

## **A. Technical Appendix to the article “Collective Religiosity and the Gender Gap in Attitudes towards Economic Redistribution in 86 Countries, 1990-2008”.**

The following Appendix discusses several robustness checks estimated to validate the results detailed in the main text. One possible concern is that the results are driven by one particular dimension of religiosity. Because religious experience is essentially multidimensional (Durkheim 1995[1912], 44) and recent research notes that different dimensions of religiosity affect political attitudes in their own way (Eisenstein 2006, 338; Layman 1997, 296-297), we consider three alternative measures of *societal religiosity* (self-perception of religiosity, importance of religion and participation in collective religious services) to check whether different measures of religiosity might influence the pro-redistribution gender gap in different ways.

We estimate three additional Models that measure *societal religiosity* with the variables *self-identified religious*, *importance of religion* and *religious practice*.<sup>1</sup> Figure 5 (in the main text) depicts the main results of these additional analyses (estimates are reported in Table A1). It displays changes in the effect of *female* and the estimated values for men and women at different standardized values of the three additional country-level variables. It further indicates that *self-identified religious*, *importance of religion* and *religious practice* have strong and significant moderating impacts on *female*. Gender differences in pro-redistribution attitudes remain significant ( $p < .05$ ) only up to one standard deviation above the mean of *religious practice* and *self-identified religious*, and half standard deviations above the mean of *importance of religion*. It is clear that the indicator *importance of God* has a stronger moderating effect than any other variable. At the same time, *importance of religion* has a slightly stronger moderating impact on *female*

than *self-identified religious* and *religious practice*. It is also worth noting that neither individual *importance of religion* nor one's *religious practice* have a significant effect on preferences for redistribution.

Table A1. Parameter estimates predicting the demand for redistribution in 86 countries, 1990-2008 (WVS)

	Model 1		Model 2		Model 3	
<i>Individual level variables</i>						
Female	.152***	(.020)	.148***	(.018)	.139***	(.020)
Self-identified religious	-.167***	(.038)				
Importance of religion			-.053	(.032)		
Religious practice					-.029	(.033)
Age	.001	(.002)	.001	(.002)	.001	(.002)
Unemployed	.165***	(.037)	.170***	(.036)	.170***	(.034)
Inactive	.105***	(.024)	.104***	(.023)	.106***	(.023)
Income	-.119***	(.010)	-.118***	(.010)	-.113***	(.008)
Low education (ref. cat.)						
Middle education	-.395***	(.043)	-.385***	(.043)	-.377***	(.044)
Upper education	-.667***	(.068)	-.649***	(.067)	-.645***	(.067)
Number of children	-.000	(.010)	-.001	(.009)	-.000	(.009)
Year	.014	(.010)	.019	(.010)	.021*	(.010)
Constant	5.565***	(.411)	5.228***	(.378)	5.127***	(.332)
<i>Country level variables</i>						
Other country (ref. cat.)						
Catholic country	.143	(.378)	.380	(.341)	.491	(.312)
Muslim country	-.036	(.523)	.129	(.519)	.112	(.460)
Orthodox country	.232	(.366)	.401	(.363)	.195	(.356)
Protestant country	.352	(.376)	.574	(.342)	.634*	(.306)
<i>Country-year level</i>						
Self-identified religious	.001	(.005)				
Importance of religion			-.007	(.004)		
Religious practice					-.012**	(.004)
Church-state integration log	-.098	(.147)	-.089	(.137)	-.050	(.139)
GDP per capita log	.321**	(.119)	.205	(.120)	.137	(.128)
Fem. lab. force	-.011	(.010)	-.014	(.010)	-.012	(.010)
Women in Parliament log	.152	(.181)	.149	(.183)	.142	(.165)
Government expenditure	-.022	(.019)	-.022	(.019)	-.032	(.020)
<i>Cross-level interactions</i>						
Female*Self-identified	-.004***	(.001)				
Female*Imp. of relig.			-.005***	(.001)		
Female*Religious practice					-.002*	(.001)
Female*Church-state int.	-.009	(.031)	-.008	(.030)	-.016	(.032)
Female*GDP per capita	.053*	(.025)	.032	(.024)	.060*	(.025)
Female*Female lab. f.	.003	(.002)	.001	(.002)	.004**	(.002)
Female*Women in parl.	.044	(.038)	.032	(.041)	.022	(.035)
Female*Gov. exp.	-.001	(.004)	-.004	(.004)	-.002	(.004)
<i>Random Effects - Level 3</i>						
Variance (Constant)	.440	(.123)	.357	(.107)	.424	(.118)
Variance (Female)	.010	(.005)	.006	(.004)	.012	(.005)
Covariance (Constant,	.008	(.022)	.002	(.018)	.008	(.021)
<i>Random Effects - Level 2</i>						

