association between fertility and female empowerment (WPEI) an overall time trend towards lower fertility and higher gender equality is apparent. The overall association for all data (figure 1a) is strongly negative, but in the latest cohorts the relationship is instead curvilinear (figure 1b). The post-1990 pattern, in which some countries have high fertility and high WPEI, and other countries lower fertility and WPEI, shown a clear correlation between WPEI and fertility and is as such consistent with the fertility-equality reversal theories.

In Figure 2, the same association is shown for a given country, in other words examining how the relationship between gender equality and fertility has covaried within a society (for readability I show period on the x-axis, figure S4 show WPEI on the x-axis). The picture is clearly different. While many countries show an overall negative relationship as in Figure 1a, most countries do not show a pattern of increasing fertility together with increasing fertility. The countries with the highest WEIP are found in Northwestern Europe (and New Zeeland and the Czech Republic) and do not show a U-shaped pattern. Only four countries in the data set (Belgium, Denmark, France, and the Netherlands) shows for some periods an (ambiguous) U-

shaped pattern of increasing fertility together with increasing gender equality. Another group that display a U-shaped pattern are post-communist countries that have very low fertility in the immediate post-transitional phase followed by a weak recovery (cf. Billingsley, 2010). Howver, this pattern does not fit the development suggested in fertility-equality theories, as fertility is low in all post-communist countries, and WPEI at all stages are modest.
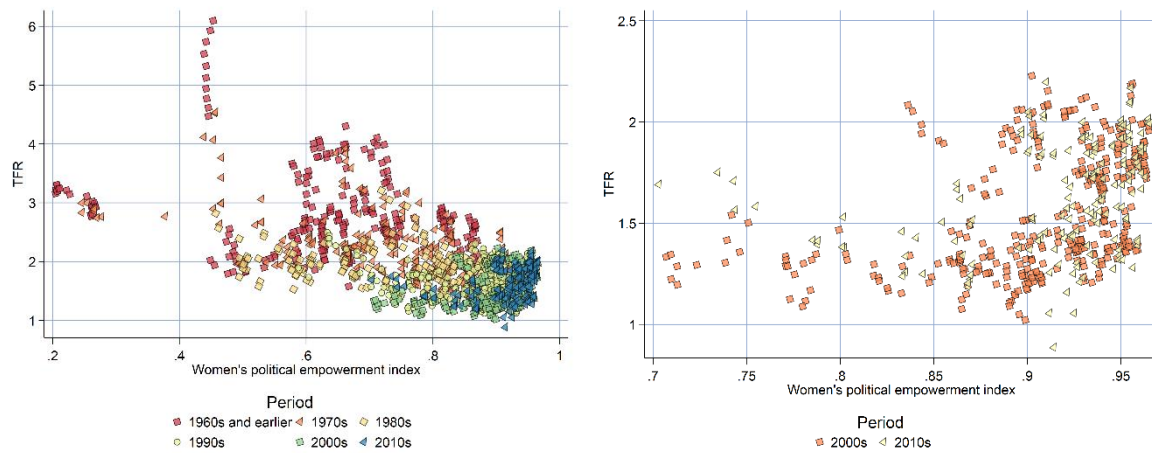

Figure 1: Association between TFR and female political empowerment in 35 countries, by period, for all periods (1a) and post-2000 (1b).

It appears that the cross-sectional pattern shown in Figure 1b is driven by that high fertility-high WPEI countries have consistently both higher fertility and WPEI than other countries in the sample. However, within these high fertility-WPEI countries gender equality is not positively related to fertility. In between-country analyses, such a pattern produce a cross-sectional U-shaped relationship between fertility and gender equality.

Regression analyses, regressing WPEI on TFR to give a quantified account of earlier findings are presented in Figure 3 (and supplemental table A1). The model setup mirror the focus on between and within society differences in the earlier scatter plots, with particular focus on the period after 1990.

