



Does individualism promote gender equality?

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ABSTRACT

We argue that individualism promotes gender equality. Individualist values of autonomy and self-determination transcend gender identities and serve to legitimize women's goals and choices. In contrast, collectivist values may subordinate women's personal goals to their social obligations, generating greater acceptance of gender inequality. Using individual level data from World Values Surveys, we find that individualism is significantly associated with support for gender equal attitudes regarding employment, income, education, and political leadership. Individualism is also associated with greater levels of female employment and educational attainment, and lower levels of fertility. These results are robust to controlling for income, education, religion, historical plough use, gendered language, and country-time fixed effects. Our within country analysis allows us to isolate the impact of individualism from other confounding effects. Using historical rainfall variation as an instrument for individualism, we find that the exogenous portion of individualism reduces support for patriarchal attitudes and fertility, and it increases female employment and educational attainment. These effects are economically large. We address concerns over instrumental validity by controlling for a variety of factors, including historical plough use, religious affiliation, religiosity, social trust, average rainfall levels, distance from the equator, cool-water conditions, agricultural suitability, historical political and economic development, and the presence of large animals. This paper contributes to a mounting body of evidence suggesting a key role for highly persistent cultural norms and values in determining gender inequality, the gender division of labor, and economic and social outcomes for women.

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1. Introduction

Feminist thought has deep roots in the Enlightenment, drawing on emerging ideas about individual liberty and equality closely associated with John Locke's (2005[1690]) doctrine of natural rights and, radically, extending them to women (Kent, 2006). For example, Mary Wollstonecraft's *A Vindication of the Rights of Women* (1792) grew out of her debate with William Burke over the political rights of men in the context of the French Revolution. Furthermore, John Stuart Mill's *On the Subjection of Women* (1869) builds on arguments regarding autonomy and self-determination developed a decade earlier in *On Liberty* (1859). Most scholars agree that civil and political rights have significant practical consequences for women as well. Civil rights played a central role, for example, in the British and American suffrage movements, and

democratic political rights are closely associated with gender equality (Inglehart, Norris, & Welzel, 2002).¹

As Tabellini (2008, p. 272) has argued, however, Enlightenment ideas regarding individual rights and liberties are not universally accepted, and contemporary support for these ideas reflects the influence of cultural values that are "at least partly inherited from the distant past." And, indeed, evidence from a variety of sources indicates that individualism is causally associated with the emergence of formal rules regarding individual political rights and civil liberties (Licht, Goldschmidt, & Schwartz, 2007, Davis & Abdurazokzoda, 2016). In light of the relation between individual rights and feminism, this work raises a critical question: Does individualism foster gender equality?

Individualism and collectivism reflect the importance of social relationships in an individual's fundamental understanding of the

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¹ Critics of the argument that democracy foster gender equality point out the lack of gains for minority women and for female members of societies colonized by democratic countries. More generally, radical feminists reject the idea that individual rights are sufficient to attain gender equality. See Marso (2015) for discussions.

self. In individualist societies the self is understood to be *independent*, while in collectivist societies the self is *interdependent*, embedded in a web of social networks and obligations (Gorodnichenko & Roland, 2012). Schwartz (2006, p. 140) elaborates by describing autonomy cultures as comprised of individuals who are autonomous, bounded entities. Such individuals foster, encourage and express their own emotions, preferences, ideas, and abilities. Furthermore, they value variety in life and their own individual uniqueness. In contrast, embedded cultures are comprised of individuals who are entrenched in the collective. They value social relationships, working toward shared goals, and partaking in shared ways of life.

The hypothesis that individualism promotes gender equality is based on two related ideas. First, the values emphasized by individualist societies – autonomy, self-expression, creativity, and an ethos of individual rights – are inherently egalitarian and transcend gender identities. As a result, the values and norms of individualist societies tend to support an understanding of women as autonomous individuals and the moral equals of men, and potentially de-emphasizes identities and obligations associated with gendered relationships, e.g. wife, mother, and daughter. In contrast, the web of relationships and obligations that characterize more collectivist societies may ascribe subordinate roles to women in which their personal goals are de-emphasized relative to their obligations to the collective.

Second, collective societies tend to be more hierarchical, as the development of accepted authority structures facilitates the coordination of collective behavior. If these hierarchies are patriarchal in nature, as they often are, then a society that emphasizes the family, tribe, nation, or church will tend to subordinate women and generate greater acceptance of gender inequality. Consistent with this hypothesis, participation in collective religious activities and strong family ties predict traditional attitudes toward working women and the gender division of labor, e.g. Seguino (2011) and Alesina and Giuliano (2014), respectively. More recently, Davis and Williamson (2018) provide evidence that individualism reduces the strength of family ties.

If our hypothesis is correct, then we expect individualism to be expressed in terms of both reduced support for patriarchal attitudes and gendered social outcomes. The dual focus on both attitudes and social outcomes strengthens our study. The relation between individualism and social outcomes shows that culture matters for the lives that women actually lead. In addition, because social outcomes may reflect a host of factors, including institutions and policies, the relation between individualism and patriarchal attitudes lends credence to the specific cultural channel of influence proposed here. At the level of attitudes, we expect less acceptance of gender inequality in various dimensions of life – employment, income differences, education, and politics. Second, we expect these attitudes to have practical consequences in terms of observed social outcomes for women, particularly female employment, educational attainment, and fertility.

We test these hypotheses using data from all six waves of the World Values Survey, which comprises over 350,000 individual surveys from over 100 countries beginning in 1981 (Inglehart et al., 2014). The survey questions used reflect attitudes toward gender equality in employment, income, education, and leadership roles in politics. We aggregate these variables to create an index of attitudes toward gender equality, a *patriarchal attitudes index*. We also consider survey responses regarding multiple outcome variables, including employment, education and fertility.

Most studies of individualism use measures of cultural variation constructed by Hofstede (2001) or Schwartz (2006) that are available at the national level. In contrast, we rely on survey data, which requires us to measure individualism at the individual level. We address this issue by drawing on Beugelsdijk, Maseland, and Van

Hoorn (2015), who construct a proxy for Hofstede's individualism measure based on four questions from the WVS. We use these same questions to construct an individual-level proxy for Hofstede's index of individualism.

In OLS regressions, we find that individualism is negatively related to patriarchal attitudes expressing support for gender inequality in employment, income earnings, education, and leadership. Individualism is also associated with greater female employment and educational attainment and lower female fertility. These results are robust to individual level demographic and socioeconomic controls, as well as controls for variables that are emphasized in the cultural literature on gender, including religious affiliation, gendered language, and historical plough use.

All regressions control for country-wave fixed effects. Thus, our results do not reflect a number of potentially important associations relating individualism and gender equality that act through culture's influence on national-level variables, including the level of economic development (Gorodnichenko & Roland, 2011, 2017; Davis, 2016) and the quality of national political institutions. For example, an important line of research finds a positive relation between individualism and democracy (Licht et al., 2007; Davis & Abdurazokzoda, 2016), while other work finds that democracy increases gender equality (Inglehart et al., 2002). In spite of missing these channels of influence, the use of country-wave fixed effects gives us greater confidence that the associations we observe are correctly attributed to culture.

A potential drawback of our measurement of individualism is that this variable is based in part on questions regarding an individual's attitudes toward homosexuality and abortion, and it is likely that these attitudes are codetermined with an individual's attitudes toward gender. Because of this, our initial findings, while suggestive, cannot be interpreted as representing causal effects. We address this issue in two ways. First, we show that the relation between individualism and gender equality holds using an alternative measure of individualism that does not rely on these variables. Second, we directly address causation by employing instrumental variable analysis.

We instrument for individualism using a measure of rainfall variation. Davis (2016) argues that climate shocks increase the return to collectivist risk-sharing agreements in preindustrial societies, and that the resulting social values persist in part to the present day. In support of this theory, Davis (2016) presents evidence of a robust negative relation between rainfall variation and contemporary levels of individualism at the country level. We construct a measure of rainfall variation by utilizing information using gridded data on historical monthly precipitation levels from the Climate Research Unit (CRU). We then match this variable to individual respondents using a WVS question regarding the language an individual speaks at home and information from *Ethnologue* (Lewis, Simons, & Fennig, 2009) on the geographic origin of languages.

Using this instrument, we find strong support for the proposition that individualism reduces support for gender inequality. In addition, we find that individualism increases female employment and female educational attainment and reduces fertility. Importantly, these effects are economically large. For example, a standard deviation increase in the individualism index leads to a 0.84 standard deviation reduction in our patriarchal attitudes index. In addition, a standard deviation increase in individualism reduces female fertility by 1.1 children, increases women's educational attainment by 2.24 years, and increases the probability that a woman is employed outside the home by 23.5 percent.

We address concerns over instrumental validity by controlling for a variety of factors that have been found to influence gender equality and are plausibly correlated with rainfall variation. These include historical plough use (Alesina, Giuliano, & Nunn, 2013),

religious affiliation (Davia, 2017), religiosity (Ager & Ciccone, 2018), social trust (Durante, 2010), average rainfall levels, distance from the equator, cool-water conditions (Welzel, 2013, 2014; Santos Silva et al., 2017), agricultural suitability, historical factors reflecting levels of political and economic development, and the presence of large animals (Alesina et al., 2013). For variables not measured by WVS questions, such as historical plough use, cool-water conditions, rainfall, latitude, and Alesina et al. (2013) controls, we measure these variables at the geographic origin of an individual's language.

