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Telecommunication ties and gender ideologies in the age of globalization: International telephone networks and gender attitudes in 47 countries

Xiaoling Shu¹ , George Barnett² and Robert Faris¹

Abstract

Scholars have posed different hypotheses on the impact of global telecommunications on value orientations. We analyze and characterize the global telecommunication network and test a series of hypotheses on the relationship between gender values and three types of telephone connections: ties with the global society, ties with Western nations, and ties within groups of nations sharing similar cultural, religious, political, or geographical traits. We use multilevel models and data on two levels, between-country telecommunications network data from TeleGeography, and individual-level data ($N = 70,225$) on people living in 47 countries from the World Value Survey, waves III and IV. Countries with high degrees of communication insulation, measured as a high percentage of within-group ties of all global telephone links, hold less egalitarian attitudes toward gender equality. This negative effect of group insulation depresses the egalitarian effects of younger birth cohort, college education, and higher income. Embeddedness in a localized information diffusion network and isolated from global communication is associated with less egalitarian attitude toward gender equality, but neither global ties nor ties with Western countries are linked with gender attitudes.

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Sex and gender, network, multilevel models, globalization

The process of globalization and its impact on global society have generated a massive body of research on this topic (for a review, see Guillen, 2001). Globalization is perceived as a multifaceted process, encompassing economic, social, and political dimensions of networks of movement of goods, money, people, and ideas beyond national boundaries. Scholars have posed different hypotheses on the impact of global communication on value orientations (Holton, 2000). Some argue that the process of globalization is far-reaching and that its sweeping impact will lead to global convergence towards Western values or a 'global culture', while others see the process of globalization as being more fragmented and believe that its impacts vary from one society to another (Elasma, 2003). Little systematic analysis has been done on the impacts of these globalization processes on attitudes and values (for a review, see Norris and Inglehart, 2009).

We analyze and characterize the global telecommunications network and test a series of hypotheses on the relationship between location in this network and value convergence/divergence among nations. Using multilevel models, we test whether the influences of the West reach other countries through a global network or countries embedded in localized information diffusion networks are likely to share similar value orientations and mutually reinforce each others' beliefs. We identify three types of location in the international telephone networks: ties with all countries, ties with Western countries, and percentage of ties with countries within the same cultural, religious, or political group. We use data on two levels: between-country telecommunications network data from TeleGeography, and individual-level data ($N=70,225$) on people living in 47 countries from the World Value Survey, waves III and IV.

Convergence or divergence in values

There are two opposing perspectives on the nature of value transformation in the global society. One group argues for the global convergence of a series of value orientations, while the other group advances a model of heterogeneous development often defined by the cultural, religious, and political traditions of nations. These perspectives envision divergent trajectories of change in values and orientations resulting from the process of globalization.

The convergence perspective

The convergence perspective argues that the interconnections between countries contribute to a more homogeneous world adopting the Western model of social

organization and lifestyle (Liebes, 2003). The global flow of information, ideas, trades, people, and cultural projects is strong, and barriers that prevent flows of things, ideas, and people that homogenize cultures are weak (Ritzer, 2010).

The convergence perspective advances two sources of global cultural convergence: more powerful cultures, and a global culture. Local cultures can be shaped by other, more powerful cultures or even a global culture (Ritzer, 2010)—for example, research and theoretical development on the concepts and models of the powerful influence of the West, particularly the United States, in Americanization and the McDonaldization theory, which highlights the powerful influences of the United States in cultural and social organizations of global societies. Other research focuses on comparable developments in cultural practices across diverse societies and proposes the emergence of a homogenized ‘global culture’ (Robertson, 1992) or ‘world culture’ (Meyer et al., 1997). Evidence is voluminous that more and more people seem to consume common global brand products (e.g., iPhones, Nike shoes) and services (e.g., Facebook, Google, Skype), watch the same TV programs (e.g., *The Voice*) and movies, and listen to the same music (Prasad and Prasad, 2006). Globalization helps to create a new class of people who belong to an emergent global culture that is beyond the scope of single nation states.

The divergence perspective

The divergence perspective argues that in reaction to globalization, traditional societies consciously isolate their citizens and society from the influence of foreign ideas and values, particularly those from Western societies. Since the powerful forces of globalization are weakening local cultures and eroding national identity, globalization in the form of American or Western cultural traditions is often considered a destructive force and an assault on local cultures (Berger, 2002; Held and McGrew, 2003; Jaja, 2010; Prasad and Prasad, 2006). The nation states of traditional societies purposefully generate a network structure in which they promote and limit exchange activities to only being conducted with countries deemed similar to their own regarding certain cultural values (Matei, 2006). Divergence or heterogeneity in cultural values are fundamentally related to barriers that prevent flows of information that will homogenize the local culture (Barnett and Rosen, 2007; Ritzer, 2010). The lack of network ties among nations is one such barrier to cultural convergence (Barnett and Rosen, 2007).

According to this perspective, cultures do not remain unaffected by global flows and globalization in general; some peripheral or superficial changes will occur, but the core of the culture will remain intact and unaffected (Ritzer, 2010). These societies may have powerful family, school, community, religious, and societal influences that prevent people from straying from the prevailing values, even those who are heavy media users (Norris and Inglehart, 2009: 229). The social segments, such as the educated, young and high-income, which often lead and bring about social change in other societies, have shown less influence in these

insulated societies that are isolated from the global society in value transitions (Chen and Barnett, 2000).

Hypotheses

Since the 1960s, many societies have become more accepting of gender equality and more liberal regarding gender relations (Bell, 1973; Wilensky, 2002). Evidence abounds for changing popular attitudes toward gender relationships, more liberal perspectives on women's rights, status and gender division of labor, and the proliferation of national and international laws and policies that promote gender equality (Bradley and Charles, 2003; Inglehart and Norris, 2003; Meagher and Shu, 2019; Ramirez et al., 1997; Shu, 2004; Shu and Meagher 2018;). This increasingly egalitarian trend is called a 'rising tide' of sweeping global convergence toward gender equality (Inglehart and Norris, 2003).

Gender equality is part of a set of beliefs that govern the goals and processes of economic, social, and political development. This cultural model was initiated among the elites of northwestern Europe and has spread to a broad range of ordinary people throughout the world (Thornton et al., 2015). The ideal gender relationship is exemplified by northwestern Europe as the standard of judging what a desirable good life is. Evidence of acceptance of this developmental idealism regarding gender equality is considered widespread even in some of the least-developed societies, although the change in this value is often uneven (Thornton et al., 2015).

Based on the idea of the emergence of a 'global culture' (Robertson, 1992) or 'world culture' (Meyer et al., 1997), we formulate two global convergence hypotheses:

GC1. ~~With~~ more *global* communication ties, people hold more egalitarian gender attitudes.

GC2. The deviation in gender attitudes from the average attitude of all countries is smaller among individuals ~~living~~ in countries ~~that have more communication ties with all other countries.~~

Alternatively, in line with the argument that the powerful influences of the Western societies play a dominant role in the cultural and social organization of global society (Barber, 1996; Howes, 1996; Liebes and Katz, 1993; Ritzer, 1993, 1996, 2010; Ritzer and Liska, 1997), we formulate two Westernization convergence hypotheses:

WC1. ~~With~~ more communication ~~with~~ *Western* countries, people hold more egalitarian gender attitudes.

WC2. The deviation in gender attitudes from the average attitudes of Western countries is smaller among individuals ~~living~~ in countries that have more communication ties with the *Western* countries.

Countries can also be nested in communication networks that are intentionally designed by their regimes to actively reject global or Western influences

(Barber, 1997) or unintentionally as countries are constrained by their level of economic development, geographical location, language, trade, and information and migration flows. Citizens of societies that are open, affluent, and democratic encounter fewer constraints in communication with the global societies as these countries have more access to telecommunication facilities, possess resources for telecommunication tools, and impose lesser constraints on the use of telecommunication. As a result, Western societies generally forge more extensive communication ties with other countries, while countries with political, religious, and economic constraints form fewer communication ties and usually only with countries that are less diverse. These latter countries are bounded by their constraints and tend to communicate more exclusively with those sharing similar traits, connect with each other, and form reciprocal ties (Lee et al., 2007). As a result, these countries form in-groups (geocultural groups) that are relatively independent and insulated from the influences of the larger global societies, including the West.

We thus formulate two communication insulation hypotheses:

CI1. The more a country's communication ties are restricted to its *geocultural group*, the less egalitarian are people's gender attitudes.

CI2. The more ties within a *geocultural group*, the less the deviation in gender attitudes from the average attitude of its *geocultural group*.