Variance (Constant)	.357	(.076)	.409	(.090)	.328	(.071)
Variance (Female)	.013	(.007)	.014	(.007)	.012	(.007)
Covariance (Constant,	-.005	(.013)	-.011	(.013)	-.001	(.011)
Residual variance	7.826	(.246)	7.776	(.245)	7.770	(.235)
Observations	199,106		207,197		202,953	
Country-years	172		174		170	
Countries	85		86		85	
Log-likelihood	-479825.42		-498930.10		-488528.93	

Notes: \* p<.05, \*\* p<.01, \*\*\* p<.001 (two-tailed test). Standard errors are in brackets.

A further potential concern with the conclusions reached is that we had to use *household* income as a control variable, since the WVS database does not contain data on *individual* income. It could be argued, for instance, that married women, wealthier than their male partners, should be expected to prefer less redistribution even though, as we learned from another question in the database, less than one third of the households represented in our database have *female* as the chief wage earner (28.5%). To check whether the gender of the household's chief wage earner affects the results, we re-estimate our models on a sub-sample of cases in which a man is the chief wage earner. Since the size and significance of the coefficients do not change substantially, the results shown in Model 1 in Table A2 are consistent with the findings reported in the main text. In fact, the effect of *female* increases from .158 in the baseline model to .188 in the sub-sample, while the effect of the interaction term *female\*societal religiosity* decreases in absolute terms from -.066 to -.051, although it remains highly significant (p<.001). That rules out the possibility that our findings reflect differences in the intra-household distribution of incomes by country. As we should expect, women in male breadwinner households are more supportive of redistribution than men but, at the same time, this effect becomes smaller as societal religiosity increases.

Table A2. Parameter estimates predicting the demand for redistribution in 86 countries, 1990-2008

	Model 1 (male-wage earner)		Model 2 (without outliers)		Model 3 (missing income)	
<i>Individual level variables</i>						
Female	.188***	(.022)	.165***	(.017)	.156***	(.017)
Individual religiosity	-.034***	(.007)	-.033***	(.006)	-.033***	(.006)
Age	.001	(.002)	.001	(.002)	.001	(.002)
Unemployed	.171***	(.047)	.178***	(.036)	.203***	(.036)
Inactive	.090**	(.028)	.108***	(.023)	.116***	(.022)
Income	-.126***	(.010)	-.118***	(.009)	-.116***	(.009)
Income missing					-.018	(.041)
Low education (ref. cat.)						
Middle education	-.387***	(.045)	-.386***	(.043)	-.401***	(.040)
Upper education	-.662***	(.069)	-.660***	(.068)	-.690***	(.064)
Number of children	.001	(.010)	.000	(.009)	.000	(.009)
Year	.019	(.012)	.018	(.011)	.019	(.011)
Constant	5.234***	(.416)	5.265***	(.419)	5.232***	(.403)
<i>Country level variables</i>						
Other country (ref. cat.)						
Catholic country	.342	(.375)	.316	(.380)	.333	(.367)
Muslim country	.068	(.539)	.115	(.534)	.083	(.531)
Orthodox country	.396	(.372)	.296	(.392)	.320	(.359)
Protestant country	.564	(.366)	.413	(.369)	.538	(.356)
<i>Country-year level</i>						
Societal religiosity	-.080	(.061)	-.124*	(.060)	-.074	(.060)
Church-state integration	-.087	(.143)	-.135	(.134)	-.102	(.138)
GDP per capita log	.220	(.121)	.213	(.119)	.242*	(.119)
Fem. lab. force	-.014	(.010)	-.016	(.009)	-.014	(.010)
Women in parliament log	.169	(.184)	.172	(.185)	.158	(.194)
Government expenditure	-.026	(.019)	-.024	(.019)	-.024	(.019)
<i>Cross-level interactions</i>						
Female*Soc. religiosity	-.051***	(.012)	-.074***	(.012)	-.061***	(.012)
Female*Church-state int.	-.027	(.031)	-.025	(.027)	-.010	(.029)
Female*GDP per capita	.072**	(.025)	.027	(.024)	.031	(.025)
Female*Female lab. f.	.002	(.002)	.000	(.002)	.002	(.002)
Female*Women in parl.	.018	(.037)	.041	(.039)	.026	(.040)
Female*Gov. exp.	-.006	(.004)	-.007	(.004)	-.005	(.004)
<i>Random Effects - Level 3</i>						
Variance (Constant)	.356	(.108)	.333	(.100)	.345	(.103)
Variance (Female)	.003	(.005)	.005	(.003)	.003	(.003)
Covariance (Constant,	.000	(.022)	.000	(.017)	.004	(.018)
<i>Random Effects - Level 2</i>						
Variance (Constant)	.431	(.092)	.419	(.093)	.414	(.090)
Variance (Female)	.021	(.010)	.013	(.007)	.019	(.007)
Covariance (Constant,	-.015	(.013)	-.012	(.014)	-.007	(.014)
Residual variance	7.745	(.259)	7.772	(.242)	7.809	(.237)
Observations	156,923		210,902		233,928	
Country-years	175		169		175	
Countries	86		84		86	
Log-likelihood	-378184.64		-507738.39		-564376.18	

