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WHEAT AGRICULTURE AND FAMILY TIES

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Abstract

Several recent contributions to the literature have suggested that the strength of family ties is related to various economic and social outcomes. For example, Alesina and Giuliano (2014) highlight that the strength of family ties is strongly correlated with lower GDP and lower quality of institutions. However, the forces shaping family ties remain relatively unexplored in the literature. This paper proposes and tests the hypothesis that the agricultural legacy of a country matters for shaping the strength of its family ties. Using data from the World Values Survey and the European Values Study, the results show that societies with a legacy in cultivating wheat tend to have weaker family ties. Analysis at the sub-national level (US data) and the country level corroborate these findings. The estimations allow for alternative hypotheses which propose that pathogen stress and climatic variation can potentially also give rise to the formation of family ties. The results suggest that the suitability of land for wheat production is the most influential factor in explaining the variation in the strength of family ties across societies and countries.

Key words: Family ties; agriculture; long-run comparative development

JEL classification: O1; Q1; Z1

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1 Motivation

Already in the early 20th century, Weber (1905) argued that strong family values hinder the development of individual entrepreneurship. In turn, this restricts the formation of capitalistic societies. More recently, several contributions to the literature have highlighted that the strength of family ties is related to various economic and social outcomes. In particular, Alesina and Giuliano (2010) find that the strength of family ties is associated with higher home production activity and larger family size, but lower levels of female labor force participation and geographical mobility. Alesina and Giuliano (2011) show that individuals that rely more on family tend to have lower levels of civic engagement and political participation. Banfield (1958) and Ermisch and Gambetta (2010) find that strong family ties reduce trust in strangers. In contrast, Ljunge (2015) argues that strong family ties are positively related to civic virtues such as the disapproval of behaviors like cheating on taxes or benefits, corruption, and activities where others are exploited for personal gains. Alesina and Giuliano (2014) suggest that the strength of family ties is strongly correlated with lower GDP and lower quality of institutions.[1] Alesina et al. (2015) argue that individuals with strong family ties tend to have lower mobility, prefer more stringent labor market regulations, and have lower income and higher unemployment.[2]

However, despite these findings, what shapes the formation of family ties has not been thoroughly investigated, and is consequently not well understood. In this paper, we seek to explain observed differences in family ties with the help of agricultural legacies. Understanding the forces that shape the formation of family ties is important, not least because this particular dimension of culture has so far received relatively less attention from the literature compared to other cultural variables such as trust, religiosity, and individualism. We hypothesize that societies which historically have been oriented towards growing wheat due to favorable conditions tend to have weak family ties. The idea is that wheat production involves a relatively short growing season and low labor input requirements (except during sowing and harvesting). Historically, the women in a household cultivated the crops, while the males tended to the cattle. Men and boys were sometimes away for months in order to secure water and grass for the herd (Bates and Lees, 1977; Moran, 1982). This mobility reduced time with their own family and increased the interactions with non-family individuals. Thus, in wheat-based cultures the family was not dependent on continuous coordinated efforts. Less emphasis was placed on building constant family cooperation. This agricultural legacy, shaped by the environmental suitability of wheat cultivation, became a

[1] In addition, the strength of family ties (at the national level) is strongly related to several other important economic outcomes as indicated by the following pairwise correlations: average years of schooling (-0.561); a democracy index (-0.470); the private credit ratio (-0.309); and the incidence of conflict (0.416). Table A1 in the appendix provides full details.

[2] Importantly, family values are transmitted from parents to their children and have remained stable and persistent over time (Alesina and Giuliano (2010)). This suggests that policy makers may face immense challenges when trying to influence individual behavior via institutional reform. For example, Putnam et al. (1993) highlight a number of cases in Asia and Latin America where legal authorities are weak, and welfare and safety are mainly provided by family systems. Similarly, Fukuyama (1996) provides evidence from parts of Italy and China where family ties are strong, while the association between individuals and the state is considerably weaker.

long-term determinant of family values and culture. This effect has persisted long after the vast majority of the population largely ended all agricultural activities and become urbanized.

We focus on wheat rather than other high-energy cereals such as rice, maize and barley. This has several reasons, which are supported by our empirical analysis. First, Talhelm et al. (2014) theory and empirical evidence suggest that rice is more relevant for explaining the cultural origins of individualism vs. collectivism (see also Ang (2015)). Second, before 1500 AD maize existed only in America. It was introduced to the Old World during the subsequent Columbian Exchange. This prevents us from identifying the historical nature of the effect of cereal crops that persist and shape the formation of family ties today. Third, we note that the farming of barley uses methods similar to wheat (Cooper et al., 1916; Conklin and Stilwell, 2017, p. 93), and that barley was prevalent across the world in the pre-1500 period. However, its energy value is relatively low (see Mayshar et al. (2015)) which makes it a less important crop.

We measure the power of family ties by using World Values Survey data, following Alesina and Giuliano (2010). The survey seeks to capture respondents' beliefs and views on the significance of family in an individual's life, the need to love and respect parents, and the importance of parental duties. To test our hypothesis, we perform the regression analysis at three different levels: individual-, subnational- (United States only) and country-level, respectively. Our reduced-form estimates consistently demonstrate that the wheat suitability ratio (the share of arable land suitable and very suitable for wheat cultivation) is negatively associated with our indicators of the strength of family ties. We believe this is the first paper to demonstrate this relationship.

Our findings hold up to a battery of robustness tests. These include investigations of alternative theories (including plough utilization, social trust, the presence of pathogen stress, climatic variability, and individualism), and focusing on the children of immigrants. The results also survive when we include other cereal crops (wetland rice, maize and barley) as control variables, and when we restrict the sample to the Old World in order to identify the reduced-form effect of historical wheat suitability. Moreover, the findings remain robust when we allow for the effects of state history and modern-day legal and fiscal capacities (state capacity), and when we account for the potential impact of wheat on pre-industrial population and urbanization.

This paper proceeds as follows. Section 2 provides a brief review of the related literature. The next section provides an account of how agricultural legacy is related to the formation of family ties. Section 4 describes the estimation strategy, data sources and construction of variables. The main empirical estimates are presented in Section 5. Several additional robustness check results are presented in Section 6. Section 7 provides additional evidence based on children of immigrants. Section 8 concludes the paper.

2 Related Literature

Family ties play a fundamental role in the development of human society. A number of studies have highlighted that different forms of family structures are important determinants of economic

activity. Todd (1983) classifies family organizations into the following four types: the absolute nuclear family (liberal vertical relationship; non-egalitarian horizontal relationship); the egalitarian nuclear family (liberal; egalitarian); the stem family (authoritarian; non-egalitarian); and the communitarian family (authoritarian; egalitarian). He argues that different political ideologies (e.g., communism, Nazism, and Anglo-Saxon liberalism) held by people around the world simply reflect their family types. Duranton et al. (2009) use this classification of family types to show that they influence economic and social variables such as wealth, inequality, education attainment and labor force participation. Galasso and Profeta (2011) and Greif and Tabellini (2012) also demonstrate that differences in family types help explain variations in the pension systems and patterns of urbanization across countries.