The effect of communication insulation works to diminish value transformation in the segments of societies that tend to lead the population in value change. An extensive body of literature shows that those with more education and income and younger cohorts are harbingers of social change (Meagher and Shu, 2019; Shu, 2004; Shu and Meagher, 2018; Shu and Zhu, 2012). These segments of a society are the first to be enlightened and lead the rest of the population in their shifts toward new ideas and values. Although some of the young, well-educated, and high-income individuals in countries with constrained global communication may have the knowledge, skills, and financial resources to circumvent macro-constraints in communication, this only impacts a small fraction of this sub-population, and these groups are still impaired in their ability to adopt new values and ideas and lead value changes in their societies, compared with the young and educated in societies with free flows of information from the global society. In addition, before the early 1990s, the majority of countries had little or no access to the internet. Telephone communication was the dominant and only form of communication for the vast majority of the global population. There was no alternative technology that young people could use to circumvent telecommunication constraints. We thus formulate the segmented communication insulation hypothesis:

SC. The stronger the communication ties *within a geocultural group*, the less egalitarian are the gender attitudes of individuals of young birth cohorts, those who are college educated, and people with higher incomes.

Data and measures

We use data from the World Value Survey, wave III (1995–98) and wave IV (1999–2003)¹ for which measures of gender attitudes and national characteristics are available, excluding countries for which information on gross domestic product (GDP) or maternity leave provision was unavailable for 1994. We use data for 47 nations in the analysis: data for 36 countries came from wave III and 11 countries from wave IV. These are two of a series of waves of surveys conducted by national agencies using both national random and quota sampling. These local agencies used translated survey instruments of almost identical questions, although the nature and quality of interviews varied somewhat among countries (Inglehart, 2000).

We analyze influences on two dimensions of gender attitude: orientations toward gender equality, and perspective on women's dual roles as worker and mother. Three variables measure attitude toward gender inequality: Men should have more right to a job than women when jobs are scarce (Disagree, Neither, Agree); Men make better political leaders than women (Disagree Strongly, Disagree, Agree, Agree Strongly); A university education is more important for a boy than for a girl (Disagree Strongly, Disagree, Agree, Agree Strongly). Two variables measure attitude toward women's dual roles: A working mother can establish warm and secure relationships with her children (Disagree Strongly, Disagree, Agree, Agree Strongly); Both husband and wife should contribute to household income (Disagree Strongly, Disagree, Agree, Agree Strongly). We recoded all of these variables, with higher values representing more egalitarian attitudes.

We also construct three mean values of gender attitudes. The global mean is the average of all countries' average attitudes. The Western mean is the average of all Western countries' attitudes. The group mean is the average of the country means of those countries that belong to the same group as defined by their cultures, religions, geographical locations, and political systems.

We further calculate the deviations of attitudes from these three means. We will use the actual deviations in our graphs to assist visualization of the size and nature (positive or negative) of the deviation. To facilitate modeling, we also calculate the absolute deviations by taking the absolute values of the deviations so that our focus is on the size of these deviations.

Individual-level explanatory variables include gender, age cohort, education, marital status, parenthood, employment status, family income, and religious attendance, as well as controlling for the survey time. Gender is a dichotomous variable: 1 indicates female respondent, 0 otherwise. We use three dichotomous variables for three age-cohort groups at the time of the surveys: Age 15–29, Age 30–50, and 50 and older. A series of four dummy variables measures respondent's highest level of education achieved: primary and below, junior high, senior high, and college and more. These variables are coded 1 if the respondent belongs to the category, 0 otherwise. Three dichotomous variables indicate respondent's marital status: married/living together as married, divorced or separated or widowed, and

single. These variables are coded 1 if the respondent belongs to the category, 0 otherwise. Parenthood is another dichotomous variable coded 1 if the respondent has children, 0 otherwise. Employment is a dichotomous variable measuring whether the respondent is employed, either full-time, part-time or self-employed. It is coded 1 if the respondent is currently in the labor force, 0 otherwise. Three dichotomous variables indicate respondent's family income level within the country: low, middle, or high. Religious attendance is represented by six dummy variables for frequency of attending religious services: more than once a week, once a week, once a month, only on special days, once a year, and never.

Country-level measures come from multiple sources. The telephone data came from TeleGeography (<http://www.telegeography.com/>). The data is millions of minutes of telephone time between countries in 1990. We used data from 1996, 1997 for Saudi Arabia and South Africa, and 1998 data for Zimbabwe. Although our data cover only 47 countries and information on their telephone communication networks, this network depiction is consistent with prior maps of global communications (Barnett et al., 2001; Barnett and Sung, 2005a, 2005b). This pattern is also largely consistent with other patterns of exchanges such as news, films, student flows, patents, trademarks and software, migration, Intergovernmental Organizations (IGOs), trade, air passengers, mail and freight, international aid, arms, conflict, music, books, capital and scientific co-authorships (Barnett and Choi, 1995; Barnett et al., 2001; Chen and Barnett, 2000; Kim and Barnett, 1996, 2000, 2007; Lim et al., 2008; Moon et al., 2010; Nam and Barnett, 2011; Salisbury and Barnett, 1999).

We use three measures of telephone communication ties: 'global ties' means the total number of countries with which the country of interest has telephone communication of at least one million minutes; 'Western ties' means the total number of Western countries with which the country of interest has telephone communication of one million minutes; 'percentage of within-group ties out of total ties' equals the ratio between the number of telephone ties with members of the same cultural, religious, political, or geographical group out of the total number of global ties. Countries in the survey are classified into the following seven groups: Western-social democratic, Western-liberal and conservative, former socialist, Islamic, Latin American, African, and Asian countries.

Three measures are control variables. Measures of GDP per capita in 1994 come from the World Bank (2012). GDP per capita is measured in current international dollars by using purchasing power parity measure, which is more appropriate in capturing the countries' true levels of economic development. We use the log transformation. Female labor force participation rate in 1994 is provided by the International Labor Organization (2012) and indicates the percentage of female population ages 15 and older who are economically active. A third country-level measure gauges women's level of autonomy in a society. This is a latent construct from two indicators. The first indicator comes from the World Value Surveys. Because personal autonomy for the majority of adults in contemporary industrial societies is closely linked to whether the individual gains an independent income

from work, as well as the extent of this income, we aggregate the proportion of self-identified female household chief wage earners for each country to indicate the extent of women's economic autonomy from men.² The second measure is the amount of financial support women receive during maternity/parental leave. Women's status and roles are influenced by public child care and parental leave policies (legislated job protection, paid maternity leave, tax relief for childcare, public childcare, etc.). Although these enactments used to be documented only for the rich democracies (Gornick, Meyers, and Ross, 1998), the newly available International Labor Organization (IOL) database provides information for a large number of rich and poor countries and contains historical data on maternity and paternity legislation and paid (social security/insurance or employer) or unpaid maternity and paternity leave (IOL, 2010 and 2011). Using historical data from 1994, we construct a measure of the duration of publicly-funded maternity leave (weeks) from three variables: number of weeks of total maternity leave; percentage of pay provided during maternity leave; and the source of pay (employer, social security/insurance, both employer and social security). We calculate the total number of weeks of publicly-funded maternity leave by multiplying the leave duration by the percentage of pay provided from either social security or social insurance.³ These two measures, female chief wage earners and length of paid maternity leave, are then used to construct one composite measure of women's autonomy using factor analysis. This single factor accounts for 79% of the variance, with both factor loadings larger than .89, and the Cronbach's Alpha is .89, indicating a high degree of internal validity among the two indicators.