Using data for all countries and periods there is a negative cross-sectional relationship between fertility and WPEI (model 1). When introducing controls for period trends (and falling fertility) comparing data-points across countries (model 2) there is an U-shaped pattern similar to what is predicted by fertility-equality reversal theories and shown earlier in scatter plots (figure 1a & 1b). It is particularly marked post-1990 (model 3). However, in all models in which country characteristics are taken into account (models 4-6), and only within-society variation is modeled the relationship is largely negative. When controlling for a general decline in fertility over time

(model 5), there is some evidence of slightly higher fertility at the very highest levels of WPEI, though the effect is small and non-significant. This pattern does not exist in the post-1990 period (model 6). As such, the regression analyses are consistent with the interpretation of the absence of a curvilinear relationship between gender equality and fertility when studying the change within societies.
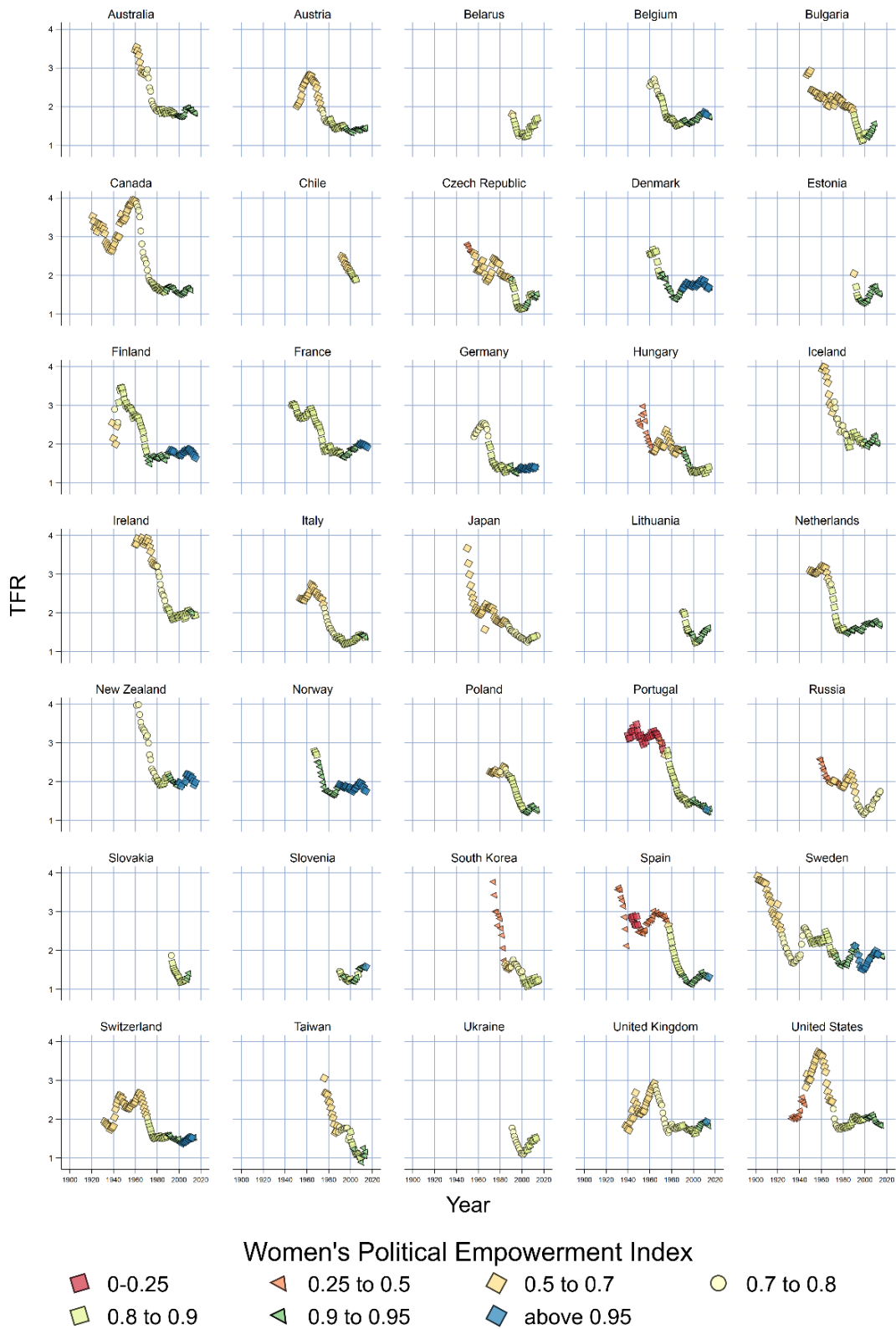
Figure 2: Association between TFR and female political empowerment in 35 countries, by country and period (only TFR below 4 shown)
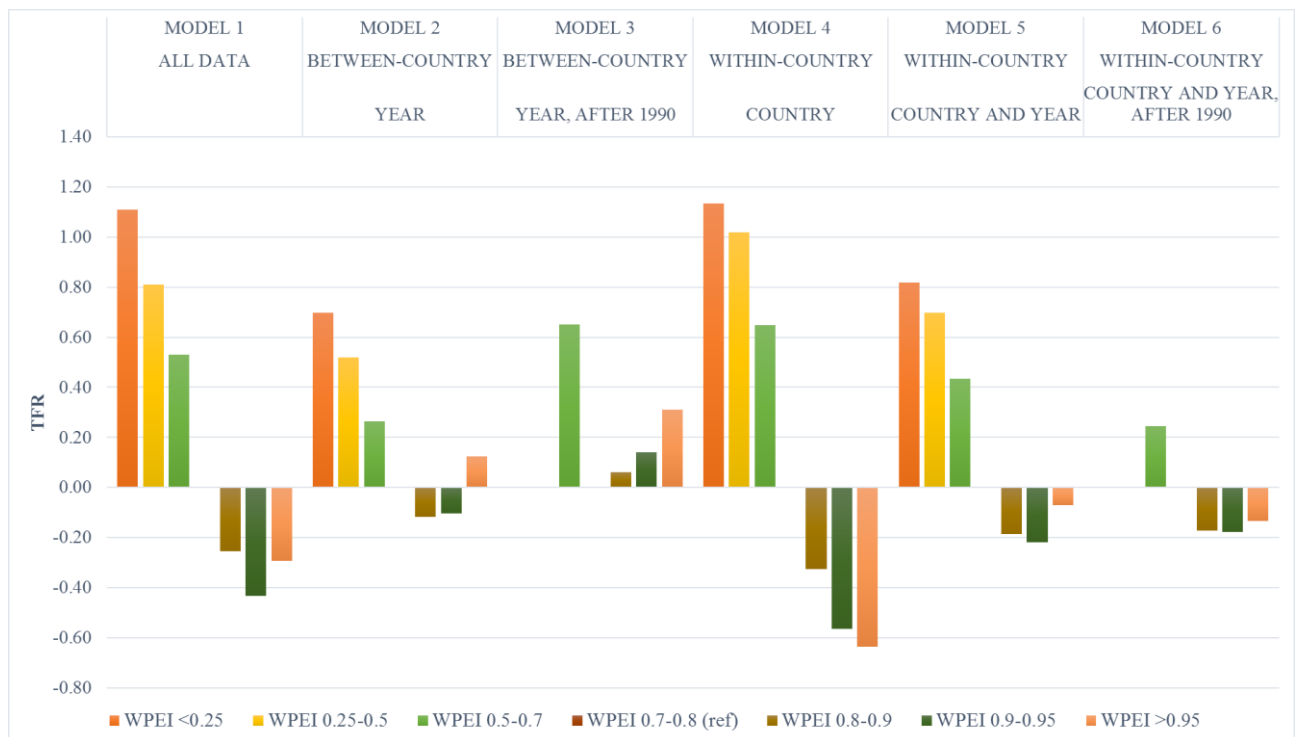
Figure 3: OLS Regression between TFR (total fertility ratio) and WPEI (female empowerment index) in six different models, 35 countries and 1970 country-years