This paper contributes to a mounting body of evidence suggesting a key role for highly persistent cultural norms and values in determining gender inequality, the gender division of labor, and economic and social outcomes for women.² Important contributions in this literature address the roles of inherited cultural values (Fernandez, 2007; Fernandez & Fogli, 2009; Fernandez, 2013), historical use of the heavy plough (Alesina et al., 2013), religion and religiosity (Norris & Inglehart, 2002; Cooray & Potrafke, 2011; Seguino, 2011; Davis & Gao, forthcoming), gendered language (Davis & Reynolds, 2018; Gay, Santacreu-Vasut, & Shoham, 2013; Gay, Hicks, Santacreu-Vasut, & Shoham, 2015; Hicks, Santacreu-Vasut, & Shoham, 2015; Mavisakalyan, 2015), and cool water conditions (Welzel, 2013, 2014; Santos Silva et al., 2017).

Our work is also closely related to the growing economics literature on individualism and collectivism, which is widely viewed as the most important single dimension of cultural variation (Triandis, 1995; Heine, 2010). Individualism is causally related to institutional quality (Licht et al., 2007; Klasing, 2013; Davis & Abdurazokzoda, 2016; Cline & Williamson, 2017), per capita income levels (Davis, 2016; Gorodnichenko & Roland, 2011), innovation and patenting rates (Gorodnichenko & Roland, 2017), and the regulation of business entry (Davis & Williamson, 2016). Given evidence linking gender inequality and economic development, our findings suggest an additional channel through which individualism may affect the evolution of economic and political systems.

Given the close empirical relation between communism and collectivist social values (Alesina & Fuchs-Schuelndeln, 2007), the evidence presented here may be seen as contributing to the debate over the role of capitalism in gender inequality (Chodsee, 2004, 2019). In spite of significant similarities, we believe a note of caution may apply here. First, evidence on gender equality in transition economies is decidedly mixed.³ In addition, the primary mechanism cited in this literature, a switch from a centralized wage setting bureaucracy to decentralized market wages, is institutional rather than cultural in nature. Finally, as noted above, because we control for country-wave fixed effects, our results do not account for the possible influence of cultural values on national economic institutions or policies. We consider investigating national channels of cultural influence to be an important topic for future research.

2. Data description and summary statistics

In this section, we describe key variables of interest, including gender inequality and individualism. We measure gender inequality by examining both patriarchal attitudes, which express a preference for a gender hierarchy, and social outcomes. The attitudinal measures we utilize are used in earlier studies, e.g. Alesina et al. (2013)

² Illustrating that gender equality has consequences on national culture, Cho (2016) finds that gender equality promotes social trust.

³ For example, Brainerd (2000) finds that during the transition, the gender wage gap increased in Russia and Ukraine but decreased in Bulgaria, Hungary, Poland, and the Czech and Slovak Republics. Newell and Reilly (2001) find no evidence of an upward trend in gender pay gaps for former Soviet Republics. Similarly, gender wage gaps appear to have risen in urban China (Zhang, Han, Liu, & Zhao, 2008) but fallen in Vietnam (Le & Nguyen, 2018).

and Alesina and Giuliano (2014). Social outcomes include female employment, educational attainment, and fertility.

Individual level survey data are collected from World Values Survey (WVS) for all variables (Inglehart et al., 2014). The surveys are conducted in over 100 countries across six waves from 1981–1984, 1990–1994, 1995–1998, 1999–2004, 2005–2009, to 2010–2014. Appendix 1 list each variable and the corresponding WVS question, and Appendix 2 provides a correlation matrix.

2.1. Patriarchal attitudes index (PAI)

Our first set of WVS questions capture individual attitudes toward women. We utilize four different survey questions to measure traditional or patriarchal attitudes regarding four dimensions of social life, including work, political leadership, higher education, and income earnings. We create a set of dummy variables indicating agreement with the following four statements: 1) “When jobs are scarce, men should have more right to a job than women,” 2) “On the whole, men make better political leaders than women do,” 3) “A university education is more important for a boy than for a girl,” and 4) “problem if women have more income than husband”. Variables are coded where a higher number indicates a more traditional perception of the role of women in society.

Summary statistics for these variables are presented in Table 1. The share of respondents agreeing with these statements varies from 25% for university education, 37% agree that men have more right to a job, 38% agree that it is a problem if a woman makes more money than her husband, and 49% agree that men make better political leaders. To create a summary measure of these attitudes, we extract the first principal component of the four questions, which we call the *patriarchal attitudes index* (PAI). A higher score on this index indicates higher levels of patriarchal attitudes, and the index is standardized with a mean of zero and standard deviation of one.

2.2. Women's social outcomes

We consider women's social outcomes by measuring female fertility, female employment, and female educational attainment. Female fertility is collected from the WVS question asking ‘how many children do you have?’ The answer is coded for female respondents who answer with a value from 0 to 8, with 8 being the highest recorded value. The mean number of children in our sample is 1.94. Female employment is a binary variable taking the value of 1 if the female respondent indicates her employment status as full-time employed, part-time employed, or self-employed. The mean of female employment is 0.44.

For female educational attainment, we measure years of schooling, which reflects the opportunity cost of a female's time. Following Davis and Reynolds (2018), we ascribe three years of education to each of four categories of schooling (some primary, primary, some secondary and secondary) and two years to the remaining two categories (some tertiary and tertiary). In our sample, female schooling ranges from 3 to 16 years with a mean of 10.85 years.

2.3. Individualism index

Our focal independent variable is individualism. The most commonly used measures of individualism are national rather than individual level (Hofstede, 1980; Schwartz, 1994). To create an individual-level measure of individualism, we draw on Beugelsdijk et al. (2015). The authors construct a proxy for Hofstede's (1980, 2001) individualism based on the following four questions from WVS: 1) Private ownership vs. government ownership of business and industry should be increased, 2) One of my main goals in life has been to make my parents proud, 3) whether abortion is justified, and 4) whether homosexuality is justified.

Table 1
Summary Statistics.

| Variables | Observations | Mean | Std. Dev. | Min | Max |
|-----------------------------------|--------------|-------|-----------|--------|-------|
| <i>Patriarchal Attitudes</i> | | | | | |
| Men right to job | 119,535 | 0.37 | 0.48 | 0.00 | 1.00 |
| Men better leaders | 119,535 | 0.49 | 0.50 | 0.00 | 1.00 |
| University for boy | 119,535 | 0.25 | 0.43 | 0.00 | 1.00 |
| Problem women income | 119,535 | 0.38 | 0.48 | 0.00 | 1.00 |
| Patriarchal Attitudes Index (PAI) | 119,535 | 0.00 | 1.00 | -1.18 | 2.00 |
| <i>Gender Social Outcomes</i> | | | | | |
| Female Fertility | 115,049 | 1.94 | 1.77 | 0.00 | 8.00 |
| Female Employment | 113,158 | 0.44 | 0.50 | 0.00 | 1.00 |
| Female Years Schooling | 110,301 | 10.85 | 3.76 | 3.00 | 16.00 |
| <i>Individualism</i> | | | | | |
| State ownership | 119,535 | 5.44 | 2.82 | 1.00 | 10.00 |
| Make parents proud | 119,535 | 0.83 | 0.38 | 0.00 | 1.00 |
| Justifiable: homosexuality | 119,535 | 3.24 | 3.01 | 1.00 | 10.00 |
| Justifiable: abortion | 119,535 | 3.57 | 2.88 | 1.00 | 10.00 |
| Individualism Index | 119,535 | 0.00 | 1.00 | -1.15 | 3.12 |
| Revised Individualism | 119,535 | 0.00 | 1.00 | -1.41 | 2.60 |
| <i>Gender Division of Labor</i> | | | | | |
| Child suffers | 71,316 | 0.46 | 0.50 | 0.00 | 1.00 |
| Housewife fulfilling | 223,299 | 0.79 | 0.41 | 0.00 | 1.00 |
| GDL index | 70,264 | 0.00 | 1.00 | -1.99 | 1.08 |
| <i>Controls</i> | | | | | |
| Age | 119,535 | 40.80 | 15.87 | 15.00 | 99.00 |
| Age squared | 119,535 | 1,917 | 1,455 | 225 | 9,801 |
| Female | 119,535 | 0.51 | 0.50 | 0.00 | 1.00 |
| Married | 119,342 | 0.57 | 0.50 | 0.00 | 1.00 |
| Income | 111,802 | 4.85 | 2.27 | 1.00 | 10.00 |
| Education (middle) | 114,617 | 0.47 | 0.50 | 0.00 | 1.00 |
| Education (upper) | 114,617 | 0.28 | 0.45 | 0.00 | 1.00 |
| Plough | 76,783 | 0.75 | 0.39 | 0.00 | 1.00 |
| Gendered language | 52,539 | 2.22 | 1.56 | 0.00 | 4.00 |
| Cool water index | 78,504 | 0.48 | 0.23 | 0.06 | 0.86 |
| Trust | 78,223 | 0.25 | 0.43 | 0.00 | 1.00 |
| Religious attendance | 78,223 | 4.49 | 2.55 | 1.00 | 8.00 |
| Rainfall level | 80,933 | 8.77 | 0.46 | 6.07 | 10.20 |
| Language latitude | 80,933 | 34.42 | 21.82 | -32.00 | 62.00 |
| <i>Instrument</i> | | | | | |
| Rainfall variation | 91,255 | 0.57 | 0.23 | 0.22 | 1.47 |

Beugelsdijk et al. argue that these four questions are consistent with Hofstede's description, meaning, and implication of individualism-collectivism. For example, Hofstede (2001) relates individualism to autonomy, the right to a private life, weak family ties, less conformity, and capitalism and market competition. Thus, each individual component can be seen as an indirect way of capturing attitudes that link to individualistic values in general. To add empirical support to this measure, Beugelsdijk et al. note that national WVS individualism is highly correlated with Hofstede's original measure (0.77).