Notes: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$  (two-tailed test). Standard errors are in brackets.

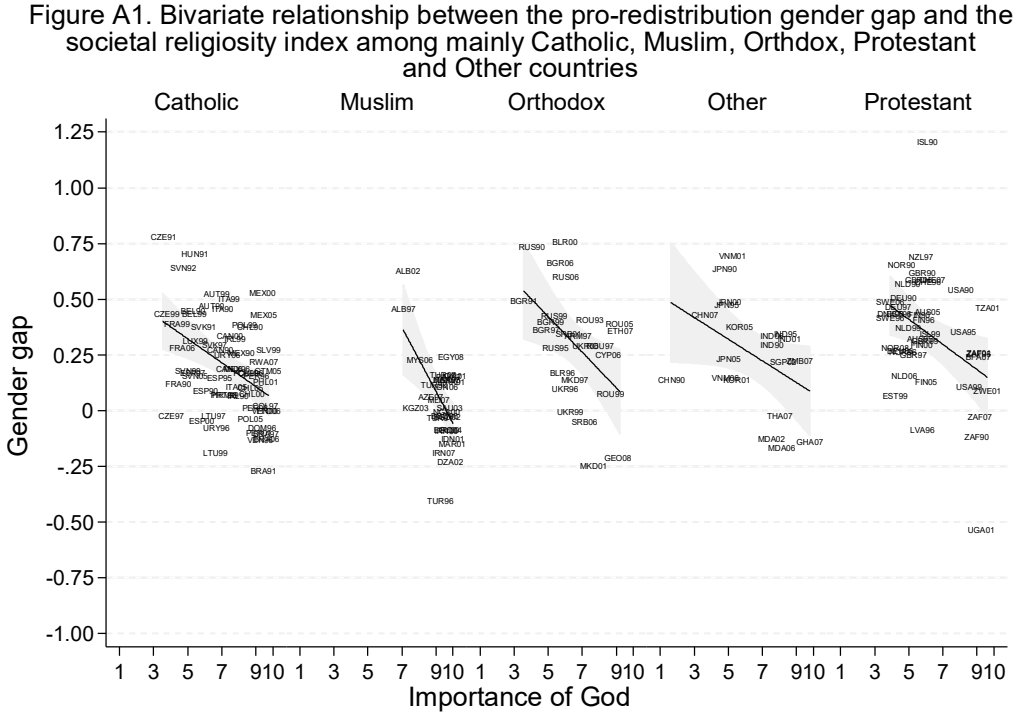
Another possible concern is that the results are shaped by the presence of highly influential country-years. We therefore compute two diagnostic statistics to detect influential observations at the country-year level: Cook's distances and dfBETA. Influential observations are those having Cook's distances and dfBETAs for the interaction term *female\*societal religiosity* above the cut-off point. Following van der Meer et al. (2010: 175), the cut-off for Cook's distances is  $4/n$  and the cut-off point for the absolute value of dfBETA is  $2/\sqrt{n}$  (where  $n$  is the number of observations at level 2).<sup>2</sup> According to this rule, China (1990), Czech Republic (1991), Czech Republic (1998), Tanzania (2001), Vietnam (2001) and Vietnam (2006) can be potentially – albeit moderately – influential cases. Thus, in the second step, we estimate the models discounting the effect of level 2 influential observations. Rather than deleting individuals belonging to these level 2 units, we eliminate their influence first, by modifying the intercept to take the value 0 for individuals in influential countries; and second, by adding a set of dichotomous variables taking value 1 for individuals in each influential country, and 0 otherwise (Langford and Lewis 1998, 125). The results do not change substantially, however, after eliminating the influence of these country-years. In fact, Model 2 in Table A2 shows that the effect of *female* slightly increases from .158 to .165, while *societal religiosity* increases in absolute terms from -.076 to -.124 ( and becomes significant at  $p < .05$ ) and the effect of the interaction term *female\*societal religiosity* increases from -.066 to -.074 ( $p < .001$ ). We can conclude, therefore, that after eliminating potentially influential cases, the explanatory power of religiosity on the gender-gap remains almost unchanged.