Conclusion

The main finding is a lack of an association between fertility and gender equality – when operationalized as female political empowerment – in more gender equal societies. A curvilinear relationship is found in cross-sectional comparisons between countries after the 1980s, but such patterns disappear when focusing on the development within countries over time. The explanation for this pattern is that countries with high gender equality relative to other contemporaneous countries (mostly in Northwestern Europe), have also had stable high fertility the last decades.

These findings stand in contrast to a recent theories in family demography - referred to as fertility-equality reversal theories in this study (Esping-Andersen & Billari, 2015; Goldscheider et al., 2015; McDonald, 2013) - that predicts a U-shaped pattern between fertility and the level of gender equality (and family friendly institutions) in a society. Such theories suggest that fertility in societies will first respond negatively to increases in gender equality but that at higher levels of gender equality the relationship will be the opposite. The theories are based on the

evolution of the relationship between fertility levels and gender equality within a society over time.

The choice of measure of gender equality in this study (female political empowerment) could be argued to be arbitrary, or not capturing some important aspect of gender equality. It is however unlikely that different measures or concepts (e.g different indices of gender equality, prevalence of family policies facilitating childbearing among dual earner couples, gendered uptake of parental leave, or gender egalitarian views) would fundamentally change the longitudinal relationship described in this article. Most gender equality indicators, as well as family oriented policies, have been monotonically increasing overtime and are strongly correlated, consistent with public and scholarly perceptions of steadily increasing gender equality in the West (Inglehart & Norris, 2003; Stanfors & Goldscheider, 2017). The rapid growth and reorientation of family policy in order to facilitate gender equality has been particularly marked in the Nordic countries, in which the development and adoption of day care centers, generous parental leave, and male uptake of parental leave have increased rapidly and steadily for the last half-century (e.g. Ferrarini & Duvander, 2009). While availability of longitudinal data for a large number of countries remains a challenge, replications with other indicators of gender equality (particularly in the private sphere) would improve the validity of the findings of this study, and the development of such longitudinal measures would be very welcome.

The cross-sectional positive correlations originate in that some Northwest European countries have both high gender equality and high fertility over a long period of time. Therefore, the presented empirical results are likely not due to a measurement choices, but are a reflection of that the countries which are universally seen as globally among the most gender equal, have not seen concurrent rises in fertility and gender equality. Instead, the high fertility (relative other rich countries) in these societies goes back to the 1960s and earlier, despite the fact that surveys show massive value change over this time, and that many policy and behavioral changes such as public daycare and male-parental leave were rare before the 1980s. Even though fertility-equality reversal are modelled on experiences in the Nordic countries, these countries have not had an experience that fits the causal model suggested in fertility-equality reversal theories.

Note that the absence of a relationship between fertility over time in a country and the overall progress towards gender equality does not rule out a relationship where at the couple-level equality and division of labor/housework is positively associated with fertility. If the population heterogeneous according to their relative gender equality, many patterns could exist, even if

there is no relationship at the aggregated level. Fertility-equality reversal theories may be more productive in predicting the gradient of fertility within couples.

A theoretical point that is not elaborated on in previous theories suggesting increasing fertility with increasing gender equality, is what happens at fertility at very high levels of gender equality. Several Nordic countries have fertility close to two children but on many indices still show substantial gender differences in attitudes, parental leave uptake, income and childcare. So far, we have not seen any substantial increase of fertility in these societies, despite increasing gender equality the last few decades. Given future increasing gender equality is a predication that we will see fertility above two children per women? A different explanation for the absence of a U-shaped relationship, is that even in the most gender equal countries in the world, the society is yet to reach the cross-over point to higher fertility. However, this is inconsistent with empirical examples in the literature (e.g., Esping-Andersen, 2016, describes the Nordic countires as being at the end of the fertility-equality reversal). If fertility-equality reversal theories are conditional on certain threshold TFR levels, this should be elaborated on in future research on the topic.

Overall, the empirical results from the study is not consistent with fertility-reversal theories. Researchers may search for other cultural, economic, or societal explanations for the untypical high levels of fertility in the most gender egalitarian countries, as high fertility in these countries goes back many decades. How do they differ from other societies culturally, and why did they have high fertility in the 1950s and 1960s, when they were less gender egalitarian than many countries with low fertility today. The apparently spurious relationship between measures of gender equality and fertility in cross-sectional data, which is not reflected in empirical longitudinal time series, is a cautionary tale to the dangers of cross-sectional analyses to model longitudinal processes and theories.