The idea of exploring the effects of family ties on economic, political and social outcomes is not new. It traces its roots back to at least the early 20th century when Weber (1905) argued that strong family values hinder the development of individual entrepreneurship. In turn, this restricts the formation of capitalistic societies. Weber believed that a society plays an important role in nurturing entrepreneurs. Individuals draw their values from the cultural, social and institutional frameworks in which they live. Their outlook on life is all determined by socio-economic and cultural factors such as family ties.

Greif (2006) notes that in medieval times, nuclear families played a pivotal role in establishing corporations. While extended kinship groups encouraged trade-related activities based on trusted relationships, individuals from nuclear family systems were relatively independent. The latter tended to gain more from membership in corporations than individuals belonging to large kinship groups. These differences were important for stimulating the growth of corporations.

Family systems may also affect industrial structures and give rise to family capitalism. Bertrand and Schoar (2006) propose that family-oriented industrial structures could cause nepotism and decrease the average quality of firms. The experiences of some European and Latin American countries suggest that the performance of family firms is relatively weak.

A recent strand of the literature initiated by Alesina and Giuliano (2010) focuses on the association between family ties and labor market outcomes. In instances of strong family ties, women tend to be responsible for traditional household tasks. Men are expected to be the sole bread winner in the family. In contrast, families characterized as having weak ties are more egalitarian, with equal distribution of household work between men and women. Alesina and Giuliano (2010) show that strong family ties result in greater home production, larger families, reduced geographical mobility and lower labor force participation by women and youth.

Alesina et al. (2015) study the relationship between family ties and the regulation of labor markets. They note that despite the associated economic costs (i.e., lower wages and higher unemployment), regulated labor markets are preferred to laissez faire by voters in countries with strong family ties. Here, individuals find it difficult to move away from their families. In order to avoid the exploitative power of monopolistic firms over immobile workers, greater labor market rigidity is preferred. Hence, labor market deregulation reform is difficult to implement in countries with

strong family ties.

Most of the literature claiming an impact of family ties on developmental outcomes fails to recognize that family ties may be an outcome of the development process, rather than its determinant. An exception is Durante (2009), who notes that the formation of family ties is strongly related to the way subsistence farmers coped with weather fluctuations in preindustrial times. Collective action helped address such climatic risks, for example the construction of large-scale storage and irrigation facilities. Moreover, improved economic relations with neighboring areas was associated with forms of mutual insurance (e.g., inter-community exchange; geographically diversified mutual insurance arrangements) if the weather was not perfectly correlated across locations. Such activities required the expansion of networks beyond the own neighborhood to other areas. This implies that regions with higher temporal and spatial variability in climate tend to have weaker family ties. In such areas, people were more inclined to interact with non-family members. This reduced their dependence on family for insurance services.

In a similar vein, Fincher and Thornhill (2012) test the hypothesis that the degree to which people embrace strong family ties is positively associated with parasite-stress. Societies exposed to high levels of pathogen stress tend to avoid members outside their societies who may carry infectious diseases. These social and psychological behaviors favor interaction only to in-group members. This results in stronger family ties. The results provided by Fincher and Thornhill (2012) support this hypothesis; higher parasite-stress tends to strengthen family ties.

Banfield (1958) observed that people in a poor southern Italian village tended to trust only their immediate family members, and did not expect the outsiders to trust them. In this case, family ties and generalized trust acted as substitutes. Ermisch and Gambetta (2010) suggest that the reason family ties is negatively related to trust is a lack of outward exposure. This limits experience with strangers and the motivation to interact with them. On the other hand, Reher (1998) argues that the strength of family ties is determined by the cultural patterns of family loyalties and allegiances. In particular, demographic patterns of co-residences with adult children and older people, and the organization of a support system for the latter, are what matters most for the strength of family ties.

Our study is also related to a small but growing literature that focuses on the long-term historical effects of agricultural crops. For instance, using data on countries' suitability for potato cultivation, Nunn and Qian (2011) show that the introduction of the potato to the Old World from the Americas explains a significant share of the increase in population and urbanization during the 18th and 19th centuries. Alesina et al. (2013) show that a location's suitability for growing plough-positive crops (wheat, barley, and rye) versus plough-negative crops (sorghum, foxtail millet, and pearl millet) predicts the adoption of plough technology, which subsequently explains gender inequality today. Mayshar et al. (2015) propose that the emergence of hierarchy and state institutions depends on the extent to which the elite was able to appropriate food crops from farmers. Hence, the difference between the maximum potential yield for cereals (more appropriable crops) and the maximum potential yield for roots and tubers (less appropriable crops) can account for the

formation of hierarchy and state institutions. Their empirical estimates provide strong support for this hypothesis, which challenges Diamond's (1997) suggestion that the emergence of state government is due to land productivity. Similarly, Galor and Özak (2016) show that higher agricultural productivity, measured by potential crop yield, generates a persistent and positive impact on the prevalence of long-term orientation today.

3 Agricultural Legacy and Family Ties: A Conceptual Link

Several studies have established that agricultural legacy is an important determinant of several key economic outcomes. In particular, Easterly (2007) shows that the contemporary income distribution can be explained by the ratio of the suitability of land for wheat to sugarcane (see also the earlier work of Engerman and Sokoloff (1997) and Sokoloff and Engerman (2000) for this hypothesis). Nunn and Qian (2011) use the suitability index for cultivating potatoes to investigate the role of potatoes in increasing the historical population of the Old World. Alesina et al. (2013) argue that the farming technology traditionally used by a society, namely the propensity for plough cultivation, shaped the development of cultural traits and norms regarding the role of women in society. More recently, Talhelm et al. (2014) put forward the rice theory of culture. They show empirically that rice suitability determines the formation of individualistic norms. However, Ruan et al. (2015) provide contrasting evidence suggesting this effect is weak or non-existent.

We argue in this paper that ecological differences that determine the feasibility of wheat agriculture are crucial for the formation of family ties. Wheat is believed to originate from the Fertile Crescent (the region covering the modern-day southern Iraq, Syria, Lebanon, Jordan, Israel and northern Egypt) in the 11th millennium. Its domestication induced Neolithic transitions across Europe, North Africa and West Asia. It was one of the most important crops for many of the Old World's civilizations. Wheat was a major cereal grown in the Mediterranean basin, Europe, non-tropical Asia and the highlands of Ethiopia (Zohary and Hopf, 2012, p. 20).

The idea that farming legacy matters for cultural formation is straight forward. Societies endowed with environments which are favourable for the cultivation of wheat tend to engage more in wheat farming. Societies that grow wheat depend more on natural rainfall (which may vary significantly) and less on irrigation. Wheat is often sown in the fall (winter wheat), and during the ensuing winter months the family does not need to remain close to the fields. The main wheat growing season lasts only part of the year (spring to fall). Historically, the women were the ones cultivating the crops. Thus, in areas where agriculture is only seasonally possible, men and boys would spend a rather (seasonally) nomadic life for extended periods of time, in order to secure access to feed and water for the cattle (Bates and Lees, 1977; Moran, 1982). Moreover, this may also have helped avoid raiders and predators. This mobility facilitated trade and communication with other tribes. Since trade encouraged specialization, family members would tend to cooperate less in their daily lives.

