

Supplementary Materials to Public Gender Egalitarianism: A Dataset of Dynamic Comparative Public Opinion Toward Egalitarian Gender Roles in the Public Sphere

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Appendix A: Survey Items Used to Estimate Public Gender Egalitarianism and Their Distribution

National and cross-national surveys have often included questions tapping attitudes toward equality for women and men in the public sphere over the past half-century, but the resulting data are both sparse, that is, unavailable for many countries and years, and incomparable, generated by many different survey items. In all, we identified 51 such survey items that were asked in no fewer than five country-years in countries surveyed at least twice; these items were drawn from 123 different survey datasets. These items are listed in the table below, along with the dispersion (α) and difficulty (β) scores estimated for each from the DCPO model. Question text may vary slightly across survey datasets, but not, roughly speaking, by more than the translation differences across languages found within the typical cross-national survey dataset. Lower values of dispersion indicate questions that better identify publics with more public gender egalitarianism from those with less. Items have one less difficulty score than the number of response categories. Survey dataset codes correspond to those used in the `DCPOtools` R package; they appear in decreasing order of country-years contributed.

Together, the survey items in the source data were asked in 124 different countries in at least two time points over 49 years, from 1972 to 2021, yielding a total of 2,999 country-year-item observations. The number of items observed in the source data for each country-year is plotted in Figure S1 below. The PGE scores of country-years with more observed items are likely to be estimated more precisely. The estimates for country-years with fewer (or no) observed items rely more heavily (or entirely) on the random-walk prior and are therefore less certain.

Overlap among items have not been a concern in the literature on generating latent-variable estimates of public opinion across countries and over time from sparse data, largely because the dynamic aspect of the models employed, that is, the random-walk prior, works to tie together items that do not overlap (see Claassen 2019; Caughey, O’Grady, and Warshaw 2019; Solt 2020). Nevertheless, the most commonly observed item in the PGE source data, `polileader4`, effectively serves as the bridge between the other items: it has overlapping country-year observations with 39 of the other 50 items (which together cover 91% of the observed country-years), and only a single item (`politics4a`, which covers 22 country-years) had no observations within a year of a `polileader4` observation.

Survey Item Code	Country-Years	Question Text	Dispersion	Difficulties	Survey Dataset Codes
polileader4	443	On the whole, men make better political leaders than women do	0.46	-0.15, 1.00, 2.43	wvs_combo, pewrel2006_10nat, amb_combo, amb_us2012, wvs7, amb_us2018, evs_combo, wvs4_swe, eb631, evs2017, lb2009, lb2004, amb_brazil2016, amb_brazil2018, amb_chile2012, amb_chile2014, amb_chile2018, arabb1, arabb2, arabb3, amb_uruguay2018, amb_canada2012, amb_canada2018, amb_ecuador2018, amb_venezuela2012, amb_venezuela2014, amb_bolivia2012, amb_bolivia2014, amb_bolivia2018, amb_panama2018, amb_costarica2018, wvs6_bahrain, amb_trinidad2012, amb_suriname2012
job3a	377	When jobs are scarce, men should have more right to a job than women	0.49	0.63, 1.22	evs_combo, wvs_combo, wvs4_swe, wvs6_bahrain