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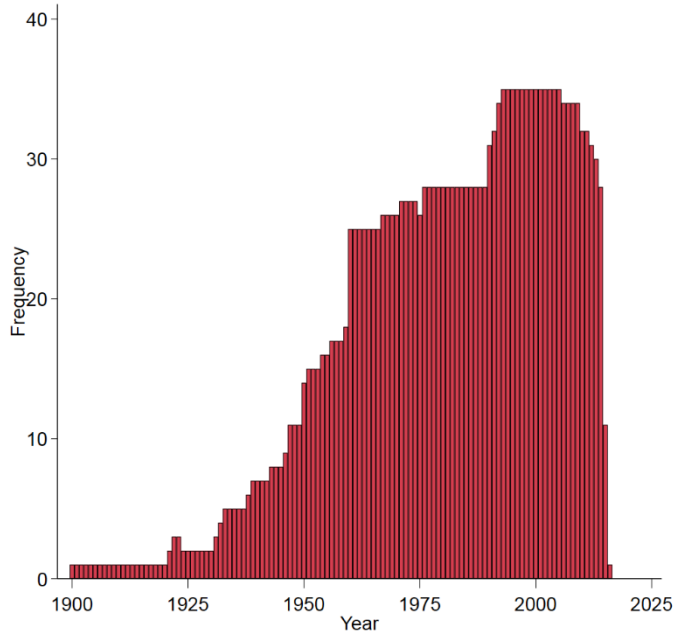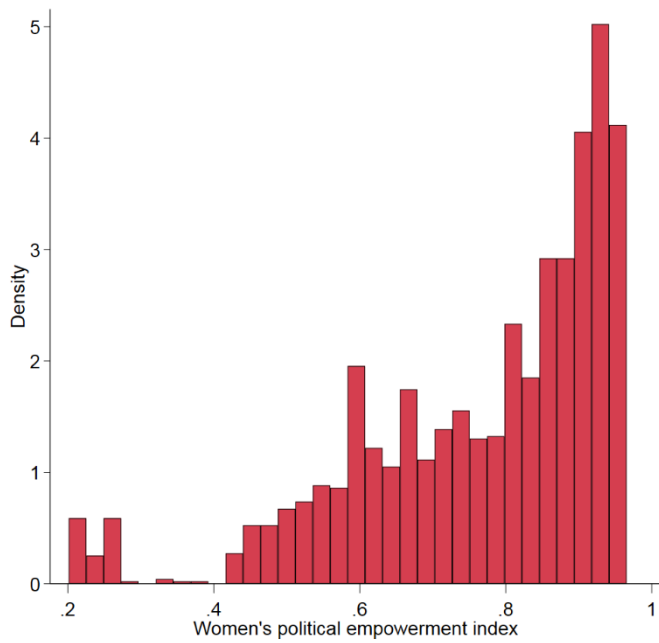
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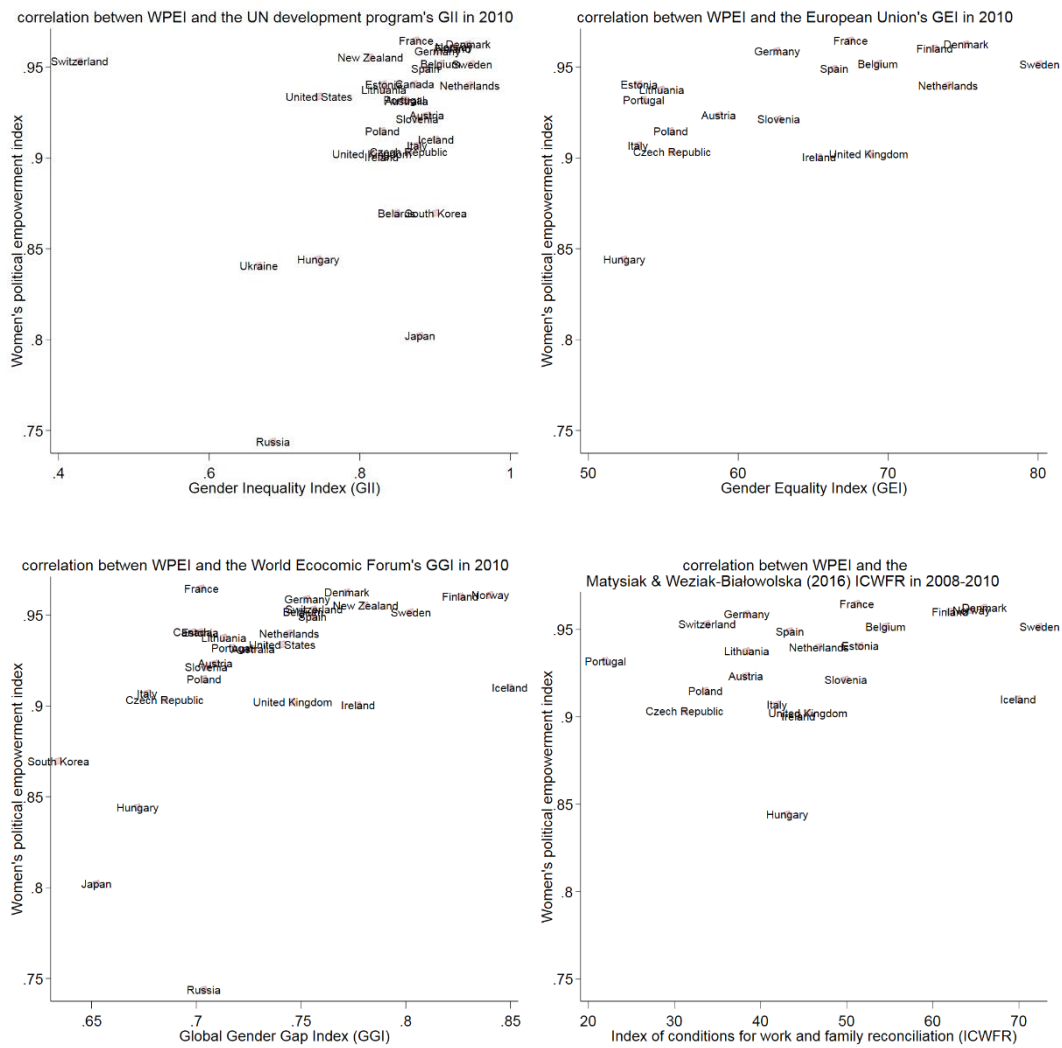
Supplemental Figure S1: Correlations between different gender indices. See supplemental files for input data and sources.