Moreover, wheat agriculture does not require a large amount of manpower (except during sowing

and harvesting). Hence, families in wheat growing societies are not continuously highly dependent on each other. Over time, the lower need for inter-dependence, cooperation and coordination in societies with a legacy of wheat farming led to the development of cultures with weaker family ties.[3]

4 Approach and Data

4.1 Regression Model

The following model is regressed to investigate the reduced-form effect of wheat agricultural legacy on the shaping of family ties:

$$SFT_i = \alpha + \beta WSR_i + cv'\gamma + \varepsilon_i \tag{1}$$

where SFT is an index which captures the strength of family ties, WSR is the wheat suitability ratio, cv' is a vector of control variables, and ε is an unobserved error term. It is necessary to control for other effects, since the *SFT-WSR* relationship may be confounded by some omitted influences that not only determine family ties but also correlate with the suitability of wheat cultivation.

4.2 Data

A. Strength of family ties (SFT)

Our dependent variable is the strength of family ties (SFT). To capture the power of family ties, we follow the approach of Alesina and Giuliano (2010) and use individual responses from the World Values Survey regarding the role of the family. In particular, we construct three indicators to capture the strength of family ties based on the following questions.

The first question asks respondents to indicate how important family is in their life. The answers range from being "very important" to "not at all important". We assign a value of 1 to answers which indicate that family is "very important" and 0 otherwise. This variable is labeled FAMILY for the purpose of our study. Individuals who view their family as important in their life develop strong family ties. This cultural attribute shapes societies that are characterized by traditional family structures, with the male being the sole bread winner whilst the female is dedicated to housework. We believe FAMILY captures the form of family ties most relevant for this analysis. Conceptually, we expect that the historical lack of a need for inter-dependence, cooperation and coordination, as induced by an exposure to environmental factors conducive for wheat agriculture, can be adequately captured by the extent to which individuals downplay the importance of family

[3] In the middle ages, this may have led to a higher tendency for war and crusades, travel for politics and diplomacy, pilgrimage, and trade. For example, the Venetian explorer and merchant Marco Polo (1254-1324) originated from Italy, which has a high level of agro-ecological suitability for wheat. More recently, such societies may also have a tendency to allow and encourage international travelling and exploration, as well as the pursuit of advanced education in distant locations. These topics are beyond the scope of the present paper, and are left for further research.

ties. Hence, a priori, we expect a negative association between the suitability of wheat agriculture and FAMILY.

While our analysis focuses mainly on how wheat is associated with FAMILY, we also utilize two additional measures of family ties (for completeness and consistency) from the World Values Survey, proposed by Alesina and Giuliano (2010, 2011, 2014). Accordingly, the second question asks whether the respondents agree with statement – "Regardless of what the qualities and faults of one's parents are, one must always love and respect them"; or the alternative statement – "One does not have the duty to respect and love parents who have not earned it by their behavior and attitudes." A value of 1 is assigned if the respondents share the view that they should always respect parents, and 0 if they think parents should only be respected if they have earned it. This variable is labeled RESPECT.

The last question prompts the respondents to share their views regarding parents' responsibilities to their children. They are asked to choose one of the following statements that they tend to agree with: (1) Parents' duty is to do their best for their children even at the expense of their own well-being; (2) Parents have a life of their own and should not be asked to sacrifice their own well-being for the sake of their children; or (3) Neither. A score of 1 is assigned if they pick the first statement, and 0 otherwise; we call this variable PARENT.

Survey data from the following six waves are used: wave 1 (1981-1984), wave 2 (1990-1994), wave 3 (1995-1998), wave 4 (1999-2004), wave 5 (2005-2008) and wave 6 (2010-2012). While data on FAMILY are not available for the first wave, the last two waves do not provide data for RESPECT and PARENT. In Figure 1, we present the data for the strength of family ties at the country level using the first principal component of FAMILY, RESPECT, and PARENT. It is evident that there is a large dispersion of values in *SFT* across the world. Africa and America have larger *SFT* values compared to Europe and Oceania. The extent of *SFT* is generally moderate in Asia.

[Figure 1]

B. Wheat suitability ratio (WSR)

Our main explanatory variable is the wheat agro-ecological suitability ratio, defined as the share of arable land suitable or very suitable for wheat cultivation. The resulting ratio ranges between 0 and 1, where a higher value reflects greater suitability. The data are taken from the *Global Agro-ecological Zones database* (see GAEZ (2000)), which is jointly developed by the International Institute for Applied Systems Analysis (IIASA) and the Food and Agriculture Organization (FAO). We use measures that capture wheat cultivation that occurs under rain-fed conditions with an intermediate level of inputs. The assumption of rain-fed conditions is used since this method of water supply is unaffected by human intervention such as improved irrigation systems and farming technologies. The resulting wheat suitability ratio should therefore better capture historical agricultural conditions.

Nunn and Qian (2011) argue that while crop suitability ratios obtained from the FAO dataset are calculated in the 1990s, they should be reasonably good proxies for historical suitability given

the fact that they are constructed based on factors such as climatic features and soil conditions relevant to agricultural production that change only very slowly over time. Hence, our instrument is sufficiently exogenous with respect to the process of cultural formation. Figure 2 provides the distribution of wheat agricultural suitability across 153 countries. Table A2 and Table A3 in the Appendix provides all sources and descriptive statistics, respectively.

[Figure 2]

5 Main Results

5.1 Analysis using World Values Survey (WVS) Individual-Level Data

We first investigate the relationship between wheat suitability and family ties using individual level data from the World Values Survey (WVS). Accordingly, we regress individual responses that capture the strength of family ties on the degree of wheat suitability at the country level. Note that while we have data for wheat suitability at the regional level (except for the last wave of the survey), the location of the respondents cannot be identified in all surveys. We are therefore obliged to use country-level information for *WSR*. The regressions control for standard individual characteristics, including age, age squared, marital status, gender, educational attainment (primary, secondary or tertiary), and income (low, middle or high).

The reduced-form regression results are reported in Table 1. Column (1) shows that when we regress FAMILY only on the wheat suitability ratio, the coefficient on the latter is statistically significant at the 1% level. When individual characteristics are added to the specification in column (2), the results are unchanged. The next three columns check if the results in column (2) are sensitive to controlling for survey year fixed effects (column (3)), region fixed effect (column (4)) and both effects (column (5)), respectively. In all cases, the coefficients on *WSR* remain highly significant (at the 1% level). Column (6) repeats the exercise in column (5) and clusters the standard errors by region. The results are not sensitive to the clustering of standard errors, however; the *WSR* coefficient remains significant at the 1% level. Next, using the same specification as column (6), RESPECT and PARENT are used as the dependent variable in columns (7) and (8), respectively. Our results are robust when these alternative measures of family ties are used. Lastly, column (9) uses the first principal component of FAMILY, RESPECT and PARENT as the outcome variable. This estimation again gives consistent evidence.