In order to create an individual-level index of individualism, we use principal component analysis to extract the first principal from responses to the four WVS questions noted above. We standardized the index where a higher score reflects a greater level of individualism.

2.4. Baseline controls variables

To initially avoid over controlling, we include a minimal set of baseline control variables that are clearly exogenous, including age, age-squared, and a dummy variable equal to 1 if female. Attitudes toward women could relate to age if younger individuals are more open to new ideas, including less traditional roles for women. Not surprisingly, women may have less traditional beliefs about the role of women in society compared to their male counterparts. If men benefit materially from gender inequality, they may hold more gender hierarchical attitudes. The average age of our sample is around 41 and about half are female. We also consider

specifications with an extended set of demographic controls, including marital status, educational attainment, and family income.

3. Empirical analysis

This section provides preliminary evidence on the association between individualism, gendered attitudes and women's outcomes. Using several measures of individual attitudes as well as summary indices, we find that that individualism is consistently associated with lower support for patriarchal attitudes and a gender division of labor. We also provide evidence that the effect of individualism extends beyond attitudes to key dimensions of women's lives. In particular, individualism is associated with lower female fertility, greater female educational attainment, and a greater likelihood that a woman works outside the home. These associations are robust to a variety of alternative specifications, including the use of different measures of individualism and attitudes toward women, and the inclusion of controls for religious affiliation, historical plough use, and speaking a gendered language.

To conduct our empirical analysis, we consider individual-level survey data from up to 97 countries spanning over the six waves of the World Values Survey. Observations are not balanced across countries, since not every country is covered in every wave. However, the cross-section time series structure enables us to conduct a panel estimation accounting for unobserved time-constant variables at the country-level.

Unless otherwise specified, we include our main controls along with country*wave dummies in each specification. While this

approach controls for the impact of economic development, national cultural and institutional variables that may be correlated with individual cultural values, it is likely to underestimate the effect of individualism on gendered attitudes and women's outcomes. In particular, our estimates will not reflect the potential impact of individualism on gender inequality acting through the quality of legal and political institutions (Licht et al., 2007, Klasing, 2013, Davis & Abdurazokzoda, 2016; Cline & Williamson, 2017), the level of economic development (Gorodnichenko & Roland, 2011, Davis, 2016), or public policy outcomes (Davis & Williamson, 2016). Nevertheless, the effects we do observe are more credibly attributed to this cultural trait.

3.1. Benchmark OLS results

Table 2, Panel A presents initial results regarding the relation between individualism and attitudes toward women. The results are broadly consistent with our hypothesis: there is a strong negative association between individualism and support for patriarchal attitudes. We find a negative and statistically significant relation between individualism and patriarchal attitudes regarding right to job, leadership, higher education, and earnings. This suggests that a person who is more individualistic also has more favorable attitudes toward women's participation across a number of important dimensions of social life. In terms of magnitudes of these effects, a one standard deviation increase in individualism reduces the likelihood that an individual agrees with a particular patriarchal attitude from 2.1% for income earnings to 5.4% for employment.

As seen in column (5), there is a strong negative association between individualism and the patriarchal attitudes Index (PAI), defined as the first principal component of the four patriarchal attitudes. A one standard deviation increase in individualism decreases PAI by about 1/10th of a standard deviation, which is just under one-half of the impact associated with being female.

Panel B of Table 2 presents results for individualism and key outcomes for women, including female fertility, female employment and female educational attainment. We exclude the female dummy variable for these specifications.

As seen in column (1) there is a strong negative relation between individualism and a woman's fertility. Our results indicate that a one-standard deviation increase in individualism is associated with a 0.107 decrease in the number of children a woman has. Column 2 repeats this exercise using an indicator of female employment as the dependent variable. Here, we find a significant positive association between individualism and female employment: a one standard deviation increase in individualism is associated with a 3.6 percent increase in the likelihood that a woman is employed outside the home. In column 3, we provide evidence of a positive and statistically significant relation between individualism and female educational attainment, measured as years of schooling. Our results indicate that a standard deviation increase in individualism is associated with a 0.55 increase in years of schooling.

Overall, our results suggest that the lives of individualist women are less defined by the gender division of labor: relative to otherwise identical women living in their country, they have fewer children, spend more years attaining an education, and are more likely to work outside the home. More individualism supports less traditional social outcomes.

3.2. Robustness tests: alternative measures of individualism and attitudes

A potential concern regarding the results in Table 2 is that two of the variables we use in constructing our individualism index reflect attitudes toward reproductive rights and homosexuality and, thus, may be codetermined with attitudes toward women.

Below, we address this issue using an instrumental variable approach based on agricultural risk in preindustrial societies. As a preliminary step, we also investigate the association between patriarchal attitudes and the components of the individualism index and an alternative measure of individualism.

Panel A of Table 3 shows results for regressions in which the components of the individualism index are entered as regressors in different combinations. Our findings in column 1 indicate that preferences for state ownership and making parents proud are positively associated with traditional attitudes toward women. Tolerance for homosexuality and abortion are negative and significantly associated, as expected. We note the relatively high correlation between tolerance for abortion and homosexuality (see Appendix 2). Both tolerance for homosexuality and abortion are each significant when the other is omitted from the regressions, as seen in columns 2 and 3. Preference for state ownership and making parents proud have the expected signs and are significant in all four iterations.

Panel B of Table 3 provides evidence on the association between individualism and gender equality using a revised individualism index, which equals the normalized first principal component of state ownership and making parents proud. Dependent variables include patriarchal attitudes, and women's fertility, employment and education. As shown, the patterns of sign and significance is identical to that for our primary measure of individualism. This suggests that the link between individualism and gender equality is not driven by the particular manner in which we construct individualism, as the results are robust to an alternative measure.

Next, we consider the relation between individualism and alternative measures of attitudes toward the role of women in society. In particular, we consider measures of support for a gender division of labor, in which women specialize in household production and child-rearing and men specialize in market production. While support for a gender division of labor is closely related to a preference for patriarchy, it is conceptually different in that it does not presuppose an explicitly hierarchical relationship between genders.

We consider three measures of support for a gender division of labor. The first, *Child suffers*, is an indicator that takes a value of one if a respondent is in agreement with the statement: "A pre-school child is likely to suffer if his or her mother works." The second, *Housewife fulfilling*, is an indicator that takes a value of one if a respondent is in agreement with the statement: "Being a housewife is just as fulfilling as working for pay." Our third measure is a gender division of labor (GDL) index equal to the normalized value of the first principal component of these two variables.

As seen in Panel C of Table 3, there is a strong, statistically significant, negative correlation between individualism and all three measures of support for a gender division of labor. While we focus primarily on patriarchal attitudes in the remainder of the paper, our results on the gender division of labor suggest that individualism influences attitudes toward the role of women in society in a manner that goes beyond explicit support for patriarchy.

3.3. Robustness tests: additional controls

Next, we check for omitted variable bias. First, we augment our baseline specification to control for additional demographic variables, including a dummy variable equal to 1 if married, income, education, and religion. Income is coded as a scale from one to eleven, where one indicates the lowest scale of income and eleven is the highest. Education is classified into low, middle, and upper. We include two dummy variables equal to 1 for middle and upper education, excluding the lower level education group. We exclude the education controls when examining female employment and educational attainment. To address the potential role of religion, we include indicator variables for individual affiliation with each of

Table 2
Individualism, Patriarchal Attitudes and Outcomes, OLS.

| Dependent Variables: | Panel A: Patriarchal Attitudes | | | | | Panel B: Gender Outcomes | | |
|----------------------|--------------------------------|------------------------|------------------------|--------------------------|------------------------|--------------------------|------------------------|-----------------------|
| | Men right to job (1) | Men better leaders (2) | University for boy (3) | Problem women income (4) | PAI (5) | Female Fertility (1) | Female Employment (2) | Female schooling (3) |
| Individualism | -0.054*** (-8.894) | -0.041*** (-6.660) | -0.024** (-3.301) | -0.021*** (-6.050) | -0.114*** (-6.826) | -0.107*** (-8.885) | 0.036*** (12.603) | 0.548*** (14.785) |
| Age | 0.001 (1.497) | -0.001 (-1.148) | -0.002** (-2.861) | -0.001* (-1.873) | -0.002 (-1.425) | 0.182*** (20.291) | 0.043*** (21.939) | 0.001 (0.058) |
| Age squared | 0.00001 (1.441) | 0.00003** (3.051) | 0.00004*** (4.946) | 0.00002** (3.169) | 0.0001*** (4.361) | -0.001*** (-16.298) | -0.001*** (-25.092) | -0.001*** (-5.730) |
| Female | -0.094*** (-10.027) | -0.112*** (-17.561) | -0.069*** (-10.302) | -0.014 (-1.232) | -0.241*** (-10.786) | | | |
| Country*wave dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 0.715*** (38.046) | 0.866*** (54.493) | 0.479*** (29.427) | 0.550*** (36.259) | 0.908*** (24.254) | -2.091*** (-10.607) | -0.190*** (-5.107) | 15.420*** (62.209) |
| # observations | 119,535 | 119,535 | 119,535 | 119,535 | 119,535 | 115,049 | 113,158 | 110,301 |
| # countries | 77 | 77 | 77 | 77 | 77 | 96 | 96 | 95 |
| Adj. R-squared | 0.17 | 0.19 | 0.10 | 0.10 | 0.23 | 0.34 | 0.20 | 0.23 |

Notes. Baseline controls include age, age squared, and an indicator variable equal to one if respondent is female. Female variable is dropped for female dependent outcome variables. See Appendix 1 for data description. Standard errors are clustered by country. Robust t-statistics in parentheses. ***p < 0.001, **p < 0.05, *p < 0.10.