Confirmatory factor analysis of gender attitude

The five items on gender attitudes measure two meaningful latent constructs. *Gender Equality* taps into attitudes toward women's equal rights compared to men in the public spheres of work, politics, and education. *Women's Dual Roles* encompass views about women's combined public and domestic roles. We use confirmatory factor analysis to identify these latent constructs¹ (Joreskog and Sorbom, 1993), as described by the following equation:

$$y = \lambda_y \eta + \varepsilon \quad (\text{A1.0})$$

where y is a vector of observed indicators, λ_y is a matrix of parameters linking the latent constructs η to the observed indicators, and ε is a vector of error terms. The model assumes that each indicator is a function of an underlying latent construct η and an error term ε that is independent of the latent construct (Joreskog and Sorbom, 1993). Each of the five gender-attitude items is treated as an indicator of only one underlying latent construct—one dimension of gender attitude.⁴ To allow for the possibility that this measurement model as expressed in Equality (A1.0) varies between countries, we estimate this model separately for 47 countries by comparing two models, one in which the measurement coefficients are allowed

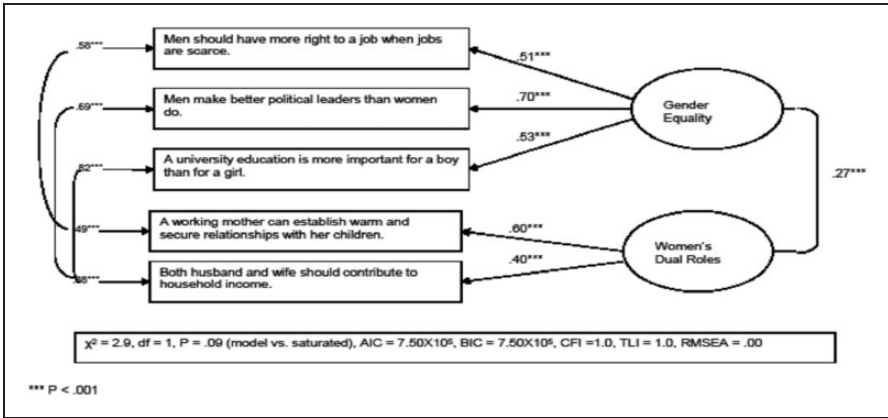


Figure 1. Measurement model for gender attitudes: gender equality and women’s dual roles, World Value Survey waves III and IV (N of countries = 47 and N of individuals = 70,225) [AQ4]

to vary across countries and another in which the measurement coefficients are constrained to be identical. Results show that these two models are not statistically different; thus, we determine that there is no basis for rejecting the hypothesis that parameters of the measurement models were equal across countries.⁵

Figure 1 presents the final parameter estimates for the measurement model. All five indicators loaded positively and significantly on the latent constructs at $P < .001$ (two-tailed test). On the basis of these factor loadings, we construct composite scores of the gender attitudes on these two dimensions. These composite measures are dependent variables in the multilevel cross-classified models.

Multilevel models

To consider the combined effects of national- and individual-level influences on gender attitudes, we estimated a series of multilevel models (Goldstein, 1987; Raudenbush and Bryk, 2002). These models have two components. The micro-component incorporates individual characteristics as expressed in the following equation:

$$\begin{aligned}
 Y_{ij} = & \beta_{0j} + \beta_{1j}G + \sum_{k=2}^3 \beta_{kj}AC_k + \sum_{k=4}^5 \beta_{kj}ED_k + \sum_{k=6}^7 \beta_{kj}M_k + \beta_8P + \beta_9E_k \\
 & + \beta_{10}FPWE_k + \beta_{11}CWE_j + \sum_{k=12}^{13} \beta_{kj}I_k + \sum_{k=14}^{18} \beta_{kj}R_k + \sum_{i=19}^{25} \beta_{kj}SY_k + \varepsilon_{ij}
 \end{aligned}
 \tag{1.0}$$

where Y_{ij} is one of the measures indicating endorsing gender equality or women’s dual roles or the absolute deviation from the three means (global, Western, and group), G is gender, AC_{2-3} are two measures of age cohort, ED_{4-5} are two measures

of education, M_{6-7} are two measures of marital status, P is parenthood, E is employment status, CWE is chief wage earner of the house, I_{12-13} are two measures of family income, R_{14-18} are five measures of religiosity, and SY_{19-25} are seven dummy variables of survey year, β 's are micro-level coefficients, and ε_{ij} is the micro-level random effect.

The micro-component of the model is applied to each of the countries on which the analysis is based, but we expect the effects of the micro-level variables to vary across countries. In the macro-component of the model, the micro-coefficients are assumed to depend stochastically on macro-level characteristics. We specify two sets of macro-level models with different series of country-level predictors. In the first specification, we use one measure of telephone ties in the macro-model as specified by the following equations:

$$\beta_{0j} = \alpha_{00} + \gamma_{01} TeleTie_j + \mu_{00} \quad (A2.0)$$

where *TeleTie* is one of the three measures of telephone ties (global, Western or group insulation), and the γ 's are coefficients and the μ is a macro error term.

In the second specification, we use three control variables to characterize countries in the macro-component of the multilevel model which can be expressed by the following set of equations:

$$\beta_{0j} = \alpha_{00} + \gamma_{01} TeleTie_j + \gamma_{02} GDP_j + \gamma_{03} FLFP_j + \gamma_{04} WAU_j + \mu_{00} \quad (B2.0)$$

where GDP, FLFP and WAU are GDP per capita, female labor force participation rate, and women's autonomy, for country j , the γ 's are coefficients, and the μ is a macro error term. The intercept β_{0j} is the dependent quantity in the equation.

In the third specification, we add a series of six equations to incorporate cross-level interaction terms between *TeleTie* and individual characteristics: two categories of education—middle school and college, two measures of birth cohorts—the middle cohort and the youngest cohort, and two measures of income—middle income and high income. For each of these six measures, we construct an equation as follows:

$$\beta_{kj} = \alpha_{00} + \gamma_{k1} TeleTie_j + \gamma_{kj} GDP_j + \gamma_{k3} FLFP_j + \gamma_{k4} WAU_j + \mu_{k0} \quad (C2.0)$$

We estimate three sets of models on the two measures of gender attitude and the deviations from the means. We estimated these models using HLM 8.0 (Raudenbush and Bryk, 2002).

Analysis

We employ three steps to analyze the data. We first illustrate the association between the two dimensions of gender attitude among people of the 47 countries studied to form five zones of gender ideology and locate these countries in this

two-dimensional space. We then graph the relationship between telephone ties—global ties, Western ties, and group insulation—and the two gender attitudes as well as the deviations from three means—global mean, Western mean, and group means. Lastly, we use a series of multilevel models to estimate telephone ties and the cross-level influences between telephone ties and individual characteristics on attitude toward gender equality and women’s dual roles, as well as deviations from the global, Western and group means.

Mapping frames of gender ideology

Based on the two latent constructs of attitude toward gender equality and women’s dual roles, we map the 47 countries’ gender attitudes based on the four-cell domain: Egalitarian Combined Spheres, Egalitarian Separate Spheres, Male Primacy with Dual Roles for Women, and Patriarchal Separate Spheres. Figure 2 illustrates country average attitudes toward gender equality and women’s dual roles by country type. We use country average attitudes to represent country norms in these perspectives. The x-axis represents liberal attitude toward women’s combined work and family roles; the y-axis represents liberal attitude toward gender equality.

The seven types of countries are located in five zones in this two-dimensional gender ideology domain. First, two social-democratic countries, Sweden and Finland, are in the upper-right cell, labeled as Egalitarian Combined Spheres, characterized by high degrees of supporting nontraditional ideas toward gender equality and women’s dual roles. A third social democratic country, Norway, shares an egalitarian attitude toward gender equality although its outlook on women’s dual roles is slightly less liberal than that of the previous two countries, barely out of the zone for Egalitarian Combined Sphere. Second, all remaining Western countries are located in the upper-left cell, sharing an Egalitarian Separate Spheres ideology. Populations in these countries uphold gender equality ideas in the public spheres of work, education, and politics but are less supportive of the ideas of working mothers and women contributing to family income. Third, most former socialist states are in the lower right cell, endorsing an ideology of Male Primacy with Women’s Dual Roles. People in these countries strongly endorse women’s (including mothers of young children’s) paid employment outside of the home, but are less enthusiastic toward ensuring women’s rights and entitlements in the labor market, education, and political arenas. Fourth, all the Islamic countries are in the most traditional domain of Patriarchal Separate Sphere ideology. Populations in these countries do not support women’s equality rights or their participation in paid employment. Lastly, people in Latin America, Asia and Africa hold gender attitudes that are close to the origin of the two axes, indicating moderate attitudes on both dimensions. Latin American nations place slightly toward the upper left domain (close to liberal and conservative welfare states), Asian countries in the lower left area (close to Islamic countries), and African nations fall right on the axis.