[Table 1]

5.2 Analysis using Cross-State Data for the United States

Next, we provide evidence based on analysis that consider state-level data for the U.S. Using data only for the U.S. enables us to control for a range of factors that vary dramatically across countries such as institutions, geography, language, and history. The resulting estimates, which

are less affected by these factors, may provide useful evidence to complement the above results. Moreover, using the U.S. as a case study provides a natural experiment to test our hypothesis. Its large landmass, along with a high degree of variation in agricultural suitability across regions, has enabled it to traditionally grow both wheat and other grains. Yet it is relatively unified in terms of the factors stated above. Substantial variations in the extent of wheat farming across states render the U.S. an ideal natural test case for our hypothesis.

Our family tie data are here obtained from Fincher and Thornhill (2012). They combine data from the following three responses to obtain an overall measure of the strength of family ties for each state in the U.S.: (1) the percentage of people living alone (reversed); (2) the percentage of elderly people (65 +) living alone (reversed); and (3) and the percentage of households with grandchildren in them. The original data are taken from Almapi (1994). Wheat suitability data for every state are obtained from FAO-GAEZ. We also control for some geographic effects, including latitude, precipitation, mean distance to lake, and mean elevation. The data are taken from FAO-GAEZ and the G-Econ project.

The results are reported in Table 2. First, we estimate the relationship without including any control variables. The findings reported in column (1) indicate that wheat suitability and FAMILY are negatively correlated, and this correlation is highly significant. Next, we sequentially add geographic controls to the raw specification in the next four columns, and then jointly in column (6). The main finding remains unchanged. In column (7), we cluster the standard errors at the district level and obtain consistent results. The findings support the notion that wheat-based societies tend to exhibit weaker family ties.

[Table 2]

5.3 Analysis using Cross-Country Data

We also estimate Eq. (1) using cross-country data. The results are reported in Table 3. In column (1), the univariate regression shows that higher wheat suitability is significantly correlated with lower values of FAMILY. The results remain largely intact when geographic controls and continent dummies are added in column (2). Moreover, the *WSR* coefficient remains significant at the 5% level when we cluster the standard errors in column (3). In columns (4) and (5), we turn to using RESPECT and PARENT as the dependent variable, respectively, but find that *WSR* is only significantly correlated with PARENT.

[Table 3]

In column (6), we take the first principal component of FAMILY, RESPECT and PARENT and use it as the dependent variable. We end up with only 63 observations; data for RESPECT and PARENT are not available in the two most recent waves of World Values Survey which cover additional countries. In this case, the coefficient of *WSR* is significant at the 5% level. The results are largely unchanged in column (7). Here, all observations of FAMILY, RESPECT and PARENT are used to construct their first principal component, which results in a total of 86 observations.

In Table 4, we perform another set of cross-country regressions using repeated cross section data. This provides up to 214 observations. As is evident, the results are very similar to the findings in Table 3. Again, we find evidence supporting our hypothesis that societies that grow wheat tend to inculcate values which promote weak family ties, suggesting that higher wheat suitability predicts weaker family ties today.

[Table 4]

However, our results may potentially be driven by the inclusion of some large countries in the estimations. These tend to have more uneven distribution of agricultural suitability across different areas. We address this concern in additional analysis reported in Table A4 in the appendix. All estimations here utilize the last specification of Table 3. In Table A4, we sequentially exclude China, India, Japan, the United States, Canada and Russia in the estimations. The results are not affected by this consideration. Our results also survive when all these countries are jointly excluded in the last column.

6 Robustness of Estimates

6.1 Including an Extended Set of Control Variables

This subsection establishes that the reduced-form effect of wheat suitability on family ties is not confounded by the plausible influences of several contemporary variables. These include per capita income, educational attainment, age dependency ratio, fertility rate, legal origins, religious composition, religiosity, and political engagement.

Income levels, educational attainment and legal origins may be associated with the development of labor market institutions. These are closely associated with family ties, as shown by Alesina et al. (2015). The age structure of the population and the fertility rate may explain the geographical proximity of adult children to the parental household, which affects the strength of family ties (Alesina and Giuliano, 2010). The relationship between wheat agriculture and family ties may also be related to some religious traits and constraints. Thus, we control for religious composition and religiosity in the regressions. Finally, as highlighted by Alesina and Giuliano (2011), individuals whose family members are more closely tied together tend to depend more on the family. They therefore have lower levels of political participation. As a result, we also control for the effect of political engagement. Table A2 gives detailed definitions of these variables.

Table 5 reports the findings using data at the individual, sub-national (U.S.), and country level, respectively. As expected, including these additional controls results in smaller sample sizes across different data sets due to the unavailability of some data. Coupled with the fact that many of these additional controls are highly endogenous in nature, we did not include them in the baseline estimations. On the whole, the qualitative aspects of our earlier results are unaffected by the inclusion of these additional control variables. This suggests that the observed association found between wheat suitability and family ties is fairly robust.

[Table 5]

6.2 Considering other Crops

Data are available from FAO-GAEZ for a number of seasonal and storable crops. However, not all cereal crops provide large amounts of calories. Mayshar et al. (2015) provide energy estimates for a number of major staple food crops based on data for the whole world in 1961. Their analysis shows that the cereal crops which provide the highest levels of energy are rice (787), maize (748), wheat (727) and barley (256), where figures in parenthesis represent total energy produced in 10^{18} kilogram calories. Note that the total energy required to support the total population in 1961 is estimated to have been 3083 (in 10^{18} kilogram calories). Accordingly, in this robustness exercise, we focus on four crops which in 1961 jointly provided 82% of the total calories produced by the main cereal crops across the world (see Mayshar et al., 2015, Table A1).[4]

Why do we choose to focus on wheat rather than other high-energy cereals such as rice, maize and barley? The decision is based on several a priori grounds. First, the rice theory of culture proposed by Talhelm et al. (2014) predicts that countries with a rice growing legacy tend to have more collectivistic cultures. The cultivation of paddy rice requires a large amount of water, which necessitates greater cooperation to ensure efficient operation of the irrigation systems. The need for greater inter-dependence and intense cooperation, induced by environments favorable for the cultivation of rice, leads to the subsequent creation of collectivistic norms and values. The empirical results of Talhelm et al. (2014) support this prediction (see also Ang (2015)), suggesting that rice is more relevant for explaining the origin of the individualism-collectivism cleavage.

Second, maize was present only in America before 1500 AD, unlike wheat. Maize was introduced to the Old World during the Columbian Exchange. Hence, the lack of maize cultivation across the world prior to 1500 AD prevents us from identifying the historical nature of the effect of this crop on the contemporary strength of family ties. Focusing on maize may limit our understanding of the historical forces that persist and shape the formation of family ties today.