Supplemental Figure S2: Frequency of person-years in the data material.

Supplemental Figure S3: Distribution of Women Political Empowerment Index (WPEI) in the data material
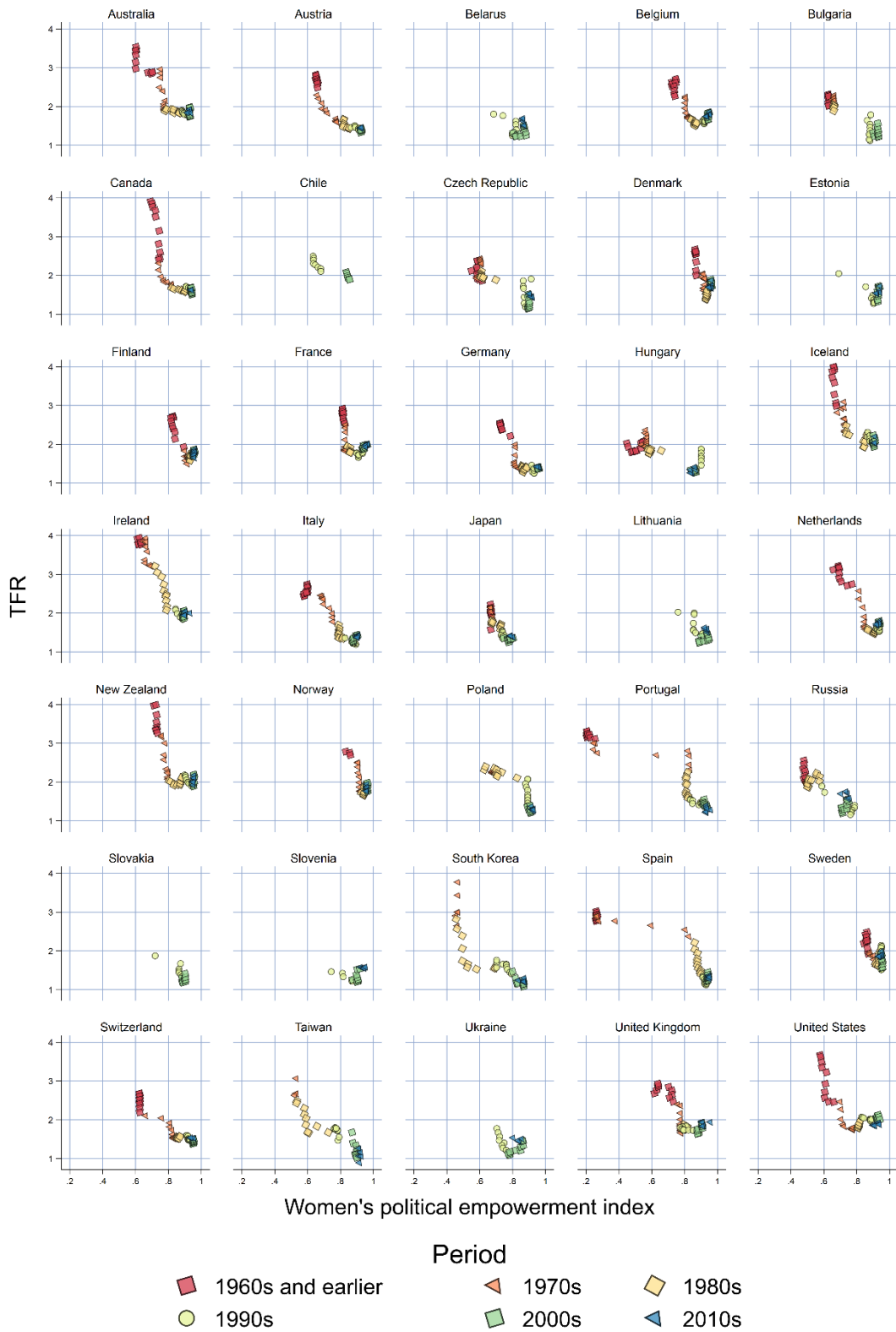
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Figure S4: Association between TFR and female political empowerment (x-axis) in 35 countries, by year and country (only TFR below 4 shown)