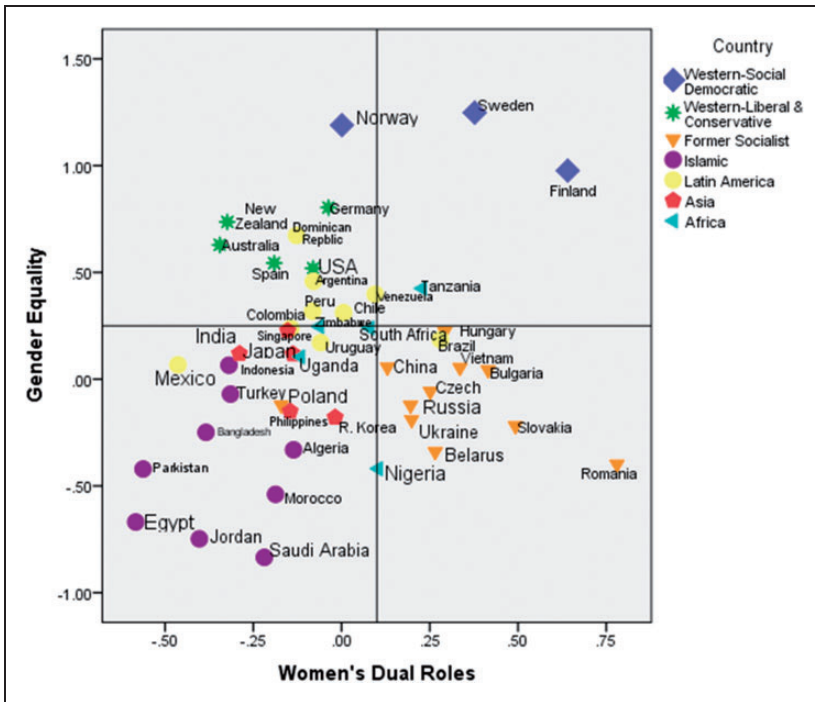


Figure 2. Attitude toward vertical inequality (gender equality) and horizontal differentiation (women’s dual roles) by type of country (N of countries = 47 and N of individuals = 70,225).

Telecommunication ties and gender egalitarianism

Characteristics of telephone ties appear to be correlated with attitude toward gender equality, as illustrated in the left panels in Figure 3. More egalitarian attitude toward gender equality is associated with more total telephone ties with other countries, as shown in the top left graph, and this positive effect appears to be especially prominent among Islamic and Asian countries. More telephone ties with Western countries are also positively associated with egalitarian attitude, and again, this association is pronounced among Islamic countries, in the middle left panel. Lastly, the degree of within-group communication insulation, measured as the percentage of within-group ties out of total ties, is negatively associated with egalitarian attitude, as demonstrated in the bottom left panel. This pattern is especially conspicuous among Islamic countries, with Saudi Arabia, Jordan, and Egypt at the high end of group insulation, with the least egalitarian attitudes, while Indonesia, Bangladesh and Algeria are at the low end of group insulation, with more egalitarian attitudes. Among the three graphs on the right-hand side, only the middle one shows a positive association between ties with the West and egalitarian attitude toward women’s dual roles. The other two do not show any association.

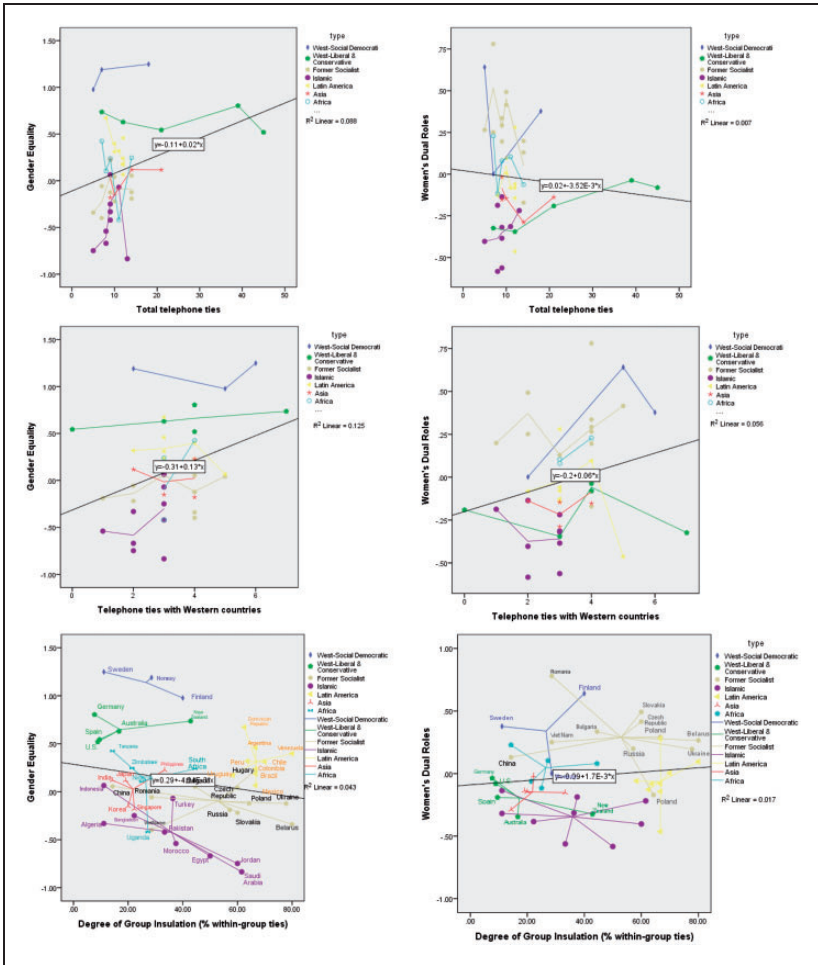


Figure 3. Telephone communication ties and gender attitudes, by country type (N of countries = 47 and N of individuals = 70,225).

Are these associations we observe statistically significant effects? Are these associations artifacts of clustering effects of individual-level characteristics of those residing in the same countries? To test these, we present a multilevel estimation of coefficients in Table 1 controlling for individual-level influences, such as birth cohort, education, marital status, parenthood, employment status, family income, gender, whether female chief wage earner in the house, and religious attendance. For each telecommunication tie with any country in the sample, attitude toward gender equality increases by .02. This increase is more than six times at .137 with each telecommunication tie with a Western country, showing that countries with more connections with Western countries hold more liberal attitudes toward the

Table 1. Effect of global, Western and within-group telephone ties on attitudes toward gender equality and Women's Dual Roles (N of countries = 47, N of individuals = 70,225).

	Gender Equality						Women's Dual Roles					
	Global ties		Western ties		Within group ties		Global ties		Western Ties		Within group ties	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
<i>Country-level Variables</i>												
Telephone Ties	0.020**	0.010	0.137**	0.057	-0.007**	0.003	-0.005	0.006	0.043	0.037	0.001	0.002
<i>Individual-level Variables</i>												
Birth Cohorts (Oldest cohort ≥ 50 is the omitted category)												
Middle Cohort (30-49)	0.091***	0.011	0.091***	0.011	0.091***	0.011	0.015	0.012	0.015	0.012	0.015	0.012
Youngest Cohort (15-29)	0.130***	0.014	0.130***	0.014	0.130***	0.014	0.003	0.016	0.004	0.016	0.003	0.016
Education (Primary School is the omitted category)												
Middle School	0.217***	0.011	0.217***	0.011	0.217***	0.011	0.084***	0.012	0.084***	0.012	0.084***	0.012
College	0.395***	0.014	0.395***	0.014	0.395***	0.014	0.142***	0.015	0.142***	0.015	0.142***	0.015
Marital Status (Married is the omitted category)												
Divorced	0.016	0.015	0.016	0.015	0.017	0.015	0.016	0.017	0.016	0.017	0.016	0.017
Single	0.068***	0.016	0.068***	0.016	0.069***	0.016	0.054***	0.018	0.054***	0.018	0.054***	0.018
Parenthood (Parent = 1)	-0.011	0.015	-0.011	0.015	-0.011	0.015	-0.025	0.017	-0.025	0.017	-0.025	0.017
Employment (Employed = 1)	0.021*	0.011	0.021*	0.011	0.021*	0.011	0.080***	0.012	0.080***	0.012	0.080***	0.012
Family Income (Low Income is the omitted category)												
Middle Income	0.078***	0.010	0.078***	0.010	0.077***	0.010	0.003	0.012	0.003	0.012	0.003	0.012
High Income	0.132***	0.011	0.132***	0.011	0.132***	0.011	0.059***	0.013	0.059***	0.013	0.059***	0.013
Gender (Female = 1)	0.357***	0.010	0.357***	0.010	0.357***	0.010	0.223***	0.011	0.223***	0.011	0.223***	0.011
Female Chief Wage Earner in the House	0.026**	0.011	0.026**	0.011	0.026**	0.011	0.035**	0.012	0.035**	0.012	0.035*	0.012

(continued)

Table 1. Continued.