Survey Item Code	Country-Years	Question Text	Dispersion	Difficulties	Survey Dataset Codes
tradroles5	261	A husband's job is to earn money; a wife's job is to look after the home and family	0.65	-0.47, 0.71, 1.44, 2.70	issp1988, issp1991, issp1994, usgss, issp1998, issp2002, issp2008, issp2012, issp2018, eb42, kgss, koweps2008, koweps2009, koweps2010, koweps2011, koweps2012, koweps2013, koweps2014, koweps2015, koweps2016, koweps2017, koweps2018, koweps2019, nsss1989, nsss1993, issp1998br, issp2018ext, issp2008a, issp2008ca, issp2018tn
income4	235	Both the husband and wife should contribute to household income	1.06	-3.46, -1.04, 1.80	evs_combo, wvs_combo, wvs4_swe, eb651, issp2012, eb653
busiexecutive4	191	On the whole, men make better business executives than women do.	0.56	-0.51, 0.78, 2.43	wvs_combo, wvs7, evs2017, wvs6_bahrain
job5	180	When jobs are scarce, men should have more right to a job than women	0.40	-0.11, 0.90, 1.46, 2.57	wvs7, ess2, ess4, ess5, ess8, evs2017
job4	122	When jobs are scarce, men should have more right to a job than women.	0.50	0.27, 1.12, 1.87	pewrel2006_10nat, pew2010, pew2019, pewrel2015_ee, jgss2006, pewrel2014_latam, pew2012, pewrel2009_afr
income5	118	Both the man and woman should contribute to the household income	0.65	-2.13, -0.64, 0.26, 2.09	issp1988, issp1994, issp2002, issp2012, kgss, koweps2008, koweps2009, koweps2010, koweps2011, koweps2012, koweps2013, koweps2014, koweps2015, koweps2016, koweps2017, koweps2018, koweps2019, nsss1989
tradroles2	100	What kind of marriage do you think is the more satisfying way of life, number 1 or number 2?	1.21	-0.18	usgss, pew2002, pew2010, pew2019
tradroles4	76	It is much better for everyone involved if the man is the achiever outside the home and the woman takes care of the home and family.	0.61	0.37, 1.70, 3.03	usgss, eb651, allbus, pgss, jgss2005, jgss2006, jgss2008, jgss2010, jgss2012, jgss2015, eb653

Survey Item Code	Country-Years	Question Text	Dispersion	Difficulties	Survey Dataset Codes
equalright4b	75	For each of the following things, how important is it to have this in our country? women have the same rights as men	0.76	-2.19, -1.09, 0.38	pew2015, pew2019, uspew2020_04amd, pew2016
tradroles4a	72	It is preferable that a woman concentrates on the home and a man on his work	0.84	-0.39, 0.98, 2.68	lb1997, lb2009, lb2000, lb2004
unqualified4	54	At the present time, in the European Union, women are less likely than men to hold positions of responsibility. Please tell me whether you agree or disagree with each of the following statements on this subject: Women do not always have the necessary qualities and skills to fill positions of responsibility	1.08	-1.75, 0.23, 2.12	eb722, eb761
poliequal3	53	Which one of the following statements comes closest to your opinion about men and women as political leaders? Men generally make better political leaders than women; In general, women and men make equally good political leaders; Women generally make better political leaders than men	0.81	0.21, 3.79	pew2007, pew2012
politicianecon3	40	If a politician is responsible for running the national economy, who would do a better job, a man, or a woman or does it not matter?	0.82	-0.40, 1.16	amb_us2018, amb_combo, amb_brazil2018, amb_chile2012, amb_chile2018, amb_uruguay2018, amb_canada2018, amb_ecuador2018, amb_venezuela2012, amb_bolivia2012, amb_bolivia2018, amb_panama2018, amb_costarica2018

Survey Item Code	Country-Years	Question Text	Dispersion	Difficulties	Survey Dataset Codes
samework4	39	There should be restrictions on men and women being employed in the same workplace.	0.34	-0.04, 0.96, 1.98	pew2002, pew2007, pew2008
equalright2	28	On a different subject, do you think women should have equal rights with men, or shouldn't they?	0.48	-0.57	pew2010, pew2012
righteq4	28	Equality between men and women is a fundamental right	0.76	-2.16, -1.15, 0.90	eb824
equalwage4a	28	In some circumstances, a woman is paid less than a male colleague for the same job. Do you think this is acceptable?	0.83	-1.79, -0.33, 1.16	eb874
unqualpol4	28	Women do not have the necessary qualities and skills to fill positions of responsibility in politics	0.56	-0.34, 0.72, 1.89	eb874
equality5	27	Proposal: Strive towards a society with greater equality between women and men	1.04	-2.14, -1.28, 0.83, 2.55	som_combo
womenmp4	27	In the European Union, women represent on average approximately one out of four national MPs. In general, do you think that this should be treated	1.06	-0.77, 1.45, 3.70	eb722
businessleader4	27	Given equal competence, women should be equally represented in positions of leadership in companies.	0.89	-2.23, -0.70, 1.42	eb761
emopoli2	26	Most men are better suited emotionally for politics than are most women.	0.77	0.67	usgss