Table 3
Individualism, Patriarchal Attitudes and Outcomes, Revised Indices, OLS.

| Dependent Variables: | Panel A: Individual components | | | | Panel B: Revised individualism index | | | | Panel C: Gender Division of Labor | | |
|----------------------------|--------------------------------|------------------------|------------------------|------------------------|--------------------------------------|------------------------|------------------------|-----------------------|-----------------------------------|--------------------------|-----------------------|
| | PAI (1) | PAI (2) | PAI (3) | PAI (4) | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) | Child suffers (1) | Housewife fulfilling (2) | GDL index (3) |
| State ownership | 0.008** (3.180) | 0.008** (3.168) | 0.008** (3.322) | 0.008** (3.323) | | | | | | | |
| Make parents proud | 0.117*** (5.899) | 0.119*** (6.090) | 0.128*** (6.619) | 0.138*** (7.266) | | | | | | | |
| Justifiable: homosexuality | -0.029*** (-6.968) | -0.032*** (-6.068) | | | | | | | | | |
| Justifiable: abortion | -0.008** (-2.135) | | -0.020*** (-4.011) | | | | | | | | |
| Revised Individualism | | | | | -0.055*** (-6.995) | -0.046*** (-5.197) | 0.015*** (6.098) | 0.283*** (8.430) | | | |
| Individualism | | | | | | | | | -0.035** (-3.098) | -0.056*** (-9.604) | -0.126*** (-4.559) |
| Age | -0.003 (-1.539) | -0.003 (-1.635) | -0.002 (-1.259) | -0.003 (-1.459) | -0.003 (-1.574) | 0.188*** (20.228) | 0.041*** (20.067) | 0.005 (0.421) | -0.000 (-0.264) | 0.002*** (3.835) | 0.005** (2.692) |
| Age squared | 0.0001*** (4.441) | 0.0001*** (4.536) | 0.0001*** (4.346) | 0.0001*** (4.552) | 0.0001*** (4.609) | -0.001*** (-16.087) | -0.001*** (-22.874) | -0.001*** (-6.070) | 0.00002** (2.353) | -0.00001** (-2.688) | -0.000002 (-0.129) |
| Female | -0.240*** (-10.443) | -0.239*** (-10.307) | -0.248*** (-11.304) | -0.248*** (-11.138) | -0.250*** (-11.209) | | | | -0.034*** (-4.170) | -0.017*** (-5.166) | -0.080*** (-4.484) |
| Country*wave dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 0.890*** (18.815) | 0.878*** (19.538) | 0.847*** (18.792) | 0.797*** (18.995) | 0.962*** (25.300) | -0.617** (-3.020) | -0.196*** (-5.049) | 8.250*** (30.219) | 0.817*** (32.490) | 0.458*** (37.304) | 0.417*** (8.954) |
| # observations | 119,535 | 119,535 | 119,535 | 119,535 | 119,535 | 131,296 | 129,310 | 123,964 | 71,316 | 223,299 | 70,264 |
| # countries | 77 | 77 | 77 | 77 | 77 | 97 | 97 | 96 | 57 | 96 | 57 |
| Adj. R-squared | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.34 | 0.21 | 0.22 | 0.15 | 0.09 | 0.11 |

Notes. Baseline controls include age, age squared, and an indicator variable equal to one if respondent is female. Female variable is dropped for female dependent outcome variables. See Appendix 1 for data description. Standard errors are clustered by country. Robust t-statistics in parentheses. ***p < 0.001, **p < 0.05, *p < 0.10.

five world religions and adherence to “other religion”. The reference category is non-religious.

As more women engage in paid work outside the home, children may adopt less traditional attitudes regarding gender roles (Fernandez et al., 2004; Seguino, 2007). Marriage could shift attitudes and preferences for work outside the home. Higher levels of income and education may promote equal opportunities for men and women, decreasing traditional attitudes about the role of women in society (Del Boca & Locatelli, 2006; Heineck, 2004). Many studies, as explained by Forsythe, Korzeniewicz, and

Durrant (2000), attribute gender inequality to differences to human capital.

The influence of a society's dominant religion on gendered attitudes and outcomes is already accounted for by including country fixed effects, but an individual's personal religious affiliation may also matter. A substantial literature finds that religion is associated with regressive attitudes toward women (Algan & Cahuc, 2006, Guiso, Sapienza, & Zingales, 2003, Fortin, 2005, Inglehart & Norris, 2003, Seguino, 2011) and greater gender inequality across a range of social outcomes (Seguino, 2011, 2016, Cooray &

Table 4
Individualism, Patriarchal Attitudes and Outcomes, Additional Controls, OLS.

| Dependent Variables: | Panel A: Religious affiliation controls | | | | Panel B: Historical plough | | | | Panel C: Gendered language | | | |
|----------------------|---|-------------------------|--------------------------|-------------------------|----------------------------|-------------------------|--------------------------|-------------------------|----------------------------|-------------------------|--------------------------|-------------------------|
| | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) |
| Individualism | -0.085*** (-5.424) | -0.035*** (-3.777) | 0.024*** (8.806) | 0.398*** (11.130) | -0.074*** (-4.457) | -0.031** (-2.633) | 0.024*** (7.919) | 0.371*** (10.901) | -0.076*** (-4.962) | -0.042** (-2.768) | 0.024*** (7.185) | 0.386*** (11.132) |
| Married | -0.002 (-0.180) | 0.699*** (16.279) | -0.068*** (-8.191) | -0.400*** (-5.844) | 0.005 (0.396) | 0.706*** (14.664) | -0.076*** (-9.140) | -0.328*** (-4.657) | -0.006 (-0.422) | 0.743*** (11.187) | -0.075*** (-6.370) | -0.353*** (-4.334) |
| Income | -0.011*** (-3.767) | -0.026*** (-5.922) | 0.029*** (13.459) | 0.429*** (17.872) | -0.009** (-2.923) | -0.024*** (-4.915) | 0.030*** (13.169) | 0.413*** (17.034) | -0.009** (-2.788) | -0.033*** (-5.509) | 0.028*** (8.890) | 0.409*** (15.480) |
| Education (middle) | -0.152*** (-9.401) | -0.491*** (-14.215) | | | -0.142*** (-7.470) | -0.488*** (-13.322) | | | -0.145*** (-7.234) | -0.554*** (-12.719) | | |
| Education (upper) | -0.297*** (-12.616) | -0.756*** (-15.846) | | | -0.278*** (-11.747) | -0.751*** (-15.692) | | | -0.295*** (-11.734) | -0.817*** (-14.055) | | |
| Religion controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Plough | | | | | -0.072** (-2.684) | -0.276*** (-3.789) | 0.025 (1.008) | 0.894*** (3.520) | | | | |
| Gendered language | | | | | | | | | 0.040* (1.968) | 0.039 (1.170) | -0.033* (-1.883) | -0.408*** (-4.403) |
| Baseline controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country*wave dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 0.217*** (5.011) | -1.078*** (-6.988) | -0.335*** (-9.543) | 9.123*** (36.468) | -0.256*** (-6.610) | -1.715*** (-7.247) | -0.194** (-3.091) | 7.961*** (24.571) | -0.521*** (-12.045) | 2.355*** (10.235) | -0.425*** (-7.178) | 7.627*** (27.088) |
| # observations | 102,990 | 98,081 | 101,908 | 99,468 | 76,783 | 71,165 | 73,222 | 72,424 | 52,539 | 48,435 | 49,427 | 49,175 |
| # countries | 73 | 93 | 94 | 93 | 68 | 87 | 88 | 88 | 61 | 77 | 78 | 78 |
| Adj. R-squared | 0.25 | 0.39 | 0.22 | 0.30 | 0.25 | 0.39 | 0.22 | 0.29 | 0.27 | 0.39 | 0.23 | 0.29 |

Notes. Baseline controls include age, age squared, and an indicator variable equal to one if respondent is female. Female variable is dropped for female dependent variables, columns (2)–(4). See [Appendix 1](#) for data description. Standard errors are clustered by country. Robust t-statistics in parentheses. ***p < 0.001, **p < 0.05, *p < 0.10.

Potrafke, 2011). Religion is also significantly correlated with individualism (Davia, 2017), raising the possibility that our initial results are spurious.

Table 4, Panel A reports the results with additional controls for socioeconomic factors and religious affiliation. As shown, individualism is robust to the inclusion of these variables. Individualism's coefficient is significant at the 1% level in all specifications, although the size is reduced. The additional controls have the expected sign and significance. Income and education, for example, significantly reduce patriarchal attitudes and female fertility. Income also significantly increases female employment and educational attainment.

We further check the sensitivity of our results by including two key variables that the literature highlights as being associated with patriarchal attitudes or social outcomes. First, we add a measure of historical plough use. Alesina et al. (2013) establish that use of the heavy plough, which requires significant upper body strength, is associated with a preindustrial gender division of labor, and that historical plough use is associated with lower levels of contemporary female labor force participation. To control for this potential impact, we include the share of a country's population, based on language origin, with ancestors that used the heavy plough. As reported in Panel B, individualism is robust to this inclusion.

Next, we include the effect of speaking a gendered language, defined as a language in which gender plays an important role in the grammar of nouns and pronouns. A large literature finds that speaking a gendered language is associated with gendered outcomes, including lower rates of female labor force participation (Gay et al., 2013; Mavisakalyan, 2015), early female marriage (Gay et al., 2013), and a greater educational gender gap (Davis & Reynolds, 2018).