	Gender Equality						Women's Dual Roles					
	Global ties		Western ties		Within group ties		Global ties		Western Ties		Within group ties	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Religious Attendance (More than once a week is the omitted category)												
Once a week	0.002	0.013	0.002	0.013	0.002	0.013	-0.001	0.015	-0.001	0.015	-0.001	0.015
One a month	0.022	0.016	0.022	0.016	0.023	0.016	0.006	0.018	0.006	0.018	0.005	0.018
Only on special days	0.063***	0.014	0.063	0.014	0.063***	0.014	0.050***	0.016	0.050***	0.016	0.050***	0.016
Once a year	0.060***	0.018	0.060	0.018	0.060***	0.018	0.065**	0.021	0.065*	0.021	0.065**	0.021
Never	0.116***	0.013	0.117	0.013	0.117***	0.013	0.090***	0.015	0.090***	0.015	0.090***	0.015
Intercept	-0.776***	0.142	-0.978	0.197	-0.275***	0.160	-0.185*	0.094	-0.378*	0.131	-0.295*	0.105

***p < .001, **p < .01, *p < .05.

concept of gender equality. Western countries are the pioneers leading this tidal wave of gender egalitarianism. On the other hand, the higher the degree of within-group insulation, as measured by the percentage of within-group ties out of total ties, the more conservative the gender attitude. For each one percent increase in the in-group ties out of total ties, attitude toward gender equality decreases by .007. Since almost all the Latin American countries, most of the former Socialist countries, and some of the Islamic countries have degrees of group insulation higher than 50%, the negative effect of group insulation can only be counter-affected by ties with three or more Western countries. Similar to the results in Figure 3, there is no association between telephone ties and attitude toward women's dual roles. Although the coefficient for ties with Western countries is positive, the effect is not statistically significant.

Do telecommunication ties promote convergence of values by reducing deviation from the normative values? Figure 4 shows the amount of deviation from the global mean, Western mean, and group means in two gender attitudes by total ties, ties with Western countries, and percentage of within-group ties. These graphs generally do not show a pattern of convergence in attitudes, with the exception of two. The graph in the left middle panel shows that with more ties with Western countries, deviations from the mean of Western countries' attitudes toward gender equality tend to shrink. Since most countries hold less egalitarian attitudes than the average attitude in Western countries, their attitudes are all below the zero line. As the number of ties with Western countries increases, the average deviation from the zero line appears to be converging toward the zero line. This is consistent with the Western convergence theory. The top graph on the right, showing the diminishing deviations from the global mean by total number of global telephone ties, illustrates a global convergence toward a global normative attitude toward women's combination of work and family roles. These two graphs provide some evidence supporting a Western convergence on attitude toward vertical gender equality and a global convergence on attitude toward horizontal role differentiation.

Estimates from multilevel models in Table 2 are consistent with the observation from these graphs: more ties with Western countries reduce deviation from the Western attitude on gender equality, while more global ties with all countries reduce deviation from the global average attitude on women's dual roles. With an increase in telephone ties with one Western country, the deviation from Western attitude toward gender equality is reduced by .068. With an increase in telephone ties with any other country, the deviation from the global average attitude toward women's dual roles is reduced by .007. The remaining measures of telecommunication ties are not associated with the amount of deviation in gender attitudes.

The effects of communication insulation and segmented communication insulation

We estimated a series of multilevel models that include additional characteristics of countries to gauge the net effects of telecommunication ties on gender attitudes.

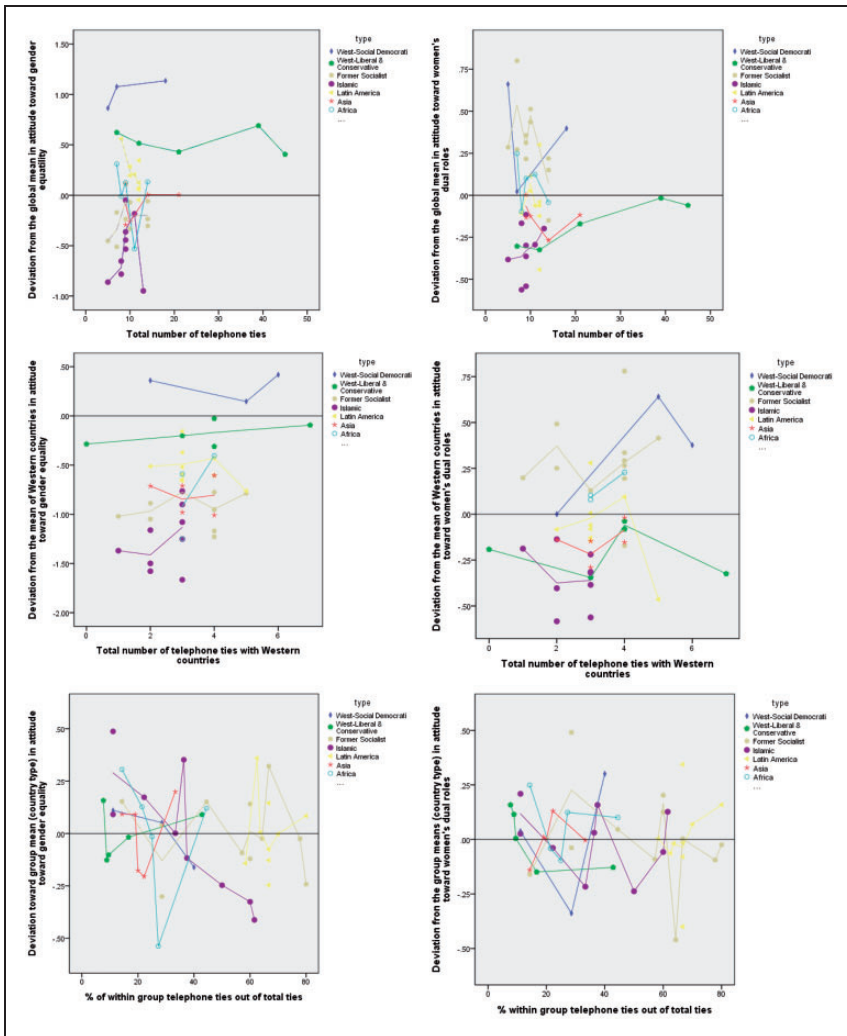


Figure 4. Telephone communication ties and deviation from the global mean, Western mean, and group means in gender attitudes, by country type (N of countries = 47 and N of individuals = 70,225).

These results are in Table 3. After including female labor force participation rate, ln GDP, and a measure of women’s autonomy, neither global telephone ties nor ties with Western countries are statistically associated with attitudes toward gender equality. However, even with these predictors of gender attitudes controlled for, within-group communication ties are negatively associated with egalitarian attitude. Countries that are more insulated in their cultural/religious/political group, as measured by the percentage of within-group telephone ties out of total telephone

Table 2. Effect of global, Western, and within-group telephone ties on absolute deviations from global, Western, and group means of attitudes toward gender equality and women's dual roles (N of countries = 47, N of individuals = 70,225).

	Gender Equality						Women's Dual Roles					
	Global ties on		Western ties on		Within Group Ties on		Deviation from		Western ties on		Within Group Ties on	
	Global Mean Attitude	Std. Err.	Deviation from Western Mean Attitudes	Std. Err.	Deviation from Group Mean Attitude	Std. Err.	Group Mean Attitude	Std. Err.	Deviation from Western Mean Attitudes	Std. Err.	Deviation from Group Mean Attitude	Std. Err.
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
<i>Country-level Variables</i>												
Telephone Ties	-0.003	0.0025	-0.068*	0.036	0.001	0.001	-0.007*	0.003	0.001	0.019	0.001	0.001
<i>Individual-level Variables</i>												
Birth Cohorts (Oldest cohort ≥ 50 is the omitted category)												
Middle Cohort (30-49)	0.008	0.018	-0.078***	0.012	-0.022*	0.009	-0.001	0.010	-0.001	0.010	0.004	0.010
Youngest Cohort (15-29)	0.020	0.0148	-0.046***	0.009	-0.027**	0.007	-0.014	0.008	-0.015*	0.008	-0.010	0.007
Education (Primary School is the omitted category)												
Middle School	-0.078***	0.0153	-0.179***	0.009	-0.046***	0.007	-0.013	0.008	-0.015*	0.008	-0.009	0.007
College	-0.064**	0.0241	-0.276***	0.011	-0.043***	0.009	-0.031***	0.009	-0.034***	0.009	-0.014	0.009
Marital Status (Married is the omitted category)												
Divorced	0.014	0.0093	0.000	0.012	0.029*	0.009	0.008	0.010	0.008	0.010	0.015	0.010
Single	0.028*	0.0132	-0.028*	0.013	0.032*	0.010	-0.001	0.011	-0.002	0.011	-0.002	0.011
Parenthood (Parent = 1)	-0.001	0.0117	0.005	0.013	-0.002	0.010	0.048***	0.011	0.048***	0.011	0.038***	0.010
Employment (Employed = 1)	0.019	0.0141	-0.001	0.009	0.007	0.007	0.012	0.007	0.010	0.007	0.011	0.007
Family Income (Low Income is the omitted category)												
Middle Income	-0.021	0.0128	-0.060***	0.008	-0.016*	0.006	0.001	0.007	0.001	0.007	0.002	0.007
High Income	-0.035*	0.015	-0.103***	0.009	-0.032***	0.007	0.007	0.008	0.006	0.008	0.019**	0.007
Gender (Female = 1)	-0.037	0.0264	-0.226***	0.008	-0.008	0.006	-0.025***	0.007	-0.029***	0.007	-0.017**	0.006
Female Chief Wage Earner in the House	0.007	0.0068	-0.012	0.009	0.008	0.007	-0.006	0.007	-0.006	0.007	-0.011	0.007

(continued)

Table 2. Continued.