Survey Item Code	Country-Years	Question Text	Dispersion	Difficulties	Survey Dataset Codes
jobs7	23	Changing the subject again, some say that when there is not enough work, men should have a greater right to jobs than women.	0.31	0.28, 0.65, 1.05, 1.41, 1.68, 1.97	amb_us2012, amb_combo
politics4a	22	It is sometimes said that "politics should be left to men." How far would you agree with this?	1.04	-1.48, -0.07, 1.17	eb19, eb27
quota7	22	ballot quotas for women	0.64	-0.55, -0.16, 0.33, 0.96, 1.56, 2.15	amb_combo
household4	21	The best thing for a woman to do is to take care of the house	0.62	0.18, 1.42, 2.29	cdcee
earn2	19	Do you approve or disapprove of a married woman earning money in business or industry if she has a husband capable of supporting her?	1.28	-0.43	usgss, cmlic1980_val, cbsnyt198104
president2	19	If your party nominated a woman for President, would you vote for her if she were qualified for the job?	0.80	-0.50	usgss
office2	19	Why there are not enough women in public charges: That is not their place	0.88	-1.68	lb2006
poliwork7	16	Recently there has been a lot of talk about women's rights. Some people feel that women should have an equal role with men in running business, industry and government. Others feel that a women's place is in the home. Where would you place yourself on this scale or haven't you thought much about this?	0.72	-0.98, -0.58, -0.14, 0.66, 0.99, 1.51	anes_combo

Survey Item Code	Country-Years	Question Text	Dispersion	Difficulties	Survey Dataset Codes
homecountry2	16	Do you agree or disagree with this statement? Women should take care of running their homes and leave running the country up to men.	0.82	0.16	usgss
businessleader3	15	Here is a list of occupations and responsibilities that men or women can have. For each of them, please indicate whether you think that they should be more for men, more for women, or for either a man or a woman.	0.59	0.74, 4.99	eb443
polileader3	15	Chief Executive Here is a list of occupations and responsibilities that men or women can have. For each of them, please indicate whether you think that they should be more for men, more for women, or for either a man or a woman.	0.46	0.92, 4.65	eb443
govtact5	13	Head of Government The government should increase opportunities for women in business and industry	0.34	-0.67, 0.31, 1.35, 2.44	issp1985, aes1993, aes1996, aes1998, aes2001, aes2004, aes2010, aes2013
politics4	13	Women should not be involved in politics as much as men	0.44	-0.99, 0.02, 1.21	asianb3
return4	11	Women should return to their traditional roles in society	0.89	-0.55, 0.57, 1.81	uspew_valcombo, uspew2009_val
equalright4a	11	Insuring equal rights between men and women	0.19	-2.15, -1.17, 0.06	arabb3