We generate a measure of gendered language based on the gender intensity of a language's nouns and pronouns. The index of gendered nouns follows Davis and Reynolds (2018), giving one point to languages in which nouns are classified as either masculine or feminine and an additional point to languages in which the rules of gender assignment are both formal and semantic rather than only semantic (Corbett, 2013). Our measure of the gender intensity of a language's pronouns follows Mavisakalyan (2015), assigning one point to languages in which there are gender distinctions in the third-person singular and a second point if there are also gender distinctions in the first- or second-person singular pronouns. We add these two measures together to create a gendered language index, which is matched to survey respondents using the language an individual speaks at home.

As reported, in Table 3, Panel C, the association between individualism and gender equality is robust to the inclusion of the gendered language index, with individualism significant at the five percent level or better in all four specifications.

4. Instrumental variables regressions

An important caveat regarding our results so far is that they may not reflect causal effects. Two concerns are paramount. First, cultural variables may be endogenous, raising issues related to omitted variable bias and reverse causation. For example, economic development may give rise to more modern perspectives regarding the gender division of labor and simultaneously, by increasing social and geographic mobility, undermine the social ties that underlie collectivist social norms. While our estimates include country-wave fixed effects, which capture the impact of modernization on values at the national level, they do not control for the impact of differential rates of modernization across subnational regions or across urban and rural populations. More broadly, our measure of individualism combines information on beliefs

about abortion, homosexuality and the authority of parents that are quite plausibly outcomes of social processes that also influence attitudes toward gender inequality. A second concern, which applies to any survey-based data, regards the potential impact of measurement error on coefficient estimates.

We address these concerns through an instrumental variable estimation strategy. In particular, we instrument for individualism using a measure of historic rainfall variation. Davis (2016) develops a model of optimal socialization in which households adopt more collectivist attitudes in order to facilitate informal risk-sharing arrangements. In preindustrial societies, more variation in rainfall generates increased risk and uncertainty, leading individuals to adopt collectivist attitudes as a way to mitigate risk from weather shocks. Collectivism increases the disutility of renegeing on a risk sharing arrangement, and thus allow individuals to credibly commit to greater transfers in the face of an adverse income shock. These attitudes persist over time such that historic rainfall variation is negatively associated with contemporary individualist values.

To measure rainfall variation, we utilize precipitation information in the CRU Hulme Global Land Precipitation Data (Hulme, 1992), which provides historical monthly precipitation levels from 1900 to 1998 for global land areas at a 5-degree resolution. For each grid, we compute the standard deviation of the natural log of monthly precipitation for each month. Monthly precipitation data is used on the argument that rainfall in April may be a poor substitute for rainfall in August. This is averaged across a six-month growing season, identified as April-September in the northern hemisphere and October-March in the southern hemisphere, to obtain a gridded measure of exogenous precipitation shocks, *rainfall variation*.

We link information on rainfall data to WVS survey respondents using information on the language an individual speaks at home and information from Ethnologue on the geographic coordinates indicating a language's point of origin. This provides a measure of exogenous agricultural risk faced by those speaking a given language. The use of this instrument limits our sample in two ways. First, information on language is only available for waves 3–5 of the WVS. Second, the sample is limited to the overlap of languages covered by the WVS and Ethnologue. The resulting sample has up to 91,255 observations.

The relation between rainfall variation at the point of language origin and individualism is illustrated in Figs. 1 and 2. Fig. 1 shows this association for ten languages of India, which is the country with the greatest number of distinct languages for which we have rainfall data. Fig. 2 illustrates the residual correlation between rainfall variation and individualism, controlling for country fixed effects, for the 136 language-country groups in our sample. In both cases, we limit the analysis to language-country groups with more than fifty observations. Both figures demonstrate the strong negative relation between rainfall variation and individualism, initially established by Davis (2016), which underlies the first stage of our IV regressions.

Table 5 presents the first and second stage results including only the baseline controls. As shown in Panel A, rainfall variation is negative and significantly related to individualism at the one percent level. In addition, first stage adjusted R-squareds and F-statistics are significantly above the thresholds for concern over weak instrument bias.

We present the second stage regression results in Panel B. We find that the coefficient of individualism is negative and significant at the one percent level for all specifications. That is, the exogenous variation in individualism that is driven by rainfall variation is negatively related to patriarchal attitudes and female fertility, and is positively related to the likelihood that a woman works outside the home and has more years of education.

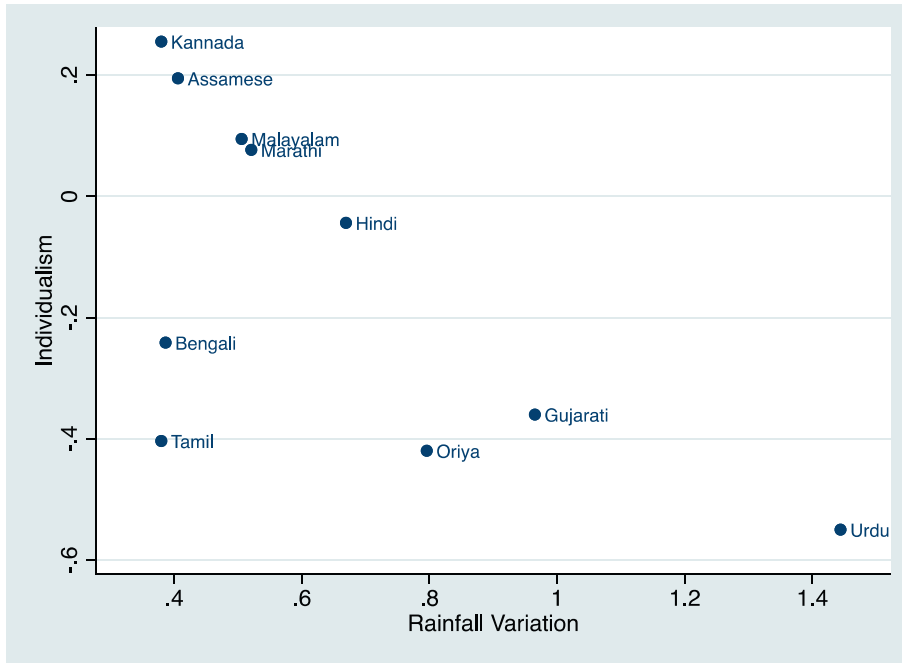


Fig. 1. Rainfall Variation and Individualism for the Languages of India. Notes. India is the country with the greatest number of languages for which rainfall data is available.

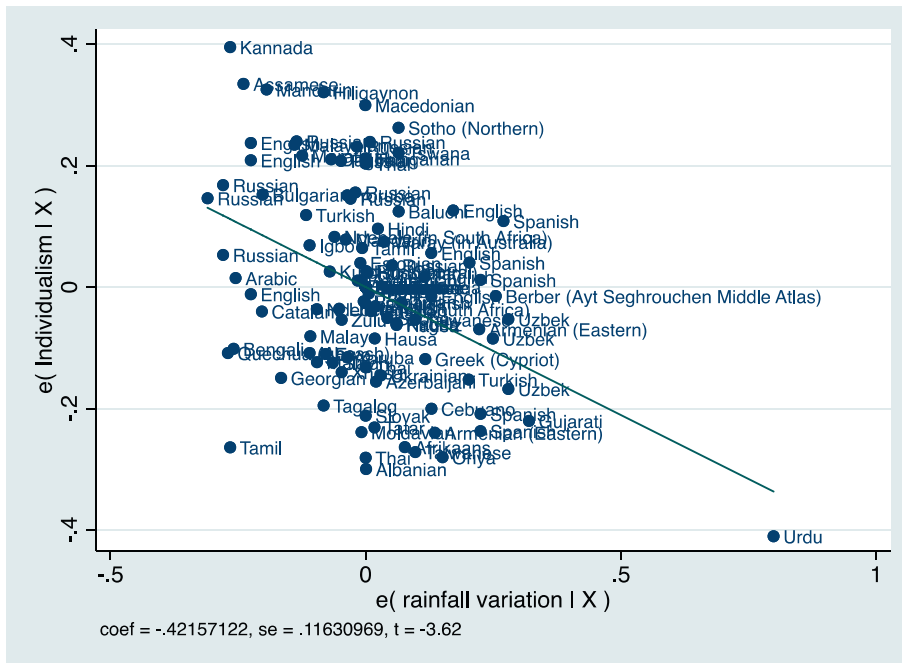


Fig. 2. Rainfall Variation and Individualism, controlling for country fixed effects. Notes. 136 country-language combinations with more than 50 observations.

Our results indicate that individualism also has an economically significant impact on attitudes and outcomes for women. For example, our estimates suggest that a one standard deviation rise in the individualism index reduces PAI by 0.84 of a standard deviation. In addition, it reduces female fertility by 1.1 children, increases the likelihood that a woman is employed by 23.5 percent, and increases female schooling by 2.24 years.

We note that the coefficients on individualism in the IV regressions are significantly larger than those in our OLS specifications. This likely reflects two factors. First, it is likely that our individualism index is subject to significant measurement error, leading to attenuation bias, which will tend to bias OLS coefficients toward

zero. If our instrumental variable, rainfall variation, is measured more precisely, the IV coefficients will be larger in magnitude.