	Gender Equality						Women's Dual Roles					
	Global ties on		Western ties on		Within Group Ties on		Deviation from		Western ties on		Within Group Ties on	
	Global Mean Attitude	Std. Err.	Coef.	Std. Err.	Mean Attitude	Std. Err.	Coef.	Std. Err.	Mean Attitudes	Std. Err.	Coef.	Std. Err.
Religious Attendance (More than once a week is the omitted category)												
Once a week	-0.016	0.0122	-0.003	0.011	-0.014	0.008	-0.006	0.009	-0.006	0.009	-0.006	0.009
One a month	-0.018	0.0138	-0.028*	0.013	-0.010	0.010	-0.033**	0.011	-0.033**	0.011	-0.024*	0.011
Only on special days	-0.017	0.0151	-0.044**	0.012	-0.008	0.009	-0.029*	0.010	-0.031**	0.010	-0.020*	0.009
Once a year	-0.018	0.0192	-0.045**	0.015	-0.011	0.012	-0.045**	0.013	-0.047**	0.013	-0.040**	0.012
Never	-0.011	0.0192	-0.069***	0.011	0.001	0.008	-0.036**	0.009	-0.038**	0.009	-0.021*	0.009
Intercept	0.952***	0.0618	1.637***	0.125	0.770***	0.042	0.903**	0.045	0.825***	0.066	0.727***	0.047

***p < .001, **p < .01, *p < .05.

Table 3. Net effect of global, Western, and within-group telephone ties on attitude toward gender equality and women's dual roles (N of countries = 47, N of individuals = 70,225.)

	Gender Equality						Women's Dual Roles					
	Global ties		Western ties		Within group ties		Global ties		Western ties		Within group ties	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
<i>Country-level variables</i>												
Telephone Ties	0.004	0.009	0.048	0.049	-0.005*	0.002	0.000	0.003	0.003	0.032	0.001	0.002
Female Labor Force Participation Rate	0.015	0.005	0.014	0.004	0.012	0.005	0.000	0.001	0.005	0.003	0.006*	0.003
Ln GDP	0.246**	0.082	0.250**	0.071	0.233**	0.069	0.040*	0.023	-0.068	0.046	-0.063	0.047
Women's Autonomy	-0.005	0.082	-0.018	0.077	0.049	0.082	-0.013	0.023	0.159***	0.050	0.151**	0.055
<i>Individual-level variables</i>												
Birth Cohorts (Oldest cohort ≥ 50 is the omitted category)												
Middle Cohort (30-49)	0.092***	0.011	0.092***	0.011	0.092***	0.011	0.015	0.012	0.015	0.012	0.015	0.012
Youngest Cohort (15-29)	0.131***	0.014	0.131***	0.014	0.131***	0.014	0.003	0.016	0.004	0.016	0.004	0.016
Education (Primary School is the omitted category)												
Middle School	0.216***	0.011	0.216***	0.011	0.216***	0.011	0.084***	0.012	0.083***	0.012	0.083***	0.012
College	0.394***	0.014	0.394***	0.014	0.394***	0.014	0.142***	0.015	0.142***	0.015	0.142***	0.015
Marital Status (Married is the omitted category)												
Divorced	0.016	0.015	0.016	0.015	0.016	0.015	0.016	0.017	0.015	0.017	0.015	0.017
Single	0.069***	0.016	0.069***	0.016	0.069***	0.016	0.054***	0.018	0.055	0.018	0.055***	0.018
Parenthood (Parent = 1)	-0.011	0.015	-0.011	0.015	-0.011	0.015	-0.025	0.017	-0.025	0.017	-0.025	0.017
Employment (Employed = 1)	0.021*	0.011	0.021*	0.011	0.021*	0.011	0.080***	0.012	0.079***	0.012	0.079***	0.012
Family Income (Low Income is the omitted category)												
Middle Income	0.078***	0.010	0.078***	0.010	0.077***	0.010	0.003	0.012	0.002	0.012	0.003	0.012
High Income	0.132***	0.011	0.132***	0.011	0.132***	0.011	0.059***	0.013	0.059***	0.013	0.059***	0.013
Gender (Female = 1)	0.357***	0.010	0.357***	0.010	0.357***	0.010	0.223***	0.011	0.222***	0.011	0.222***	0.011
Female Chief Wage Earner in the House	0.026**	0.011	0.026**	0.011	0.026**	0.011	0.035**	0.012	-0.035**	0.012	-0.035*	0.012

(continued)

Table 3. Continued.

	Gender Equality			Women's Dual Roles								
	Global ties		Western ties		Within group ties		Global ties		Western ties		Within group ties	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Religious Attendance (More than once a week is the omitted category)												
Once a week	0.002	0.013	0.002	0.013	0.002	0.013	-0.001	0.015	0.000	0.015	-0.001	0.015
One a month	0.022	0.016	0.022	0.016	0.022	0.016	0.006	0.018	0.006	0.018	0.005	0.018
Only on special days	0.062 ^{***}	0.014	0.062 ^{***}	0.014	0.062 ^{***}	0.014	0.050 ^{***}	0.016	0.049 ^{***}	0.016	0.049 ^{***}	0.016
Once a year	0.059 ^{***}	0.018	0.059 ^{***}	0.018	0.059 ^{***}	0.018	0.065 ^{**}	0.021	0.064 [*]	0.021	0.064 ^{**}	0.021
Never	0.116 ^{***}	0.013	0.116 ^{***}	0.013	0.116 ^{***}	0.013	0.090 ^{***}	0.015	0.088 ^{***}	0.015	0.088 ^{***}	0.015
Intercept	-3.405 ^{***}	0.767	-3.521 ^{***}	0.688	-2.898 ^{***}	0.746	-0.185 [*]	0.094	0.089 [*]	0.452	0.006 [*]	0.506

^{***} $p < .001$, ^{**} $p < .01$, ^{*} $p < .05$.

ties, are less supportive of women's equality. For each one percent increase in the within-group ties, gender attitude moves in the traditional direction by .005. This supports our communication insulation hypothesis that countries immersed in their own group and isolated from the global community tend to lag behind on the global rising tide of gender equality. Telephone ties are not associated with attitudes towards women's combination of worker and mother roles, as shown in the right side of Table 3.

We next test if the amount of absolute deviations from the global means, Western means, and group means varies by telephone ties. These results are in Table 4. These models show that after controlling for female labor force participation rate, ln GDP, and women's autonomy, none of the three measures of telephone ties—ties with all other countries, ties with Western countries, and percentage of within-group ties—is associated with gender attitude. We fail to support any of the hypotheses on the nature of convergence and divergence from these results.

Lastly, we investigate the way in which telecommunication insulation negatively influences attitude toward gender equality. Since research shows that younger cohorts as well as highly educated and high-income segments tend to lead the entire population in the transition toward egalitarian attitudes, we add a series of cross-level interaction terms between these individual characteristics and one-country characteristics, percentage of within-group ties out of total ties. The results are shown in Table 5. The main effect of percentage of within-group ties is no longer statistically significant, indicating that its negative effect falls disproportionately on these segments of those societies that are isolated from the global community. In these countries that forge minimal communication ties with countries other than those sharing similar cultures, religions, or political systems, younger birth cohorts are less egalitarian in their endorsement of the concept of gender equality. For each percentage increase in degree of insulation, the positive effects of being a member of the middle cohort (ages 30–49) or the youngest cohort (ages 15–29) are reduced by .0018, from .17 and .0021 down from .22, respectively. Similarly, the positive effect of college education in moving attitude toward the egalitarian direction is also reduced by .0021, from .4812 for each percentage increase in percentage of within-group ties out of total ties. Lastly, the positive effects of being in the middle-income and high-income categories also diminish by .0014 and .0018, respectively, for each one percent increase in within-group ties, reducing the total positive effects from .1351 and .2113 of being in the middle- and high-income groups.