Third, we note that barley shares a number of similar features to wheat (see Cooper et al., 1916; Kolay, 2008, p. 151; Fageria et al., 2010, p. 219; Conklin and Stilwell, 2017, p. 93). In addition, it was prevalent across the world in the pre-1500 period (available in Asia, Europe and North America; see Table A2 of Galor and Özak, 2016). However, barley's energy value is relatively low. According to Mayshar et al.'s (2015) estimates, the amount of energy produced by barley is only about a third of that available from wheat. Perhaps as a reflection of its lower energy content, according to the statistics provided by FAOSTAT (2017), the production of barley relative to wheat declined from 0.33 (72.4/222.4) in 1961 to 0.20 (144.5/729.0) in 2014, where the figures in parenthesis indicate the global production level in millions of metric tons.

To check our main finding against the use of alternative cereal crops, in Table 6 we report

[4]Estimates for calories produced are also available for oats (193), rye (119), sorghum (135), and millet (97), where figures in the parenthesis indicate the total energy produced (in 10^{18} kilogram calories) for the whole world in 1961. Source: Mayshar et al. (2015).

the cross-country regression results using FAMILY (panel A) and the first principal component of FAMILY, RESPECT and PARENT (panel B). First, columns (1), (2) and (3) replace wheat with wetland rice, maize and barley, respectively. As expected, the coefficients of wetland rice are statistically insignificant in both cases (panels A and B, column (1)). Column (2) shows that the effect of maize is also statistically insignificant, perhaps suggesting that only cereal crops that existed widely across the globe before 1500 AD matter for the formation of family ties. Barley provides results that are consistent with wheat, regardless of the dependent variable used (column (3)). This finding is consistent with the fact that barley is grown using similar methods and locations as wheat.

[Table 6]

Next, we provide a horserace analysis for the cereal crops discussed. When wheat is paired with rice (column (4)), maize (column (5)) or barley (column (6)), only the coefficients of wheat are statistically significant with a sign consistent with our prediction. Note that the coefficients of barley are significant but have the opposite sign. This is perhaps due to the very high correlation between the suitability ratios for wheat and barley (0.998), and hence the results should be interpreted with caution.[5] Similar findings are obtained when all crops are included in the column (7). The results are also rather consistent when individual-level data are used (the results are reported in Table A5 in the appendix). Overall, the results support our approach to focus on wheat as the crop that explains the origin of family ties.[6]

6.3 Alternative Hypotheses: the Roles of Plough Use, Trust, Climatic Variation, Disease and Individualism

Our research focuses on wheat suitability as the key condition that gives rise to the formation of family ties. This is not meant to say that other factors are unimportant. Several studies have proposed that other variables are important in explaining the strength of family ties, including the practice of plough agriculture, social trust, climatic variability, pathogen stress, and individualism.

In particular, Alesina et al. (2013) show that traditional plough use determines gender-based division of labor; it fosters the belief that activities participated in by females should be limited to inside the home. Societies that discourage women's participation in the labor force and political

[5]The high association between the suitability of wheat and barley is perhaps unsurprising given that they share many similar requirements. Both are seasonal crops and are usually sown in the fall (Fageria et al., 2010, p. 219). In terms of climatic features, wheat is cultivated in regions with 350-600 mm of annual rainfall whereas barley can grow in drier climates with only 200–350 mm of annual rainfall (Conklin and Stilwell, 2017, p. 93). However, both crops are dependent on water during the critical stages of growth (Kolay, 2008, p. 151), and they need about 450-650 mm of water over their entire growing period of 120-150 days (Brouwer and Heibloem, 1986). Moreover, both barley and wheat are not labor-intensive crops, according to a study by Cooper et al. (1916) on the labor requirements for field crops in the U.S. between 1902-1912.

[6]Note that although the effect of maize is found to be significant at the 10% level and the effect of barley is significant at the 5% level when data for the U.S. are used, these cereal crops are highly correlated with wheat. The correlation with wheat suitability is 0.93 for maize suitability and 0.98 for barley suitability. Hence, the horserace estimates would not be indicative. Coupled with the fact that rice cultivation is not prevalent in the U.S., we therefore do not report the results for the U.S. using the suitability of other cereal crops.

activities are also likely to emphasize the importance of family, and hence plough cultivation may directly account for the formation of strong family ties.

Previous work has also established that people with strong family ties tend to have lower levels of social trust. This is because strong and stable relationships provided by families enhance trust within the in-groups. Beyond these relationships people lack a sense a security, however. Hence, they are less likely to trust a stranger (Banfield, 1958; Ermisch and Gambetta, 2010). Furthermore, Durante (2009) argues that a climatically more volatile environment reduces one's reliance on the family for insurance purposes and increases the propensity to interact with members outside the family. Fincher and Thornhill (2012) propose that the higher the levels of parasite-stress individuals face in a region, the greater the importance of family to the individuals. This reflects the importance of avoiding out-group members who may carry infectious diseases and the necessity to develop in-group networks which provide support and insurance.

Finally, Gorodnichenko and Roland (2012) propose that the strength of family ties varies negatively with the extent of individualism. In individualistic societies people are more likely to migrate for better jobs and join other new groups to pursue self-interests, weakening family ties. In contrast, people in collectivistic societies tend to be more dependent on their large family-based organizations or clans to obtain support and resources, and this strengthens their family ties. Taken together, these alternative arguments suggest that the strength of family ties should be positively associated with plough use and pathogen stress but negatively correlated with social trust, climatic volatility and individualism.

We test the relevance of these alternative propositions by using measures for plough use, generalized trust, temperature variability, pathogen burden and individualism. The results are reported in Table 7. The additional variables are added sequentially and jointly, using FAMILY (first six columns) and the first principal components of FAMILY, RESPECT and PARENT (next six columns) as the dependent variables. The coefficients of these variables are either insignificant, or significant but less precisely estimated than those for wheat suitability (which remain highly significant throughout). These results suggest that wheat suitability has a stronger power in explaining the shaping of family ties, providing considerable support for our hypothesis.

[Table 7]

6.4 Accounting for the Persistence of Wheat Suitability

In principle, the negative association between wheat suitability and family ties uncovered so far could be driven by reverse causality. Individuals that value the importance of family may choose to migrate and settle in areas which were unfavorable for growing wheat, thus creating difficulties in identifying the causal effect of wheat suitability. To mitigate this concern, we follow an approach similar to that of Galor and Özak (2016). In particular, we examine the effect of pre-1500 AD wheat suitability on the formation of family ties. Wheat was only prevalent in Asia, Europe

and North Africa prior to the Columbian Exchange.[7] Focusing only on areas where wheat was available for cultivation before 1500 AD restricts the analysis to a sample of countries which had not experienced large-scaled global migrations. These occurred after 1500 AD, thus enabling us to identify the historical effect of wheat suitability.

We report cross-country regression results using FAMILY (panel A) and the first principal component of FAMILY, RESPECT and PARENT (panel B) in Table 8. The results reported in column (2) show that pre-1500 AD wheat suitability has a significant effect on current family ties. This suggests that the effect of wheat suitability is persistent. Compared to the baseline estimates reproduced in column (1), the size of the estimated effect of pre-1500 AD wheat suitability increases when FAMILY is used as the outcome variable, but decreases when we consider the first principal component. Hence, we cannot ascertain how these changes are attributable to the cross-country migration of crops since 1500 AD.