The second factor is that the IV estimates reflect the exogenous variation in personal values that is driven by variations in climatic conditions at the level of individual languages. As a consequence, in moving from OLS to IV specifications, we are also moving from a measure of *individual values* to a measure of the *collective values* of a particular language group. The IV coefficient measures the local average treatment effects (LATE) of our instrument (Imbens & Angrist, 1994), and, thus, the variation in individual values that covaries with the social norms of an individual's language group. If individual values have a greater influence on attitudes and social

Table 5
Individualism, Patriarchal Attitudes and Outcomes, IV Analysis.

| Dependent Variables: | Panel A: First Stage | | | | Panel B: Second Stage | | | |
|-----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|--------------------------|-------------------------|
| | Individualism (1) | Individualism (2) | Individualism (3) | Individualism (4) | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) |
| Rainfall variation | -0.490*** (-12.164) | -0.489*** (-12.153) | -0.496*** (-12.199) | -0.471*** (-11.400) | | | | |
| Individualism | | | | | -0.843*** (-7.602) | -1.108*** (-6.291) | 0.235*** (4.913) | 2.244*** (5.500) |
| Age | 0.010*** (11.018) | 0.008*** (9.155) | 0.008*** (8.665) | 0.009*** (9.296) | 0.005** (2.890) | 0.189*** (77.699) | 0.041*** (62.713) | -0.002 (-0.378) |
| Age squared | -0.0001*** (-18.143) | -0.0002*** (-17.750) | -0.0002*** (-17.254) | -0.0002*** (-17.901) | -0.0001** (-2.388) | -0.002*** (-41.771) | -0.0005*** (-48.909) | -0.001*** (-6.018) |
| Female | 0.036*** (6.861) | | | | -0.218*** (-26.802) | | | |
| Country*wave dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 0.379 (1.518) | 0.114 (0.000) | -0.034 (-0.076) | 1.653 (0.001) | -0.007 (-0.089) | -2.724*** (-15.464) | -0.381*** (-7.754) | 10.357*** (27.759) |
| # observations | 91,255 | 85,591 | 84,473 | 83,113 | 91,255 | 85,688 | 84,473 | 83,203 |
| # countries | 71 | 90 | 91 | 91 | 71 | 90 | 91 | 91 |
| Adj. R-squared | 0.35 | 0.39 | 0.39 | 0.39 | -0.10 | 0.14 | 0.10 | 0.09 |
| F-stat excluded instruments | 147.96 | 147.73 | 148.81 | 129.88 | | | | |

Notes. Instrumental variable is historical rainfall variation. See Appendix 1 for data description. Robust t-statistics in parentheses. ***p < 0.001, **p < 0.05, *p < 0.10.

Table 6
Individualism, Patriarchal Attitudes and Outcomes, Revised Indices, IV Analysis.

| Dependent Variables: | Panel A: Revised individualism index | | | | Panel B: Gender Division of Labor |
|-----------------------|--------------------------------------|-------------------------|--------------------------|-------------------------|-----------------------------------|
| | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) | GDL index (5) |
| Revised Individualism | -3.377** (-2.724) | -4.314** (-2.597) | 1.011** (2.667) | 8.624** (2.466) | |
| Individualism | | | | | -0.407*** (-3.622) |
| Age | 0.032** (2.353) | 0.224*** (14.913) | 0.032*** (8.833) | -0.066* (-1.839) | 0.007*** (4.164) |
| Age squared | -0.0003** (-2.054) | -0.002*** (-10.733) | -0.0004*** (-9.646) | 0.00004 (0.104) | -0.0001** (-1.964) |
| Female | -0.515*** (-5.148) | | | | -0.064*** (-6.534) |
| Country*wave dummies | Yes | Yes | Yes | Yes | Yes |
| Constant | -0.595** (-1.961) | -4.196*** (-7.395) | -0.004 (-0.032) | 13.246*** (10.482) | 0.200** (1.970) |
| # observations | 91,255 | 99,188 | 97,972 | 94,473 | 59,057 |
| # countries | 71 | 91 | 92 | 92 | 54 |
| Adj. R-squared | -9.04 | -4.14 | -3.05 | -3.78 | 0.06 |

Notes. Instrumental variable is historical rainfall variation. See Appendix 1 for data description. Robust t-statistics in parentheses. ***p < 0.001, **p < 0.05, *p < 0.10.

outcomes when they are in alignment with the values of an individual's larger social group, then we can expect the variation in individual values driven by language-level climate conditions to have a greater impact on these outcomes as well.

4.1. Robustness of IV results

Next, we consider the robustness of our instrumental variable results to a variety of alternative specifications. Table 6 presents IV results for specifications incorporating alternative measures of individualism and gendered attitudes. As seen in columns 1–4, our key instrumental variable results are robust to the use of the revised individualism index, with individualism having the expected sign and being significant at the five percent level in all four regressions.

In column 5, we present results from an IV regression using the gender division of labor index as the dependent variable. Again, we find a strong, negative, statistically significant relation between individualism and support for a gender division of labor.

Next, we address several concerns related to the validity of the exclusion restriction. The exclusion restriction will be violated if rainfall variation at the geographic origin of an individual's language is correlated with geographic, climatic or other variables that influence patriarchal attitudes and gender equality. In order to minimize such concerns, Tables 7 and 8 provide evidence on the robustness of the IV results to additional controls.

First, we consider the potential role of religion. As noted earlier, a large literature argues that religion plays a significant role in structuring attitudes toward women. In addition, Davis (2017) finds that the climatic conditions in the region in which a religion developed have a significant impact on its values. If the climatic conditions in the regions in which an individual's language and religion developed are correlated this might violate the exclusion restriction. As before, we control for the influence of religion by including dummy variables for membership in five global religions plus other religion. Panel A of Table 7 shows that our results are robust to this inclusion. Individualism remains negative and highly significant in all specifications; however, the size of the estimated effects is somewhat reduced.

Table 7
Individualism, Patriarchal Attitudes and Outcomes, Additional Controls, IV Analysis.

| Dependent Variables: | Panel A: Religious affiliation controls | | | | Panel B: Cool water index | | | | Panel C: Alesina et al. (2013) controls | | | |
|--------------------------------|---|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|-----------------------------|----------------------------|---|----------------------------|-----------------------------|----------------------------|
| | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) |
| Individualism | -0.781*** (-5.735) | -0.787*** (-3.910) | 0.216*** (4.069) | 2.195*** (4.856) | -0.738*** (-5.891) | -0.809*** (-4.206) | 0.183*** (3.694) | 2.060*** (4.828) | -0.643*** (-4.295) | -1.263*** (-4.581) | 0.163** (2.536) | 0.768 (1.439) |
| Married | -0.057*** (-3.865) | 0.630*** (25.505) | -0.050*** (-7.049) | -0.130** (-2.155) | -0.055*** (-3.893) | 0.618*** (25.400) | -0.055*** (-8.057) | -0.118** (-2.034) | -0.049** (-3.077) | 0.578*** (18.035) | -0.060*** (-7.422) | -0.273*** (-4.090) |
| Income | 0.012** (2.722) | -0.004 (-0.530) | 0.022*** (9.833) | 0.344*** (18.044) | 0.010** (2.388) | -0.002 (-0.277) | 0.024*** (11.145) | 0.343*** (18.849) | 0.008 (1.570) | 0.011 (1.289) | 0.025*** (9.624) | 0.389*** (18.294) |
| Education (middle) | -0.093*** (-6.483) | -0.424*** (-18.299) | | | -0.091*** (-6.563) | -0.417*** (-18.141) | | | -0.099*** (-6.671) | -0.383*** (-13.203) | | |
| Education (upper) | -0.116*** (-3.312) | -0.577*** (-11.354) | | | -0.119*** (-3.665) | -0.564*** (-11.530) | | | -0.142*** (-3.871) | -0.467*** (-7.121) | | |
| Religion controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cool water index | | | | | -0.057 (-1.377) | -0.133** (-2.196) | 0.047** (2.397) | 1.402*** (9.558) | -0.157** (-2.131) | -0.070 (-0.562) | 0.191*** (5.089) | 0.648** (2.534) |
| Alesina et al. (2013) controls | No | No | No | No | No | No | No | No | Yes | Yes | Yes | Yes |
| Baseline controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country*wave dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | -0.023 (-0.281) | -1.870*** (-11.478) | -0.482*** (-9.767) | 9.220*** (25.190) | 0.013 (0.149) | -1.776*** (-10.907) | -0.504*** (-10.444) | 8.420*** (23.773) | 0.954** (2.500) | -0.943 (-1.625) | -1.367*** (-8.710) | 5.295*** (4.784) |
| # observations | 80,933 | 74,470 | 76,755 | 75,733 | 78,504 | 72,645 | 74,566 | 73,908 | 76,783 | 70,253 | 72,123 | 71,501 |
| # countries | 68 | 88 | 89 | 89 | 68 | 87 | 88 | 88 | 68 | 87 | 88 | 88 |
| Adj. R-squared | -0.04 | 0.27 | 0.13 | 0.14 | -0.02 | 0.26 | 0.16 | 0.16 | 0.06 | 0.07 | 0.18 | 0.28 |

Notes. Instrumental variable is historical rainfall variation. Baseline controls include age, age squared, and an indicator variable equal to one if respondent is female. Female variable is dropped for female dependent variables, columns (2)–(4). Alesina et al. (2013) controls include historical plough, agricultural suitability, large animals, political hierarchies, economic complexity, and tropical climate. See Appendix 1 for data description. Robust t-statistics in parentheses. ***p < 0.001, **p < 0.05, *p < 0.10.