We next add additional cross-level interaction terms to take the varying effects of education, cohort and income in countries with different levels of female labor force participation rate and GDP into account. With these additional twelve interaction terms, the negative effect of group insulation on cohort, education, and income remain largely unchanged; the negative effect on middle school education is now statistically significant. These results indicating that the process of isolation and barrier to international information diffusion is a process independent of GDP development and female labor force participation.

Table 4. Net effect of telephone ties on absolute deviations from global, Western, and group means of attitudes toward gender equality and women's dual roles (N of countries = 47, N of individuals = 70,225).

	Gender Equality			Women's Dual Roles								
	Global ties on		Western ties on		Within Group		Global ties on		Western ties on			
	Deviation from Global Mean Attitude	Std. Err.	Deviation from Western Mean Attitudes	Std. Err.	Ties on Deviation from Group Mean Attitude	Std. Err.	Deviation from Global Mean Attitude	Std. Err.	Deviation from Western Mean Attitudes	Std. Err.		
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.		
<i>Country-level Variables</i>												
Telephone Ties	-0.002	0.004	-0.010	0.029	0.001	0.001	-0.004	0.003	0.022	0.016	0.000	0.001
Female Labor Force Participation Rate	-0.005*	0.002	-0.012***	0.003	-0.002*	0.001	-0.006*	0.002	-0.007***	0.001	-0.006***	0.001
Ln GDP	-0.014	0.037	-0.166***	0.042	-0.062***	0.019	-0.035	0.028	-0.058*	0.024	-0.048*	0.022
Women's Autonomy	0.044	0.037	0.056	0.046	-0.009	0.022	0.063**	0.028	0.070***	0.026	0.044	0.026
<i>Individual-level variables</i>												
Birth Cohorts (Oldest cohort ≥ 50 is the omitted category)												
Middle Cohort (30-49)	0.008	0.009	-0.078***	0.012	-0.023*	0.009	-0.001	0.010	-0.001	0.010	0.004	0.010
Youngest Cohort (15-29)	0.020**	0.007	-0.047***	0.009	-0.027***	0.007	-0.014	0.008	-0.015*	0.008	-0.010	0.007
Education (Primary School is the omitted category)												
Middle School	-0.078***	0.007	-0.178***	0.009	-0.045***	0.007	-0.013	0.008	-0.015*	0.008	-0.008	0.007
College	-0.064***	0.009	-0.276***	0.011	-0.042***	0.009	-0.031***	0.009	-0.034***	0.009	-0.014	0.009
Marital Status (Married is the omitted category)												
Divorced	0.014	0.010	0.000	0.012	0.029***	0.009	0.008	0.010	0.008	0.010	0.015	0.010
Single	0.028*	0.011	-0.028*	0.013	0.031***	0.010	-0.001	0.011	-0.002	0.011	-0.002	0.011
Parenthood (Parent = 1)	-0.001	0.010	0.004	0.013	-0.002	0.010	0.048**	0.011	0.048***	0.011	0.038**	0.010
Employment (Employed = 1)	0.019**	0.007	0.000	0.009	0.008	0.007	0.012	0.007	0.010	0.007	0.011	0.007

(continued)

Table 4. Continued.

	Gender Equality				Women's Dual Roles						
	Global ties on		Western ties on		Within Group		Global ties on		Western ties on		
	Deviation from Global Mean Attitude	Std. Err.	Deviation from Western Mean Attitudes	Std. Err.	Ties on Devaiton from Group Mean Attitude	Coef.	Std. Err.	Deviation from Global Mean Attitude	Coef.	Std. Err.	
Family Income (Low Income is the omitted category)											
Middle Income	-0.021**	0.007	-0.060***	0.008	-0.016**	0.006	0.001	0.007	0.001	0.007	0.007
High Income	-0.035***	0.007	-0.103***	0.009	-0.033***	0.007	0.007	0.008	0.006	0.008	0.007
Gender (Female = 1)	-0.037***	0.006	-0.225***	0.008	-0.008	0.006	-0.025***	0.007	-0.029***	0.007	0.006
Female Chief Wage Earner in the House	0.007	0.007	-0.012	0.009	0.008	0.007	-0.006	0.007	-0.006	0.007	0.007
Religious Attendance (More than once a week is the omitted category)											
Once a week	-0.016	0.009	-0.003	0.011	-0.014	0.008	-0.006	0.009	-0.006	0.009	0.009
One a month	-0.018	0.011	-0.027*	0.013	-0.009	0.010	-0.033**	0.011	-0.033*	0.011	0.011
Only on special days	-0.018*	0.009	-0.043**	0.012	-0.007	0.009	-0.029**	0.010	-0.031*	0.010	0.009
Once a year	-0.018	0.012	-0.045***	0.015	-0.010	0.012	-0.046***	0.013	-0.047**	0.013	0.012
Never	-0.011	0.009	-0.069***	0.011	0.002	0.008	-0.037***	0.009	-0.038***	0.009	0.009
Intercept	1.258***	0.343	3.425***	0.413	1.396***	0.205	1.445***	0.258	1.584***	0.230	0.234

***p < .001, **p < .01, *p < .05.

Table 5. Main and cross-level interaction effects of within-group telephone ties (degree of group insulation) on attitude toward gender equality (N of countries = 47, N of individuals = 70,225).

	Gender Equality		Gender Equality	
	Coefficient	Std. Err.	Coefficient	Std. Err.
<i>Country-level Variables</i>				
% within group ties	-0.0021	0.0029	-0.0022	0.0029
Female Labor Force Participation Rate (FLFPR)	0.0123*	0.0046	0.0140**	0.0046
Ln GDP	0.2349***	0.0693	0.1925**	0.0701
Women's Autonomy	0.0460	0.0820	0.0498	0.0820
Birth Cohorts (Oldest cohort ≥ 50 is the omitted category)				
Middle Cohort (30-49)	0.1695***	0.0222	0.0934***	0.1080
Middle Cohort (30-49) \times % within group ties	-0.0018***	0.0005	-0.0012*	0.0005
Middle Cohort (30-49) \times FLFPR			0.0011	0.0007
Middle Cohort (30-49) \times Ln GDP			0.0807***	0.0111
Youngest Cohort (15-29)	0.2242***	0.0266	0.1364***	0.1186
Youngest Cohort (15-29) \times % within group ties	-0.0021*	0.0005	-0.0014*	0.0006
Youngest Cohort (15-29) \times FLFPR			0.0015	0.0008
Youngest Cohort (15-29) \times Ln GDP			0.0838***	0.0123
Education (Primary School is the omitted category)				
Middle School	0.2474***	0.0237	0.2111***	0.1053
Middle School \times % within group ties	-0.0007	0.0005	-0.0012*	0.0005
Middle School \times FLFPR			-0.0021**	0.0007
Middle School \times Ln GDP			-0.0175	0.0113
College	0.4812***	0.0280	0.3819***	0.1252
College \times % within group ties	-0.0021***	0.0006	-0.0028***	0.0006
College \times FLFPR			-0.0033***	0.0008
College \times Ln GDP			-0.0285*	0.0135
Marital Status (Married is the omitted category)				
Divorced	0.0116	0.0148	0.0080	0.0149
Single	0.0683***	0.0163	0.0664***	0.0163
Parenthood (Parent = 1)	-0.0083	0.0154	-0.0062	0.0154
Employment (Employed = 1)	0.0173	0.0108	0.0180	0.0108
Family Income (Low Income is the omitted category)				
Middle Income	0.1351***	0.0212	0.0729***	0.0976
Middle Income \times % within group ties	-0.0014**	0.0004	-0.0013**	0.0005
Middle Income \times FLFPR			-0.0010	0.0006
Middle Income \times Ln GDP			-0.0178	0.0103
High Income	0.2113***	0.0236	0.1289**	0.1063
High Income \times % within group ties	-0.0018***	0.0005	-0.0020***	0.0005
High Income \times FLFPR			-0.0028***	0.0007

(continued)

Table 5. Continued.