Supplemental table S1: Linear Regression on TFR (total fertility ratio) and WEIP (female empowerment index) in 12 different models, 35 countries and 1970 country-years

Type of model:	ALL DATA			BETWEEN-COUNTRY			BETWEEN-COUNTRY			WITHIN-COUNTRY			WITHIN-COUNTRY			WITHIN-COUNTRY		
Specification:				YEAR			YEAR, AFTER 1990			COUNTRY			COUNTRY AND YEAR			COUNTRY AND YEAR, AFTER 1990		
	Coefficent	C.I. (95%)		Coefficent	C.I. (95%)		Coefficent	C.I. (95%)		Coefficent	C.I. (95%)		Coefficent	C.I. (95%)		Coefficent	C.I. (95%)	
Linear model																		
WPEI	-2.45	-2.59	-2.32	-1.14	-1.31	-0.97	0.76	0.46	1.06	-3.19	-3.31	-3.06	-2.08	-2.29	-1.86	-1.84	-2.19	-1.48
Categorical model																		
WPEI <0.25	1.11	0.93	1.29	0.70	0.54	0.86				1.13	0.97	1.30	0.82	0.65	0.98			
WPEI 0.25-0.5	0.81	0.69	0.93	0.52	0.41	0.62				1.02	0.92	1.12	0.70	0.59	0.81			
WPEI 0.5-0.7	0.53	0.45	0.61	0.26	0.19	0.34	0.65	0.49	0.81	0.65	0.59	0.71	0.44	0.36	0.51	0.24	0.14	0.35
WPEI 0.7-0.8 (ref)	0			0			0			0			0			0		
WPEI 0.8-0.9	-0.25	-0.33	-0.18	-0.12	-0.19	-0.05	0.06	0.00	0.13	-0.33	-0.39	-0.26	-0.18	-0.25	-0.12	-0.17	-0.22	-0.12
WPEI 0.9-0.95	-0.43	-0.51	-0.35	-0.10	-0.18	-0.03	0.14	0.08	0.29	-0.56	-0.63	-0.50	-0.21	-0.30	-0.13	-0.18	-0.24	-0.12
WPEI >0.95	-0.29	-0.40	-0.19	0.12	0.02	0.23	0.31	0.24	0.38	-0.64	-0.73	-0.54	-0.07	-0.19	0.06	-0.13	-0.21	-0.06