Table 8
Individualism, Patriarchal Attitudes and Outcomes, Additional Controls, IV Analysis.

| Dependent Variables: | Panel A: Trust and Religious Attendance | | | | Panel B: Rainfall level and language latitude | | | | Panel C: All controls | | | |
|--|---|----------------------------|-----------------------------|----------------------------|---|----------------------------|-----------------------------|----------------------------|-----------------------|----------------------------|-----------------------------|----------------------------|
| | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) | PAI (1) | Female Fertility (2) | Female Employment (3) | Female schooling (4) |
| Individualism | -0.816*** (-5.055) | -0.838*** (-3.920) | 0.209*** (3.829) | 2.345*** (4.890) | -0.669*** (-5.982) | -0.607*** (-4.490) | 0.104** (2.586) | 2.305*** (6.627) | -0.817*** (-4.131) | -0.762*** (-3.502) | 0.065 (1.029) | 1.325** (2.579) |
| Married | -0.056*** (-3.566) | 0.625*** (25.167) | -0.054*** (-7.612) | -0.148** (-2.432) | -0.047*** (-3.719) | 0.648*** (34.388) | -0.063*** (-10.829) | -0.118** (-2.367) | -0.061** (-3.261) | 0.629*** (25.403) | -0.073*** (-9.597) | -0.237*** (-3.830) |
| Income | 0.012** (2.469) | -0.003 (-0.441) | 0.022*** (9.987) | 0.334*** (17.180) | 0.009** (2.411) | -0.008* (-1.791) | 0.027*** (15.520) | 0.334*** (22.636) | 0.012** (2.007) | -0.004 (-0.673) | 0.028*** (11.607) | 0.362*** (18.179) |
| Education (middle) | -0.091*** (-5.822) | -0.429*** (-18.669) | | | -0.101*** (-7.965) | -0.438*** (-23.462) | | | -0.086*** (-4.762) | -0.433*** (-18.742) | | |
| Education (upper) | -0.109** (-2.683) | -0.573*** (-11.009) | | | -0.143*** (-4.916) | -0.616*** (-17.250) | | | -0.102** (-2.149) | -0.587*** (-11.551) | | |
| Religion controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Trust | 0.052** (2.754) | 0.092*** (3.349) | -0.006 (-0.712) | 0.020 (0.295) | | | | | 0.054** (2.389) | 0.081** (2.879) | 0.013 (1.456) | 0.156** (2.222) |
| Religious attendance | -0.021** (-2.977) | -0.033** (-2.760) | 0.007** (2.379) | 0.111*** (4.132) | | | | | -0.022** (-2.506) | -0.030** (-2.490) | -0.001 (-0.148) | 0.061** (2.109) |
| Rainfall level | | | | | -0.034 (-1.591) | -0.056* (-1.832) | 0.038*** (3.939) | -0.001 (-0.018) | 0.031 (0.989) | -0.126** (-3.168) | 0.022* (1.799) | -0.081 (-0.913) |
| Language Latitude | | | | | -0.001 (-1.052) | -0.002** (-2.570) | 0.000 (0.562) | 0.015*** (8.038) | -0.002* (-1.732) | -0.001 (-0.412) | -0.000 (-0.762) | 0.005 (1.642) |
| Cool water index | | | | | | | | | -0.154* (-1.664) | 0.177 (1.503) | 0.153*** (3.883) | 0.706** (2.478) |
| <i>Alesina et al. (2013)</i> controls | No | No | No | No | No | No | No | No | Yes | Yes | Yes | Yes |
| Baseline controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country*wave dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 0.035 (0.408) | -1.784*** (-9.663) | -0.499*** (-9.128) | 8.875*** (20.802) | 0.319 (1.487) | -1.317*** (-4.145) | -0.799*** (-8.162) | 8.586*** (11.220) | 1.005** (2.016) | -0.007 (-0.011) | -1.450*** (-7.625) | 5.534*** (3.958) |
| # observations | 78,223 | 70,028 | 72,461 | 71,261 | 80,933 | 74,470 | 76,755 | 75,733 | 74,169 | 65,927 | 67,969 | 67,145 |
| # countries | 67 | 87 | 88 | 88 | 68 | 88 | 89 | 89 | 67 | 86 | 87 | 87 |
| Adj. R-squared | -0.07 | 0.25 | 0.14 | 0.12 | 0.05 | 0.32 | 0.21 | 0.12 | -0.08 | 0.28 | 0.22 | 0.25 |

Notes. Instrumental variable is historical rainfall variation. Baseline controls include age, age squared, and an indicator variable equal to one if respondent is female. Female variable is dropped for female dependent variables, columns (2)–(4). *Alesina et al. (2013)* controls include historical plough, agricultural suitability, large animals, political hierarchies, economic complexity, and tropical climate. See [Appendix 1](#) for data description. Robust t-statistics in parentheses. ***p < 0.001, **p < 0.05, *p < 0.10.

Next, we consider the robustness of our results to a climatic configuration identified by Welzel (2013, 2014) as the *cool water condition*. As defined in Welzel (2014, p. 35), the cool water condition “combines (1) fairly low average annual temperatures with (2) continuous rainfall over all seasons and (3) access to permanently navigable rivers.” The relative accessibility of fresh water under these conditions tends to undermine authoritarian structures and leads over time to the evolution of emancipatory values and institutions. Santos-Silva et al. (2017) extend the analysis of the cool water condition to explicitly consider its effect on women, finding that it leads to lower pre-industrial fertility and greater contemporary levels of gender equality.

We test the robustness of our IV results by including the cool water index developed by Welzel (2013, 2014).⁴ The cool water index combines measures of the three conditions noted above and is matched to respondents using the geographic origin of the language they speak at home. Our results, shown in Panel B of Table 7, generally confirm the body of work on the cool water condition, finding that the cool water index is a significant determinant of both patriarchal attitudes and women’s fertility, employment, and education. More importantly for our purpose, however, we also find that individualism is robust to the inclusion of this variable.

In the third panel of Table 7, we include a measure of historical plough use based on the concern that rainfall variation may be correlated with dimensions of climate associated with the presence of plough-positive crops. In this specification, we also control for a number of other variables from Alesina et al. (2013) that are potentially correlated with rainfall variation, including agricultural suitability, tropical climate, and historical measures of the presence of large animals, political hierarchies, and economic complexity, all of which are measured at the geographic origin of the language an individual speaks at home. As seen in Panel C, individualism is robust to the inclusion of these variables in three of the four specifications.

Rainfall variation is also credibly linked to social trust and church membership (Durante, 2010; Ager & Ciccone, 2018), raising additional concerns over instrumental validity. We address this in Table 8, Panel A by controlling for trust and the frequency of attendance at religious services. Individualism remains negative and significant at the 1% level in all specifications.

In Panel B, we control for two dimensions of climate in the region of language origin that are correlated with rainfall variation, the level of average monthly rainfall and distance from the equator. Individualism’s coefficients remain negative and significant in all four specifications.

Finally, in Panel C, Table 8, we consider estimations that control simultaneously for all additional controls from Tables 7 and 8, including individual demographic controls, religious affiliation, trust, religious attendance, rainfall levels, distance from the equator, the cool water index, historical plough use, agricultural suitability, the presence of large animals, political hierarchies, economic complexity, and tropical climate. Our findings indicate that individualism has the correct sign and is significant at the five percent level or better in all but one regression.⁵

We interpret these results as strong support for our central hypothesis, which holds that individualism significantly reduces gender inequality, as evidenced by reduced support for patriarchal attitudes and distinct changes in key aspects of women’s lives, including fertility, educational attainment and the likelihood of employment.

5. Conclusion

In this paper, we forward and empirically establish a theory of gender inequality grounded in cultural values related to individualism versus collectivism. We argue that individualist values of autonomy and self-determination tend to transcend gender identities and serve to legitimize women’s pursuit of their personal goals and preferences. In contrast, collectivist values highlight women’s social obligations and may subordinate their individual goals to collective social objectives. Furthermore, collectivism may increase the influence of what are often patriarchal institutions, including family, church, and government.

We find substantial support for this proposition. Individualism is associated with significantly lower support for gender inequality in key life domains, including employment, education, and political leadership. Individualism is also associated with less support for traditional gender roles, in which women are principally engaged in the domestic sphere. The impact of individualism on women’s lives goes beyond its impact on attitudes and social norms, with significant effects on female employment, education and fertility. These results are robust to controls for the influence of key variables previously identified as influencing patriarchal attitudes and gender inequality, including religious affiliation, gendered language and historical plough use. In addition, we address potential concerns over measurement error and the endogeneity of individualism by instrumenting with a measure of rainfall variation, which is linked to individual surveys using the geographic origins of the language an individual speaks at home. Our baseline IV results indicate effects at least as large as those found in the OLS regressions.

In closing, we note that several potential channels of causation are not specifically examined in this study. In particular, individualism may influence gender equality through its impact on national economic and institutional variables, including the levels of economic development and democracy. Given existing work in these areas, which finds that individualism increases economic and political development, we believe that taking these channels into account would strengthen the relation between individualism and gender equality.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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⁴ Our thanks to Christian Welzel for graciously sharing his data.

⁵ In conducting our robustness tests, we deliberately omit gendered language as a control. Galor et al. (2018) present evidence that language structures tend to complement existing cultural norms, which are in turn rooted in geography. Given the relation between individualism and gender equality, this raises the possibility that rainfall variation may be associated with the development of gendered nouns and pronouns. Indeed, in our sample, rainfall variation and gendered language are significantly correlated at 0.34, and in a univariate regression, we find that rainfall variation significantly predicts gendered language. Thus, to avoid over-controlling we omit gendered language.