Survey Item Code	Country-Years	Question Text	Dispersion	Difficulties	Survey Dataset Codes
earn4	10	If the husband has enough income, the wife should not have a job	0.91	-0.34, 1.19, 2.98	jpgss, jpgss2005, jpgss2006, jpgss2008, jpgss2010, jpgss2012, jpgss2015
equalwork4	10	Men and women should have equal work opportunities.	0.43	-2.08, -0.64, 0.81	arabb2
job4a	9	A married woman should not work if there are not enough jobs to go around and her husband is also in a position to support the family.	0.48	0.51, 1.49, 2.50	allbus
jobpref5	9	Women should be given preferential treatment when applying for jobs and promotions	0.72	0.00, 1.87, 3.26, 4.11	nsss_combo, aes1993, aes1996, aes1998, aes2001, aes2004, aes2010, aes2013
supervise4	8	A man will lose face if he works under a female supervisor.	0.12	-0.27, 0.39, 1.37	asianb1
equaljob4	7	Men and women should have equal job opportunities and wages	0.46	-1.80, -0.44, 1.01	arabb1
equalwage4	7	Men and women should receive equal wages and salaries	0.45	-2.16, -1.11, 0.57	arabb1
equaljob5	6	Men and women should have equal job opportunities and wages	0.18	-2.06, -1.26, -0.57, 0.76	tcmeg2004
polileader5	6	On the whole, men make better political leaders than women do	0.20	-0.05, 0.79, 1.18, 2.06	tcmeg2004
rightvote5	6	A woman should have the right to vote and to be a member of parliament	0.20	-2.03, -1.38, -0.73, 0.80	tcmeg2004
politics3	6	Attitudes towards Participation of Women in Politics	0.51	-1.06, -0.07	amb_combo
earn5	5	I approve of a married woman earning money in business or industry even if she has a husband capable of supporting her	0.24	-0.49, 0.39, 0.87, 2.06	nsss_combo, nsss1989, nsss1993, wvs_combo