[Table 8]

Next, as shown in the study of Nunn and Qian (2011), crop (potato) suitability can have an impact on pre-industrial population and urbanization. Our results will be affected to the extent that wheat suitability influences past economic development, which persists and affects some current developmental outcomes that are correlated with family ties. To account for the persistence of long-term development, we control for population density in 1500 AD and the rate of urbanization in 1500 AD. Our results reported in columns (3) to (5) indicate that the coefficients of wheat suitability remain precisely estimated in all cases. When the sample is restricted to just the Old World in order to identify the historical influence of wheat suitability, the findings remain consistent.

6.5 Accounting for the Effect of State Emergence

In a related study, Mayshar et al. (2015) show theoretically and empirically that differences in crop yield between cereals and tubers (sweet potato, white potato, and yams) can explain the emergence of institutionalized states. This is due to the differences in these crops' storability and vulnerability to expropriation. This in turn explains the rise of states which offer protection to peasants. Hence, in principle, crop suitability can also lead to the formation of government, confounding our findings. To ensure that our results are not driven by the failure to control for state presence and emergence, we construct several measures of state antiquity based on the dataset of Putterman (2012). These variables are used as proxies for the strength of states. Countries that have enjoyed a longer history of statehood are assumed to be equipped with stronger state (legal and fiscal) capacities. In Table 9, we report cross-country regression results using FAMILY (panel A) and the first principal component of FAMILY, RESPECT and PARENT (panel B).

[Table 9]

[7] North Africa is defined to include Algeria, Egypt, Libya, Morocco and Tunisia in our study.

First, we consider the effect of state history for the 15 centuries up to 1500 AD. The results are reported in column (1). The effect of statehood is insignificant, whereas the coefficients of wheat suitability remain significant at the 5% level. When the length of statehood experience is extended to 1950 AD, the results are similar (column (2)). Likewise, when state history from 1-1500 AD is ancestry-adjusted (Putterman and Weil, 2010), the results are qualitatively similar (column (3)). We also consider the individual components of state history from 1-1500 AD by controlling for the effects of state presence, state autonomy and state coverage individually in the next three columns.[8] Again, the same findings prevail.

Next, state capacity can also be measured more directly using modern-day institutions and tax data instead of statehood experience. In this connection, we follow the approach of Besley and Persson (2009) and use access to credit and investor protection indices as proxies for legal capacity. Moreover, the share of income tax revenue as a fraction of GDP is used as a proxy for fiscal capacity. Table 10 reports the findings using these state capacity indicators. FAMILY is used in columns (1) to (3), and the first principal component of FAMILY, RESPECT and PARENT is used in columns (4) to (6). Similar to the above findings, we continue to find evidence supporting the notion that wheat suitability has a statistically significant effect on the strength of family ties. We therefore conclude that the wheat-family nexus uncovered in this study is unlikely to be driven by institutional factors associated with the presence of a strong state.

[Table 10]

7 Evidence from Children of Immigrants

In this sub-section, we analyze the reduced-form effect of wheat suitability on the strength of family ties by focusing on the children of immigrants whose parents are born outside the country. Wheat suitability is in this case measured by the aggregate value of agricultural suitability for wheat in the ancestor country, which is defined using either the mother's or the father's country of origin. The underlying assumption is that the culture created by wheat farming is changing slowly over time, and this specific cultural value can be transmitted across generations. The key advantage of this exercise is that we are able to hold constant a range of institutional factors that vary at the national level. Hence, we can better tease out the causal impact of wheat culture on family ties.

Ancestry information is not systematically available from the WVS (only data for the most recent wave are available) and so we use data from various waves of the European Values Study, which provide proxies for family ties identical to those used in the WVS individual-level analysis earlier. The estimations include a set of geographic controls employed in the cross-country estima-

[8] The statehood experience measures used in columns (1) and (2) are obtained by multiplying three sub-indices: state presence, state autonomy and state coverage. State presence considers whether a government above the tribal level was present, state autonomy captures whether this government was foreign or locally based, and state coverage measures the extent to which the territory of the modern country was ruled by this government (see Putterman (2012)). The availability of this disaggregated information allows us to explore how the strength of family ties responds to different components of statehood experience.

tions and individual characteristic controls (i.e., age, age-squared, education level, gender, marital status and income level). We provide results based on both the father's and mother's country of origin on the effect of the embodied wheat culture transmitted across generations.

The findings are reported in Table 11. Columns (1) to (4) report estimates using the father's native country as ancestry. Columns (5) to (8) identify a second-generation immigrant's ancestry by the mother's country of birth. In both cases, we use FAMILY, RESPECT and PARENTS, and their first principal component, as proxies for family ties. As is evident, the wheat suitability coefficients are significant in all cases, regardless of which indicator for family ties is used. Interestingly, the maternal lineage seems to be more influential for diffusing wheat culture. The correlations are statistically and economically stronger when ancestry is traced by mother's country of birth. Overall, the results provide support in favor of the argument that the degree of ancestral wheat orientation is negatively related to the strength of family ties across second-generation immigrants in Europe. The evidence, therefore, indicates that second-generation immigrants, who originate from more wheat-oriented cultures, tend to place less emphasis on family networks.

[Table 11]

8 Concluding Remarks

The importance of culture for economic performance has long been recognized in the literature, which can be traced to the early work of Max Weber. Religiosity, individualism and, in particular, generalized trust have been highlighted as some of the most relevant aspects of culture that matter for economic outcomes. However, the association between family ties and economic performance has received relatively scant attention until recent years. Results from some recent studies suggest that the strength of family ties is related to labor market outcomes, civic virtues, and trust. The forces that drive family ties, however, remain largely unexplored. Against this backdrop, we attempt to uncover what shapes the formation of family ties. We focus on the agricultural roots of societies. In particular, we propose that ecological differences such as the type of arable land and the seasonality of rainfall, among other things, determine the suitability for wheat cultivation. In turn, wheat suitability determines the formation of family ties by affecting the degree to which continuous cooperation is needed.

Using data at the individual, sub-national and the country level, this study consistently demonstrates that wheat suitability has a strong negative reduced-form effect on the strength of family ties. Hence, our results indicate that a legacy of wheat production has over millennia yielded weaker family ties than other forms of agriculture. Wheat-based cultures do not promote the creation of strong family ties due to a historical lack of continuous dependency on family coordination for agricultural cultivation.