	Gender Equality		Gender Equality	
	Coeffe	Std. Err.	Coeffe	Std. Err.
High Income × Ln GDP			0.0076	0.0113
Gender (Female = 1)	0.3555***	0.0098	0.3575***	0.0098
Female Chief Wage Earner in the House	0.0267*	0.0108	0.0253*	0.0108
Religious Attendance (More than once a week is the omitted category)				
Once a week	-0.0001	0.0133	0.0028	0.0133
One a month	0.0211	0.0162	0.0231	0.0162
Only on special days	0.0589***	0.0143	0.0594***	0.0142
Once a year	0.0600***	0.0185	0.0609***	0.0185
Never	0.1150***	0.0131	0.1147***	0.0131
Intercept	-3.0627***	0.7496	-2.7533***	0.7558

***P < .001, **P < .01, *P < .05.

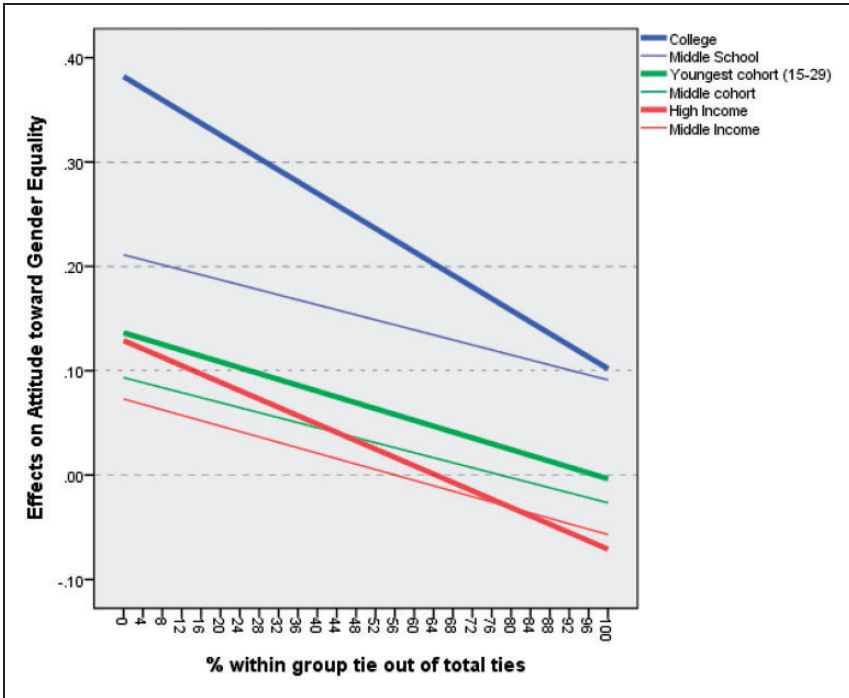


Figure 5. Depressing effects of group insulation (% within group telephone ties out of total ties) on cohort, college education, and income (N of countries = 47 and N of individuals = 70,225).

To illustrate the magnitude of these reductions, we graph these declines in the positive effects of college education, young cohorts, and income, by percentage of within-group ties out of total ties in Figure 5. In countries in which one hundred percent of communication ties are within group, the positive effects of young cohorts and income diminish to negative, while the effect of college education is cut down to half. Since one-third of the countries in our analysis are fairly isolated from the global community, with 16 countries having group insulation percentages exceeding 50%, the social elites and the young in these societies are substantially less egalitarian in their attitudes toward gender equality. This isolation effect falls disproportionately on the elites and the youth of these countries, indicating that the college educated, the young, and the high-income groups of the population fail to lead the local population in transforming its attitude, evidence consistent with our segmented communication insulation hypothesis.

Conclusions

In this paper, we test the relationship between international telecommunication networks and gender attitudes. We used individual-level data from the World Value Survey ($N = 70,225$) and country-level data compiled from various sources to estimate a series of multilevel models to unravel the influence of three types of telephone ties—global ties, ties with Western countries, and within-group ties—on individual gender attitudes, after controlling for the effects of individual and country characteristics. We draw three conclusions.

First, individuals in countries immersed in their localized communication networks are less likely to support the idea of gender equality. The percentage of within-group telephone ties out of total ties is negatively associated with egalitarian attitude toward gender equality, after controlling for national characteristics such as GDP, female labor force participation rate, and level of female autonomy measures, including the proportion of female primary wage earners and the length of public funded maternity leave policy. It is not the amount of exposure to international communication, but rather the *kind* of exposure allowed to permeate into a country that influences its value orientation. Nation states that intentionally and unintentionally conduct trade and international exchanges selectively only with countries that share similar cultural, religious or political beliefs or practices effectively insulate their citizens from new ideas that challenge the traditional views on women's status in society. This result is consistent with the finding by Norris and Inglehart (2009) that the liberal effect of exposure to the mass media has only a limited impact in parochial societies. In societies that only have limited information flow with other countries sharing similar characteristics, concerns about the threat to traditional cultures may have led to measures banning or censoring media contents as well as strong family and community socialization that reinforces traditional views and counters Western influences.

Second, this negative effect of communication insulation in a localized network is manifested in the weak or non-existent positive effect of education, cohort, and

income-effects. An extensive body of literature shows that those with more education and income and younger cohorts are harbingers of social change (Meagher and Shu, 2019; Shu, 2004; Shu and Meagher, 2018; Shu and Zhu, 2012). These segments of a society are the first to be enlightened and lead the rest of the population in their shifts toward new ideas and values. However, in countries that communicate exclusively with countries of similar cultural, religious or political traditions, these harbingers of change lose the ability to lead the population. The trickle effect of cultural change from other types of countries fails to reach the local leaders of change as they have little exposure to the new forms of thinking and orientation. The higher the degree of telecommunication insulation around a country, the less the degree of differentiation in their educated and higher income elite's and youth's gender attitude from that of the rest of the population.

Lastly, the actual number of ties with the global community or ties with Western countries has no net impact on either the level or the amount of deviation in gender attitudes. Although the number of total telephone ties and the number of ties with Western countries are positively associated with egalitarian attitude toward gender equality, these positive effects no longer exist after controlling for GDP, female labor force participation rate, and level of women's autonomy in the country. Wealthy countries, countries with high female labor force participation, and countries in which women enjoy more autonomy are also countries with more telephone ties with the global society and the West. Similarly, ties with Western countries are associated with convergence toward Western ideas of attitude toward gender equality, and ties with the global society are associated with convergence toward a global perspective on women's dual roles, but these patterns of convergence disappear when GDP, female labor force participation rate, and women's autonomy are considered. Again, countries with more telephone ties with the *Western* countries are also wealthy countries or countries with high female labor force participation, and people in these countries hold attitudes toward women's status that converge on the Western values. On the other hand, countries with more telephone ties with the *global* community are also the countries with high female labor force participation. ~~There~~ global ties and Western ties do not add additional strength toward egalitarianism in addition to high GDP, substantial female labor force participation, and strong women's autonomy.

Our analysis has established the importance of the nature of international communication ties, not simply the ~~amount~~ of ties, for gender attitudes. The countries that communicate with diverse groups of countries and do not insulate themselves within a network of similar countries have more egalitarian attitudes toward gender equality. The lack of integration into global communication networks, the lack of trade, cultural exchange, and migration freedom to the wider global community can fundamentally change the impacts of education, cohort and income on values. These national limitations on telecommunication substantially reduce the liberal effects of education, younger birth cohort, and higher income in these societies. These harbingers of social change—*young, educated, and high-income*

people—are thus less likely to initiate a process of value transformation and trickle down these liberal effects to the wider population.

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Notes

1. WVS wave V does not provide all measures of gender attitudes.
2. Measures of national characteristics such as GDI (gender-related development index), GEM (gender empowerment measure), percentage of female administrators and managers, etc. are only available in later years *after* a majority of these surveys are completed (Inglehart and Norris, 2003).
3. We also considered but chose not to use a few other variables of maternity and paternity provision: length of total maternity leave under legal protection and duration of paid paternity leave from any source. These variables are only available for 2004 and later, times later than the measures of gender attitudes. Factor analysis among these three variables measuring paid maternity leave, total maternity leave, and paid paternity leave shows that one single factor accounts for more than 77% of the variance, all of the factor loadings are larger than .82, and the Cronbach's Alpha is .52, indicating one single robust latent construct.
4. Preliminary analysis of these five indicators shows that the Cronbach's Alpha is .57, and an exploratory factor analysis shows that two factors account for more than 58% of the variance with all of the factor loadings larger than .66. Analysis of data by each country separately yields similar results.
5. We compared 47 pairs of measurement models, one in which the parameters were constrained to be equal across subgroups and one in which all of the measurement coefficients for one country were allowed to vary. For each pair of these models, we calculated $\Delta\chi^2$ (the difference of χ^2 between the two models), $\Delta df=5$, and P. All of these 47 $P > .05$, we thus determined that the former model with country-invariant coefficients fit the data as well as the latter models with country-variant measurement coefficients.

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