Appendix

Appendix 1

Data Description.

| Variables | WVS Question |
|-----------------------------------|---|
| <i>Patriarchal Attitudes</i> | |
| Men right to job | Dummy variable = 1 if agree that "When jobs are scarce, men should have more right to a job than women" |
| Men better leaders | Dummy variable = 1 if agree or strongly agree that "On the whole, men make better political leaders than women do" |
| University for boy | Dummy variable = 1 if agree or strongly agree that "A university education is more important for a boy than for a girl" |
| Problem women income | Problem if women have more income than husband (dummy = 1 for agree or strongly agree) |
| Patriarchal Attitudes Index (PAI) | Index created from extracting the first principal components from the four patriarchal attitudes questions. A higher score indicates more patriarchal attitudes. The index is standardized |
| <i>Gender Social Outcomes</i> | |
| Female Fertility | Records the number of children a female respondent has from zero to eight |
| Female Employment | Binary variable equal to one if the female respondent indicated her employment status as full-time employed, part-time employed, or self-employed |
| Female Years of Schooling | We ascribe three years of education to each of four categories of schooling (some primary, primary, some secondary and secondary) and two years to the remaining two categories (some tertiary and tertiary). Recorded for female respondents |
| <i>Gender Division of Labor</i> | |
| Child suffers | Dummy variable = 1 if agree that "Pre-school child suffers with working mother" |
| Housewife fulfilling | Dummy variable = 1 if agree that "Being a housewife is just as fulfilling as working for pay" |
| GDL index | Index created from extracting the first principal components from child suffers and housewife fulfilling. A higher score indicates more gender division of labor. The index is standardized |
| <i>Individualism</i> | |
| State ownership | Coded from 1 to 10 where 10 indicates completely agree that government ownership of business and industry should be increased vs. private ownership of business and industry should be increased |
| Make parents proud | Dummy variable = 1 if agree or strongly agree that "One of my main goals in life has been to make my parents proud" |
| Justifiable: homosexuality | Coded from 1 (never justifiable) to 10 (always justifiable): homosexuality is justifiable |
| Justifiable: abortion | Coded from 1 (never justifiable) to 10 (always justifiable): abortion is justifiable |
| Individualism Index | Index created by extracting the first principal component from the four individualism questions. A higher score reflects a greater level of individualism. Index is standardized |
| Revised Individualism Index | Index created by extracting the first principal component from State ownership and Make parents proud. A higher score reflects a greater level of individualism. Index is standardized |
| <i>Controls</i> | |
| Age | Equal to age of respondent |
| Age squared | Equal to age squared |
| Married | Dummy variable = 1 if married |
| Female | Dummy variable = 1 if female |
| Income | Income scales coded as a variable going from one to eleven, where one indicate the lower step in the scale of incomes and eleven the highest. |
| Education (middle) | Dummy variable = 1 for middle education group |
| Education (upper) | Dummy variable = 1 for upper education level |
| Religion controls | Dummy variables = 1 if individual belongs to Protestant, Catholic, Muslim, Hindu, Buddhist, or other religion |
| Historical Plough | Share of country's population with ancestors that used the heavy plough (Alesina et al., 2013). Individual level estimates are matched by using the language an individual speaks at home and the geographic coordinates indicating a language's point of origin |
| Gendered language | Index that reflect gender intensity of nouns and pronouns in the language the individual speaks at home |
| Cool water index | Measures water autonomy: equal and easy access to fresh and clean water resources. The index combines: (1) Fraction of inhabited territory with cool/rainy conditions in excess of fraction in hot/dry conditions; (2) Fraction of territory in 100 km reach of ice-free waterways; (3) Index of minimum rainfall in driest month (Welzel 2014). Individual level estimates are matched by using the language an individual speaks at home and the geographic coordinates indicating a language's point of origin |
| Agricultural suitability | Share of ancestral land suitable for growing barley, wheat, sorghum, rye, foxtail millet, or pearl millet (Alesina et al., 2013). Individual level estimates are matched by using the language an individual speaks at home and the geographic coordinates indicating a language's point of origin |
| Large animals | Share of a country's population with ancestral domestication of large animals (Alesina et al., 2013). Individual level estimates are matched by using the language an individual speaks at home and the geographic coordinates indicating a language's point of origin |
| Political hierarchies | Ancestral number of political jurisdictional hierarchies (1–5) beyond the local community (Alesina et al., 2013). Individual level estimates are matched by using the language an individual speaks at home and the geographic coordinates indicating a language's point of origin |
| Economic complexity | Ancestral economic development based on 8 settlement patterns from nomadic to fully migratory to complex settlements (Alesina et al., 2013). Individual level estimates are matched by using the language an individual speaks at home and the geographic coordinates indicating a language's point of origin |
| Tropical climate | Share of ancestral land that was tropical or subtropical (Alesina et al., 2013). Individual level estimates are matched using language an individual speaks at home and the geographic coordinates indicating a language's point of origin |
| Alesina et al. (2013) controls | Alesina et al. (2013) controls include historical plough, agricultural suitability, large animals, political hierarchies, economic complexity, and tropical climate |
| Rainfall level | The natural log of the coefficient of average monthly precipitation, 1900–2009. Based on Davis (2016). We link rainfall data to WVS survey respondents using the language an individual speaks at home and the geographic coordinates indicating a language's point of origin |
| Language latitude | Latitude based on language spoken at home. |
| Trust | Equal to 1 if answered yes to the question most people can be trusted |
| Religious Attendance | Respondent's answer coded from 1 (never) to 8 (more than once a week) to the question: How often do you attend religious services? Higher score reflects more religious service attendance |
| <i>Instrument</i> | |
| Rainfall variation | The standard deviation of the natural log of monthly precipitation levels during a six-month growing season, based on the Climate Research Unit gridded data on monthly rainfall levels from 1900 to 1998 at a 5-degree resolution, Hulme (1992). We link rainfall data to WVS survey respondents using the language an individual speaks at home and the geographic coordinates indicating a language's point of origin |

Appendix 2
Correlation Matrix.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|------|
| (1) Men right to job | 1.00 | | | | | | | | | | | | | | | | | | | | |
| (2) Men better leaders | 0.36 | 1.00 | | | | | | | | | | | | | | | | | | | |
| (3) University for boy | 0.28 | 0.35 | 1.00 | | | | | | | | | | | | | | | | | | |
| (4) Problem women income | 0.20 | 0.19 | 0.18 | 1.00 | | | | | | | | | | | | | | | | | |
| (5) PAI | 0.69 | 0.73 | 0.68 | 0.52 | 1.00 | | | | | | | | | | | | | | | | |
| (6) Female Fertility | 0.16 | 0.12 | 0.10 | 0.06 | 1.00 | | | | | | | | | | | | | | | | |
| (7) Female Employment | -0.14 | -0.13 | -0.10 | -0.05 | -0.14 | 1.00 | | | | | | | | | | | | | | | |
| (8) Female Years Schooling | -0.15 | -0.12 | -0.13 | -0.11 | -0.17 | -0.30 | 1.00 | | | | | | | | | | | | | | |
| (9) State ownership | 0.07 | 0.06 | 0.05 | 0.01 | 0.06 | 0.06 | 0.00 | 1.00 | | | | | | | | | | | | | |
| (10) Make parents proud | 0.13 | 0.11 | 0.07 | 0.04 | 0.12 | 0.04 | -0.05 | 0.05 | 1.00 | | | | | | | | | | | | |
| (11) Justifiable: homosex. | -0.24 | -0.26 | -0.14 | -0.11 | -0.28 | -0.13 | 0.11 | 0.15 | -0.06 | 1.00 | | | | | | | | | | | |
| (12) Justifiable: abortion | -0.17 | -0.15 | -0.09 | -0.08 | -0.16 | -0.15 | 0.08 | 0.17 | -0.07 | -0.21 | 1.00 | | | | | | | | | | |
| (13) Individualism | -0.24 | -0.22 | -0.12 | -0.11 | -0.26 | -0.16 | 0.09 | 0.17 | -0.19 | -0.51 | 0.81 | 1.00 | | | | | | | | | |
| (14) Plough | -0.29 | -0.29 | -0.16 | -0.07 | -0.26 | -0.14 | 0.07 | 0.07 | -0.10 | -0.18 | 0.29 | 0.26 | 1.00 | | | | | | | | |
| (15) Gendered language | 0.09 | 0.04 | 0.07 | 0.03 | 0.02 | 0.13 | -0.06 | -0.12 | 0.12 | 0.09 | 0.00 | -0.17 | 0.31 | 1.00 | | | | | | | |
| (16) Trust | -0.04 | -0.03 | 0.00 | -0.07 | -0.08 | -0.01 | 0.03 | 0.08 | -0.03 | -0.10 | 0.11 | 0.10 | 0.18 | 0.05 | 1.00 | | | | | | |
| (17) Religious attendance | 0.09 | 0.08 | 0.08 | 0.07 | 0.12 | 0.10 | -0.03 | -0.10 | 0.01 | 0.16 | -0.22 | -0.29 | -0.30 | 0.06 | -0.07 | 1.00 | | | | | |
| (18) Cool water index | -0.28 | -0.28 | -0.19 | -0.12 | -0.30 | -0.10 | 0.09 | 0.11 | -0.13 | -0.22 | 0.36 | 0.29 | 0.38 | 0.65 | 0.11 | -0.20 | 1.00 | | | | |
| (19) Rainfall level | -0.02 | 0.00 | -0.02 | -0.09 | -0.02 | -0.03 | 0.05 | 0.04 | -0.06 | -0.04 | 0.02 | 0.04 | 0.08 | 0.07 | -0.52 | 0.09 | 0.06 | 0.20 | 1.00 | | |
| (20) Language latitude | -0.20 | -0.19 | -0.12 | -0.06 | -0.18 | -0.12 | 0.07 | 0.16 | -0.07 | -0.21 | 0.23 | 0.28 | 0.27 | 0.68 | -0.31 | 0.08 | -0.30 | 0.65 | -0.14 | 1.00 | |
| (21) Rainfall variation | -0.07 | -0.13 | -0.03 | 0.07 | -0.07 | 0.06 | -0.05 | -0.10 | 0.01 | 0.07 | 0.07 | -0.09 | -0.07 | 0.29 | 0.35 | -0.09 | 0.00 | -0.10 | -0.66 | 0.12 | 1.00 |

Notes. Correlations are significant at 1% level unless italicized.

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