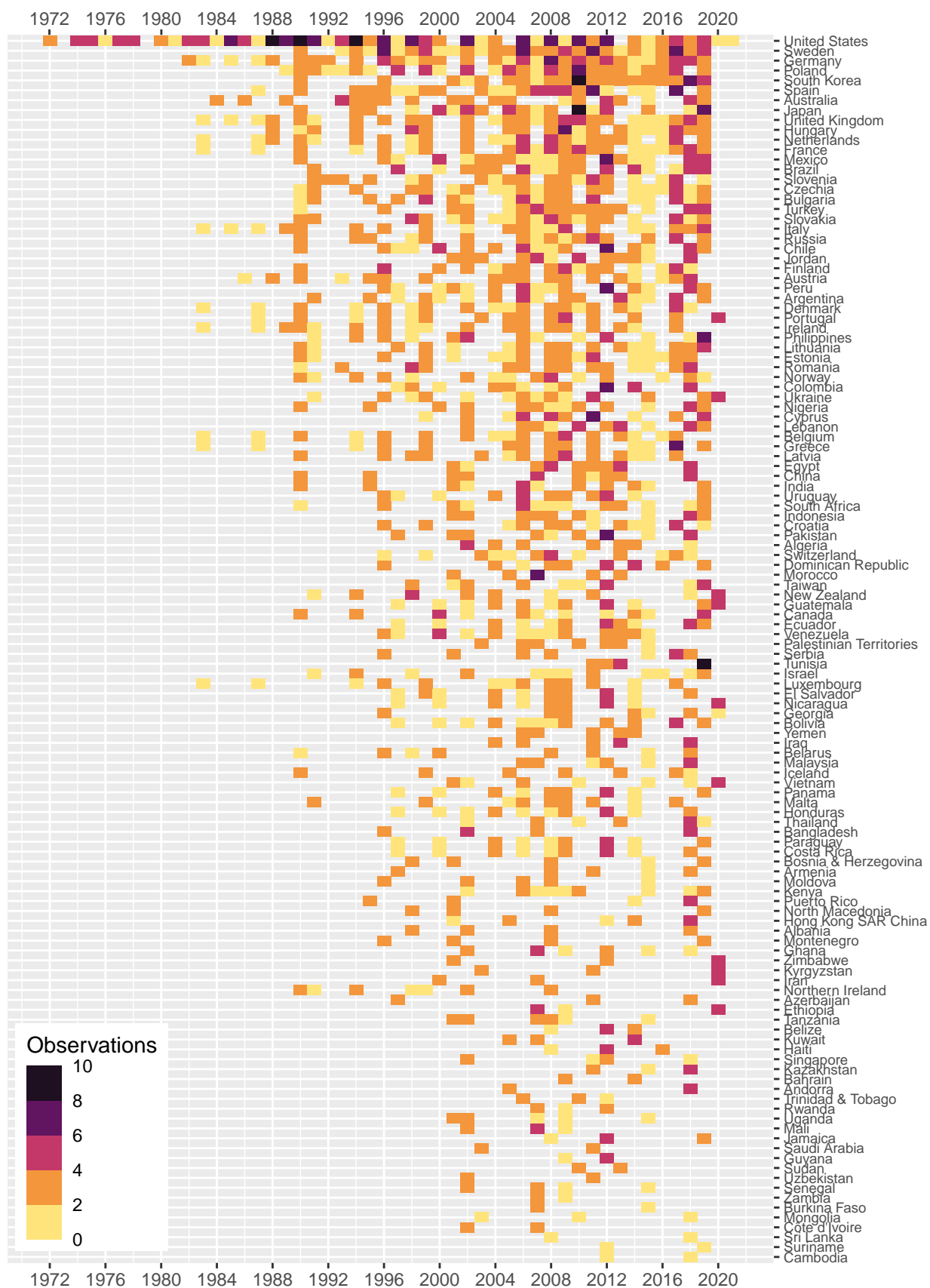


Figure S1: Source Data Observations by Country and Year
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Appendix B: Excluded Survey Items

To estimate the Public Gender Egalitarianism scores, we collected survey data on questions asking respondents' views of gender equality in the traditionally masculine public sphere of paid work and politics. These included questions are nearly always explicit in comparing men and women (but see, for example, `unequalpol14`, which asked responses to the statement “Women do not have the necessary qualities and skills to fill positions of responsibility in politics”) and nearly always explicitly invoke either paid work or politics, though they may also be broader (see, for example, `equalright2`, which asked “On a different subject, do you think women should have equal rights with men, or shouldn't they?”).

We carefully distinguished these questions from three other categories of questions on gender equality. First, the PGE source data do not include the small set of questions focusing on gender equality in the traditionally feminine private sphere of housework and childcare, such as “Men should take as much responsibility as women for the home and children,” asked (with differing response categories) in the European Values Survey and the European Social Survey. Second, as noted in the text, we also excluded questions asking respondents how women should balance opportunities in the public sphere with their traditional duties in the private sphere, such as whether mothers in the workforce can have similarly warm relationships with their children as mothers who are not, asked in the World Values Survey and many others. Given that attitudes that women should prioritize housework and childcare over paid employment and politics—or convictions that there will be negative consequences if they do not—can be expected to lead to less gender egalitarian opinions with regard to these latter, public-sphere activities, this is clearly a very closely related set of items to those we sought, and there are many of them.¹ The third and final category of excluded survey items includes respondents' views on various forms of women's domination by men, from whether wives should always adopt their husbands' surnames through the recognition that various forms of sexual harassment are not “flattering” to the justifiability of intimate partner violence committed by husbands. In each case, as the included questions are not *directly* relevant to gender egalitarianism in the public sphere, we concluded that to ensure that the PGE scores tap only a single dimension of attitudes, we would exclude these others (see also Appendix D). Usefully, this decision also allows, when the available survey data permits, future research to take up the estimation of dynamic comparative public opinion of those concepts separately and their relationships to public gender egalitarianism.

¹It is telling, though not surprising, that the complementary set of questions, on how *men* should balance responsibilities in the private sphere with their traditional roles in the public sphere, is only rarely included in surveys; one laudable example of this mostly unasked sort of question, apparently first included in Australia's 1989 National Social Science Survey and slowly becoming more common, is the item querying respondents the extent to which they agree with the statement, “Family life often suffers when men concentrate too much on their work.”