Another possible concern is about the influence of missing data on income. The distribution of missing data in this variable is only slightly conditioned by education levels, as the proportion of missing cases ranges from 10.74% for highly-educated individuals (University of college degree) to 11.74% for those who have primary education or less. However, the assumption that this information is missing at random cannot be taken for granted. Therefore, to minimize information loss due to missing data in the income variable and its potential impact on the estimates, we follow the approach proposed by Lu and Treiman (2008, 823). Specifically, we add a dichotomous variable (*income missing*) that measures whether *income* is missing and then assign the average country-year income to individuals with missing information. Thus, the expanded sample includes now more than 230,000 individuals. Nevertheless, results reported in Model 3 in Table A2 indicate that our main findings are not affected by missing data in the income variable.

First, the effect of *income* remains almost unchanged. Secondly, *income missing* is far from significant, which means that redistributive preferences of those who do not report their income do not differ from the preferences of the rest of the sample. Moreover, the size and significance of the rest of the coefficients do not change substantially. Particularly, the effect of *female* changes only from .158 to .156, while the interaction term *female\*societal religiosity* decreases slightly in absolute terms from -.066 to -.061, but without changing significance levels.

An additional concern is that the results are driven by the principles of specific religious denominations. Since countries differ in terms of their major religion or denomination, we examine whether the influence of collective religiosity on the attitudinal predispositions of men and women is heterogeneous across major denominations. We, therefore, break our sample of country-years into the five largest religious groups – i.e.,

countries where Catholicism, Islam, Orthodox Christianity, Protestantism, and Other religions are predominant. The data used to classify the countries is from Inglehart and Norris (2003) and Alesina et al. (2003). In Figure A1, we show the gender-gap against *societal religiosity* in five different plots (one for each dominant religion at the country-level). Our results indicate that the relationship is always negative and the slope quite similar in size. We conclude, then, that the impact of religiosity on the gender-gap in pro-redistribution attitudes is constant across different denominations, indicating that the theoretical argument presented by our research applies to countries with different major denominations.



A final possible concern is the potential bias in estimated coefficients because of omitted variables. Several additional variables have been added to the models reported in the paper in order to ensure that the effect of the relevant variables is robust.<sup>3</sup> In particular,



the baseline model has been re-estimated after controlling for *single mother families*,<sup>4</sup> *religious fractionalization* and *years of education*. However, neither *single mother families* nor its interaction with *female* are significant, and adding this variable does not affect the main results. Secondly, controlling for *religious fractionalization* (Alesina et al. 2003) does not change our findings. Regarding the societal level of education, one potential indicator, which is the mean country value in the years of education as estimated by Barro and Lee (2013), still produces the same results. The effect of *years of education* is non-significant, while the effect of the interaction term between female and societal religiosity remains mostly unchanged.

## Endnotes

<sup>1</sup> “Self-identified religious” represents the percentage of respondents who consider themselves “a religious person” instead of “atheist” or “not a religious person.” “Religion is important” represents the percentage of respondents who consider religion “very important” or “rather important.” “Religious practices” represents the percentage of respondents who attend religious services “once a week” or “more than once a week.”