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Table 1: Analysis using World Value Surveys (WVS) Individual-Level Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. Var. =	*FAMILY*	*FAMILY*	*FAMILY*	*FAMILY*	*FAMILY*	*FAMILY*	*RESPECT*	*PARENT*	1^{st} PC
Wheat suitability	-0.06***	-0.07***	-0.05***	-0.05***	-0.05***	-0.05***	-0.05***	-0.11***	-0.07***
	(-28.75)	(-27.42)	(-22.43)	(-18.64)	(-16.59)	(-4.14)	(-3.65)	(-5.90)	(-6.56)
Age		-0.05***	-0.05***	-0.04***	-0.04***	-0.04**	-0.06***	0.04*	-0.07***
		(-4.26)	(-4.11)	(-3.22)	(-3.16)	(-2.35)	(-2.79)	(1.78)	(-3.86)
Age squared		0.06***	0.05***	0.05***	0.05***	0.05***	0.10***	0.02	0.08***
		(4.59)	(4.31)	(4.04)	(3.86)	(2.84)	(4.61)	(0.80)	(5.17)
Marital status		0.10***	0.10***	0.11***	0.11***	0.11***	0.04***	0.05***	0.10***
		(41.37)	(41.89)	(43.34)	(43.64)	(20.66)	(8.33)	(10.19)	(20.08)
Male		-0.05***	-0.05***	-0.05***	-0.05***	-0.05***	-0.01*	-0.01*	-0.05***
		(-26.89)	(-26.95)	(-26.75)	(-26.81)	(-15.76)	(-1.85)	(-1.86)	(-14.10)
Secondary education		0.03***	0.03***	0.04***	0.04***	0.04***	-0.02***	-0.05***	0.03***
		(11.97)	(12.21)	(13.01)	(13.10)	(6.86)	(-3.38)	(-6.39)	(4.44)
Tertiary education		0.04***	0.04***	0.04***	0.04***	0.04***	-0.05***	-0.07***	0.02***
		(12.96)	(13.36)	(14.47)	(14.91)	(7.47)	(-6.51)	(-9.04)	(3.81)
Low income		-0.02***	-0.02***	-0.02***	-0.01***	-0.02**	0.07***	0.01	0.01
		(-6.85)	(-5.95)	(-4.80)	(-4.41)	(-2.29)	(6.28)	(1.30)	(1.45)
Middle income		0.00	0.00	0.01**	0.00	0.00	0.06***	0.02**	0.02***
		(1.44)	(0.19)	(2.31)	(1.36)	(0.46)	(6.61)	(2.28)	(3.82)
R-squared	0.004	0.018	0.022	0.024	0.026	0.026	0.021	0.058	0.028
Observations	300168	241386	241386	241386	241386	227498	96446	96182	227745
No. of countries	86	85	85	85	85	84	57	57	84
Wave dummies	NO	NO	YES	NO	YES	YES	YES	YES	YES
Region dummies	NO	NO	NO	YES	YES	YES	YES	YES	YES
Clustered std. errors	NO	NO	NO	NO	NO	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The intercept estimates are not shown.

Table 2: Analysis using Cross-State Data for the United States

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var. = FAMILY	Basic model	Add latitude	Add precipitation	Add distance to lake	Add elevation	Include all controls	Cluster standard errors
Wheat suitability	-0.366***	-0.375***	-0.543***	-0.245**	-0.614***	-0.478***	-0.478**
	(-2.729)	(-3.491)	(-4.688)	(-2.309)	(-3.725)	(-3.801)	(-2.495)
Latitude		-0.570***				-0.366***	-0.366***
		(-5.307)				(-2.994)	(-4.073)
Precipitation			0.571***			-0.064	-0.064
			(4.928)			(-0.287)	(-0.188)
Distance to lake				0.610***		0.421***	0.421*
				(5.748)		(3.314)	(2.279)
Mean elevation					-0.394**	-0.333	-0.333
					(-2.389)	(-1.518)	(-1.254)
R-squared	0.134	0.459	0.429	0.492	0.228	0.635	0.635
Observations	50	50	50	50	50	50	50

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The standard errors are clustered at the division level in the last column. The coefficients are standardized beta coefficients. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The intercept estimates are not shown.

Table 3: Analysis using Cross-Country Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var. =	FAMILY	FAMILY	FAMILY	RESPECT	PARENT	1^{st} PC (restricted sample)	1^{st} PC (full sample)
Wheat suitability	-0.44***	-0.41**	-0.41**	0.15	-0.39*	-0.27**	-0.32**
	(-3.544)	(-2.223)	(-3.099)	(0.739)	(-2.689)	(-3.770)	(-3.631)
Island		0.06	0.06*	-0.11	-0.14*	-0.08**	-0.07
		(0.555)	(2.472)	(-1.583)	(-2.192)	(-4.261)	(-1.850)
Landlocked		0.07	0.07	-0.02	-0.15	-0.05	-0.07
		(0.606)	(1.333)	(-0.217)	(-1.761)	(-0.826)	(-1.183)
Latitude		0.03	0.03	-0.82	-0.45	-0.54	-0.42
		(0.149)	(0.121)	(-1.671)	(-1.270)	(-1.578)	(-1.335)
Distance to coast		-0.15	-0.15	0.10	-0.11	-0.06	-0.04
		(-1.375)	(-1.195)	(0.726)	(-0.833)	(-0.686)	(-0.209)
Precipitation		-0.06	-0.06	-0.24	-0.05	-0.12	-0.17**
		(-0.507)	(-1.732)	(-1.089)	(-0.307)	(-1.722)	(-2.904)
Elevation		-0.19	-0.19	0.01	0.03	0.00	-0.18
		(-1.398)	(-1.907)	(0.529)	(0.195)	(0.006)	(-1.800)
R-squared	0.195	0.266	0.266	0.511	0.524	0.529	0.414
Observations	86	86	86	63	63	63	86
Continent dummies	NO	YES	YES	YES	YES	YES	YES
Clustered std. errors	NO	NO	YES	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. The intercept estimate is not shown.*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The continent dummies included are Asia, America, Africa and Europe (Oceania is the excluded group).

Table 4: Analysis using repeated Cross-Country Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var. =	FAMILY	FAMILY	FAMILY	RESPECT	PARENT	1^{st} PC (restricted sample)	1^{st} PC (full sample)
Wheat suitability	-0.24***	-0.26***	-0.26***	0.19	-0.32**	-0.23**	-0.24**
	(-3.435)	(-2.748)	(-4.864)	(1.258)	(-3.127)	(-3.586)	(-3.898)
Island		0.03	0.03	-0.14	-0.12	-0.10***	0.01
		(0.304)	(1.880)	(-2.121)	(-1.907)	(-5.368)	(0.475)
Landlocked		0.09	0.09	-0.02	-0.14*	-0.00	-0.01
		(1.238)	(0.978)	(-0.192)	(-2.707)	(-0.009)	(-0.101)
Latitude		0.15	0.15	-0.84	-0.59	-0.54	-0.12
		(1.352)	(1.003)	(-1.830)	(-1.673)	(-1.654)	(-0.600)
Distance to coast		-0.18**	-0.18**	0.12	-0.08	-0.09	-0.11
		(-2.462)	(-4.059)	(0.999)	(-0.716)	(-1.354)	(-1.610)
Precipitation		-0.00	-0.00	-0.15	-0.12	-0.07	-0.13*
		(-0.017)	(-0.051)	(-0.767)	(-0.758)	(-0.705)	(-2.596)
Elevation		-0.24**	-0.24*	0.04	0.03	-0.10	-0.17
		(-2.288)	(-2.492)	(0.654)	(0.350)	(-1.059)	(-1.942)
R-squared	0.058	0.174	0.174	0.459	0.496	0.439	0.205
Observations	205	205	205	109	109	100	205
Continent dummies	NO	YES	YES	YES	YES	YES	YES
Clustered std. errors	NO	NO	YES	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. The intercept estimate is not shown.*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The continent dummies included are Asia, America, Africa and Europe (Oceania is the excluded group).