Appendix C: The DCPO Model

There has been a recent blossoming of scholarship developing latent variable models of public opinion based on cross-national survey data (see Claassen 2019; Caughey, O’Grady, and Warshaw 2019; McGann, Dellepiane-Avellaneda, and Bartle 2019; Kolczynska et al. 2020). To estimate public gender egalitarianism across countries and over time, we draw on the latest of these methods that is appropriate for data that is not only incomparable but also sparse, the Dynamic Comparative Public Opinion (DCPO) model presented in Solt (2020).² The DCPO model is a population-level two-parameter ordinal logistic item response theory (IRT) model with country-specific item-bias terms.

DCPO models the total number of survey responses expressing at least as much public gender egalitarianism as response category r to each question q in country k at time t , y_{ktqr} , out of the total number of respondents surveyed, n_{ktqr} , using the beta-binomial distribution:

$$a_{ktqr} = \phi \eta_{ktqr} \quad (1)$$

$$b_{ktqr} = \phi(1 - \eta_{ktqr}) \quad (2)$$

$$y_{ktqr} \sim \text{BetaBinomial}(n_{ktqr}, a_{ktqr}, b_{ktqr}) \quad (3)$$

where ϕ represents an overall dispersion parameter to account for additional sources of survey error beyond sampling error and η_{ktqr} is the expected probability that a random person in country k at time t answers question q with a response at least as positive as response r .³

This expected probability, η_{ktqr} , is in turn estimated as follows:

$$\eta_{ktqr} = \text{logit}^{-1}\left(\frac{\bar{\theta}'_{kt} - (\beta_{qr} + \delta_{kq})}{\sqrt{\alpha_q^2 + (1.7 * \sigma_{kt})^2}}\right) \quad (4)$$

In this equation, β_{qr} represents the difficulty of response r to question q , that is, the degree of public gender egalitarianism the response expresses. The δ_{kq} term represents country-specific item bias: the extent to which all responses to a particular question q may be more (or less) difficult in a given country k due to translation issues, cultural differences in response styles, or other idiosyncrasies that render the same survey item not equivalent across countries.⁴ The dispersion of question q , its noisiness in relation to our latent variable, is α_q . The mean and standard deviation of the unbounded latent trait of public gender egalitarianism are $\bar{\theta}'_{kt}$ and σ_{kt} , respectively.

Random-walk priors are used to account for the dynamics in $\bar{\theta}'_{kt}$ and σ_{kt} , and weakly informative priors are placed on the other parameters.⁵ The dispersion parameters α_q are constrained to be positive and all survey

²Solt (2020) demonstrates that the DCPO model provides a better fit to survey data than the models put forward by Claassen (2019) or Caughey, O’Grady, and Warshaw (2019). The McGann, Dellepiane-Avellaneda, and Bartle (2019) model depends on dense survey data unlike the sparse data on public gender egalitarianism described in the preceding section. Kolczynska et al. (2020) is the very most recent of the five works and builds on each of the others, but the MRP approach developed in that piece is suitable not only when the available survey data are dense but also when ancillary data on population characteristics are available, so it is similarly inappropriate to this application.

³The ordinal responses to question q are coded to range from 1 (expressing the least public gender egalitarianism) to R (expressing the most public gender egalitarianism), and r takes on all values greater than 1 and less than or equal to R .

⁴Estimating δ_{kq} requires repeated administrations of question q in country k , so when responses to question q are observed in country k in only a single year, the DCPO model sets δ_{kq} to zero by assumption, increasing the error of the model by any country-item bias that is present. Questions that are asked repeatedly over time in only a single country pose no risk of country-specific item bias, so δ_{kq} in such cases are also set to zero.