<sup>2</sup> Since we have 175 country-years, the cut-off point for Cook’s distance is  $4/175=.023$  and the cut-off point for  $dfBETA$  is  $2/\sqrt{175}=.151$ .

<sup>3</sup> These results are available upon request to the authors.

<sup>4</sup> *Single mother families* measures the proportion of households headed by women (where the woman is the chief wage earner) who also have children and who are divorced, widowed or single.

## References

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## B. Tables

Table B1. Countries included in the analysis

Albania	1998, 2002	Latvia	1996
Algeria	2002	Lithuania	1997, 1999
Armenia	1997	Luxembourg	1999
Australia	1995, 2005	Macedonia	1998, 2001
Austria	1990, 1999	Malaysia	2006
Azerbaijan	1997	Mali	2007
Bangladesh	1996, 2002	Mexico	1990, 1996, 2000, 2005
Belarus	1996, 2000	Moldova	2002, 2006
Belgium	1990, 1999	Morocco	2001
Brazil	1991, 1997, 2006	Netherlands	1990, 1999, 2006
Bulgaria	1991, 1997, 1999, 2006	New Zealand	1998
Burkina Faso	2007	Nigeria	1995, 2000
Canada	1990, 2000, 2006	Norway	1990, 1996, 2008
Chile	1990, 1996, 2000, 2005	Pakistan	2001
China	1990, 2007	Peru	1996, 2001, 2008
Colombia	1998	Philippines	2001
Croatia	1999	Poland	1990, 1999, 2005
Cyprus	2006	Portugal	1990
Czech Republic	1991, 1998, 1999	Romania	1993, 1998, 1999, 2005
Denmark	1990	Russia	1990, 1995, 1999, 2006
Dominican Republic	1996	Rwanda	2007
Egypt	2000, 2008	Saudi Arabia	2003
El Salvador	1999	Serbia	2001, 2006
Estonia	1996, 1999	Singapore	2002
Ethiopia	2007	Slovakia	1991, 1998
Finland	1990, 1996, 2000, 2005	Slovenia	1992, 1999, 2005
France	1990, 1999, 2006	South Africa	1996, 2001, 2007
Georgia	2008	South Korea	2001, 2005
Germany	1990, 1997, 2006	Spain	1990, 1995, 2000, 2007
Ghana	2007	Sweden	1996, 2006
Great Britain	1990, 1999, 2006	Switzerland	1996, 2007
Guatemala	2005	Tanzania	2001
Hungary	1991	Thailand	2007
Iceland	1990, 1999	Trinidad	2006
India	1990, 1995, 2001, 2006	Turkey	1990, 1996, 2001, 2007
Indonesia	2001, 2006	Uganda	2001
Iran	2000, 2007	Ukraine	1996, 1999, 2006
Iraq	2004	United States	1990, 1995, 1999
Ireland	1990, 1999	Uruguay	1996, 2006
Italy	1990, 1999, 2005	Venezuela	1996, 2000
Japan	1990, 1995, 2000, 2005	Vietnam	2001, 2006
Jordan	2001	Zambia	2007

Table B2. Descriptive Statistics				
	Mean	SD	Min.	Max.
<b>Dependent variable</b>				
Preference for redistribution	5.096	2.991	1	10
<b>Individual-level variables</b>				
Female	.514	.500	0	1
Individual religiosity	7.377	3.167	1	10
Age	41.429	15.962	15	99
Unemployed	.086	.280	0	1
Inactive	.344	.475	0	1
Income	4.648	2.425	1	10
Low education	.342	.475	0	1
Middle education	.444	.497	0	1
Upper education	.213	.410	0	1
Number of children	1.923	1.748	0	8
Year	1999.484	5.573	1990	2008
<b>Country level variables</b>				
Predominantly Catholic	.324	.468	0	1
Predominantly Muslim	.198	.398	0	1
Predominantly Orthodox	.144	.351	0	1
Predominantly Other	.105	.306	0	1
Predominantly Protestant	.229	.420	0	1
<b>Country-year level variables</b>				
Societal religiosity	7.392	1.959	1.624	10.000
Church-state integration log	2.102	.691	0	3.761
GDP per capita log	9.386	.953	6.742	11.227
Female labor participation	54.584	16.563	12.900	89.000
Women in parliament log	2.483	.732	0	3.908
Government expenditure	16.254	5.110	4.404	27.266

Table B3. Parameter estimates predicting the demand for redistribution in 86 countries, 1990-2008 (WVS)

	Model 1		Model 2		Model 3		Model 4		Model 5	
<i>Individual level variables</i>										
Female	.150***	(.026)	.157***	(.018)	.151***	(.025)	.155***	(.026)	.158***	(.017)
Individual religiosity	-.033***	(.006)	-.033***	(.006)	-.033***	(.006)	-.033***	(.006)	-.033***	(.006)
Age	.002	(.002)	.002	(.002)	.002	(.002)	.002	(.002)	.001	(.002)
Unemployed	.176***	(.036)	.178***	(.036)	.176***	(.035)	.176***	(.035)	.178***	(.036)
Inactive	.103***	(.023)	.107***	(.023)	.103***	(.023)	.103***	(.023)	.109***	(.023)
Income	-.118***	(.009)	-.118***	(.009)	-.118***	(.009)	-.119***	(.009)	-.118***	(.009)
Low education (ref. cat.)										
Middle education	-.385***	(.043)	-.386***	(.043)	-.385***	(.043)	-.386***	(.043)	-.386***	(.043)
Upper education	-.658***	(.068)	-.659***	(.068)	-.658***	(.068)	-.659***	(.068)	-.660***	(.068)
Number of children	-.000	(.009)	.000	(.009)	-.000	(.009)	-.000	(.009)	.000	(.009)
Year	.021*	(.009)	.029**	(.010)	.024*	(.010)	.020	(.011)	.020	(.011)
Constant	5.426***	(.171)	4.926***	(.401)	5.053**	(.360)	5.175***	(.406)	5.174**	(.404)
<i>Country level variables</i>										
Other country (ref. cat.)										
Catholic country			.632	(.357)	.529	(.328)	.367	(.368)	.371	(.367)
Muslim country			.288	(.441)	.123	(.419)	.108	(.536)	.109	(.534)
Orthodox country			.211	(.382)	.141	(.361)	.378	(.366)	.378	(.364)
Protestant country			.622	(.350)	.563	(.325)	.584	(.357)	.586	(.358)
<i>Country-year level</i>										
Societal religiosity			-.098	(.057)			-.099	(.062)	-.076	(.061)
Church-state integration					-.048	(.135)	-.116	(.141)	-.107	(.140)
GDP per capita log							.247*	(.123)	.235*	(.120)
Fem. lab. force							-.014	(.010)	-.014	(.010)
Women in parliament log							.165	(.181)	.150	(.188)
Government expenditure							-.027	(.019)	-.025	(.019)
<i>Cross-level interactions</i>										
Female*Soc. religiosity			-.078***	(.008)					-.066***	(.012)
Female*Church-state int.					-.060	(.034)			-.018	(.028)
Female*GDP per capita									.031	(.024)
Female*Female lab. f.									.001	(.002)
Female*Women in parl.									.034	(.039)

Female*Gov. exp.									-0.005	(.004)
Random Effects - Level 3										
Variance (Constant)	.520	(.122)	.421	(.105)	.463	(.117)	.369	(.107)	.363	(.107)
Variance (Female)	.033	(.008)	.007	(.004)	.030	(.008)	.031	(.008)	.005	(.003)
Covariance (Constant,	.049	(.025)	.007	(.018)	.034	(.029)	-.006	(.043)	.002	(.017)
Random Effects - Level 2										
Variance (Constant)	.423	(.101)	.425	(.097)	.420	(.097)	.408	(.089)	.409	(.089)
Variance (Female)	.013	(.008)	.014	(.007)	.013	(.008)	.013	(.008)	.013	(.007)
Covariance (Constant,	-.007	(.013)	-.006	(.012)	-.007	(.013)	-.009	(.013)	-.009	(.012)
Residual variance	7.772	(.242)	7.772	(.242)	7.772	(.242)	7.772	(.242)	7.772	(.242)
Observations	210,902		210,902		210,902		210,902		210,902	
Country-years	175		175		175		175		175	
Countries	86		86		86		86		86	
Log-likelihood	-507794.80		-507766.50		-507790.76		-507784.08		-507755.65	

Notes: \* p<.05, \*\* p<.01, \*\*\* p<.001 (two-tailed test). Standard errors are in brackets.