⁵The dispersion parameters α_q are drawn from standard half-normal prior distributions, that is, the positive half of $N(0, 1)$. The first difficulty parameters for each question, β_{q1} , are drawn from standard normal prior distributions, and the differences between β s for each r for the same question q are drawn from standard half-normal prior distributions. The item-bias parameters δ_{kq} receive normally-distributed hierarchical priors with mean 0 and standard deviations drawn from standard half-normal prior

responses are coded with high values indicating more public gender egalitarianism to fix direction. The difficulty β of “disagree” (on the four-point, “strongly agree” to “strongly disagree” scale) to the statement “On the whole, men make better political leaders than women do” is set to 1 to identify location, and for each question q the difficulties for increasing response categories r are constrained to be increasing. The sum of δ_{kq} across all countries k is set to zero for each question q :

$$\sum_{k=1}^K \delta_{kq} = 0 \quad (5)$$

Finally, the logistic function is used to transform $\bar{\theta}'_{kt}$ to the unit interval and so give the bounded mean of latent public gender egalitarianism, $\bar{\theta}_{kt}$, which is our parameter of interest here (see Solt 2020, 3–8).

distributions. The initial value of the mean unbounded latent trait for each country, $\bar{\theta}'_{k1}$, is assigned a standard normal prior, as are the transition variances $\sigma_{\bar{\theta}'}^2$ and σ_{σ}^2 ; the initial value of the standard deviation of the unbounded latent trait for each country, σ_{k1} , is drawn from a standard lognormal prior distribution. The overall dispersion, ϕ , receives a somewhat more informative prior drawn from a gamma(4, 0.1) distribution that yields values that are well scaled for that parameter.

Appendix D: Confirming the Unidimensionality of Public Gender Egalitarianism

To provide further confirmation of the unidimensionality of public gender egalitarianism, we used the survey items listed in Appendix A to estimate separate indices of gender egalitarianism in politics and in the workplace. As shown in Figure S2, these two indices both correlate very highly with the PGE scores and with each other, reinforcing the conclusion that public gender egalitarianism exists as a single dimension across countries and years.

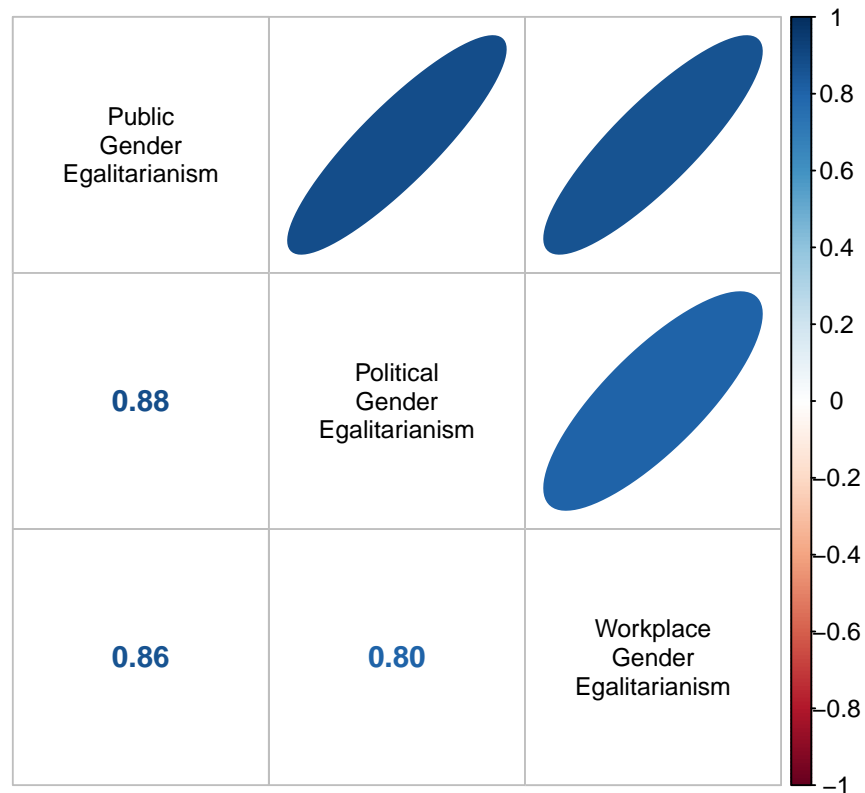


Figure S2: Pairwise Correlations Among PGE Index and Separate Political and Workplace Egalitarianism Indices

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