Table 5: Estimates with the Inclusion of Extended Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	WVS individual level data	*WVS individual level data*	*State-level USA data*	*Cross-country*	*Cross-country*	*Repeated cross-country*	*Repeated cross-country*
Dep. Var. =	FAMILY	1^{st} PC	FAMILY	FAMILY	1^{st} PC	FAMILY	1^{st} PC
Wheat suitability	-0.078***	-0.095***	-0.257***	-0.250**	-0.310***	-0.136**	-0.207**
	(-2.982)	(-3.191)	(-4.969)	(-3.724)	(-6.690)	(-3.932)	(-4.423)
R-squared	0.062	0.122	0.894	0.657	0.790	0.534	0.502
Observations	24935	24967	50	56	56	147	147
Wave dummies	YES	YES	NO	NO	NO	NO	NO
Region dummies	YES	YES	NO	NO	NO	NO	NO
Continent dummies	NO	NO	NO	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES	YES
Extended controls	YES	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The intercept estimates are not shown. The extended controls included in the estimations are as follows. *WVS individual estimations* (columns (1) and (2)): individual controls including religious denomination (Buddhist, Hindu, Muslim, Orthodox, Protestant, or Catholic), religiosity (average of five religiosity proxies from the WVS), political engagement (average of eight political orientation proxies from the WVS), and ethnic group (Caucasian, Black, South Asian, East Asian or Arabic) as well as country-level data for fertility rate in 1980, age dependency ratio in 1980, and legal origins. Note that country-level per capita real GDP in 1980 and average years of schooling in 1980 are not included as their effects have already been captured at the individual level; *US sub-national estimations* (column (3)): average real household income in the 1980s (logged), school enrolment rate in 1980, religious denomination (Buddhist, Hindu, Muslim, Orthodox, Protestant, or Catholic), religiosity (average of five religiosity proxies from the WVS), political engagement (average of seven political orientation proxies from the WVS), fertility rate in 1980, and age dependency ratio in 1980; *cross-country estimations* (columns (4) and (5)): per capita real GDP in 1980 (logged), average years of schooling 1980, religious denomination (Muslim, Protestant or Catholic), average religiosity from 1981 to 2014 (average of five religiosity proxies from the WVS), average political engagement from 1981 to 2014 (average of eight political orientation proxies from the WVS), fertility rate in 1980, age dependency ratio in 1980, and legal origins; and *repeated cross-country estimations* (columns (6) and (7)): same set of controls as cross-country estimations, except that religiosity and political engagement are measured over the survey period for each wave of the WVS.

Table 6: Analysis using Alternative Cereal Crops (Cross-Country Analysis)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Panel A: Dep. Var. = FAMILY			
Wheat suitability				-0.41**	-0.44*	-5.28***	-5.26***
				(-3.03)	(-2.53)	(-8.56)	(-8.25)
Rice suitability	0.04			0.01			0.00
	(0.41)			(0.11)			(0.02)
Maize suitability		-0.06			0.06		0.05
		(-0.38)			(0.30)		(0.24)
Barley suitability			-0.38**			4.90***	4.86***
			(-3.01)			(6.87)	(6.13)
R-squared	0.189	0.190	0.254	0.266	0.269	0.337	0.339
Observations	86	86	86	86	86	86	86
Continent dummies	YES	YES	YES	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES	YES
				Panel B: Dep. Var. = 1st PC			
Wheat suitability				-0.32**	-0.32*	-3.19***	-3.19***
				(-3.77)	(-2.37)	(-5.24)	(-4.78)
Rice suitability	-0.02			-0.05			-0.05
	(-0.28)			(-1.28)			(-0.98)
Maize suitability		-0.08			.00		-0.00
		(-0.58)			(0.02)		(-0.00)
Barley suitability			-0.30**			2.89**	2.89**
			(-3.34)			(4.53)	(3.70)
R-squared	0.368	0.374	0.409	0.415	0.414	0.439	0.440
Observations	86	86	86	86	86	86	86
Continent dummies	YES	YES	YES	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. The intercept estimate is not shown.*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The continent dummies included are Asia, America, Africa and Europe (Oceania is the excluded group).

Table 7: Testing the Roles of Plough, Trust, Climatic Variation, Disease and Individualism

Dep. Var. =	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	FAMILY (col 1-6)						1^{st} PC of FAMILY, RESPECT & PARENT (full sample) (col 7-12)					
Wheat suitability	-0.32**	-0.57***	-0.32**	-0.57***	-0.29**	-0.58***	-0.41**	-0.70***	-0.42**	-0.47**	-0.47*	-0.92***
	(-3.63)	(-8.54)	(-3.63)	(-8.54)	(-3.66)	(-14.71)	(-3.03)	(-17.62)	(-3.01)	(-3.23)	(-2.54)	(-15.83)
Plough use	0.02					0.24	0.02					0.03
	(0.14)					(1.26)	(0.10)					(0.19)
Trust		-0.40**				-0.34*		-0.35**				-0.37***
		(-3.42)				(-2.70)		(-4.46)				(-5.93)
Temperature variability			0.02			-0.35**			0.28			0.02
			(0.14)			(-3.08)			(0.96)			(0.12)
Pathogen stress				-0.40**		-0.47**				-0.35		-0.60***
				(-3.42)		(-3.92)				(-1.21)		(-5.18)
Individualism					-0.08	-0.15					-0.05	-0.07
					(-1.29)	(-0.89)					(-0.96)	(-0.47)
R-squared	0.414	0.515	0.414	0.515	0.562	0.693	0.266	0.353	0.274	0.327	0.363	0.561
Observations	86	75	86	75	67	60	86	75	86	82	67	60
Geographic controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Continent dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. The intercept estimate is not shown.*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The continent dummies included are Asia, America, Africa and Europe (Oceania is the excluded group). The standard errors are clustered at the continent level.

Table 8: Analyzing the Persistent Effect of Wheat Suitability (Cross-Country Analysis)

	(1)	(2)	(3)	(4)	(5)	(6)
	Whole World (Baseline)	Old World	Whole World	Whole World	Whole World	Old World
			Panel A: Dep. Var. = FAMILY			
Wheat suitability	-0.413**	-0.446**	-0.418**	-0.496***	-0.497**	-0.432**
	(-3.099)	(-8.777)	(-3.664)	(-8.158)	(-4.629)	(-5.781)
ln (*population density* 1500)			-0.024		-0.005	0.109
			(-0.091)		(-0.017)	(0.488)
Urbanization rate 1500*AD*				0.159	0.159**	0.105*
				(2.315)	(4.310)	(3.393)
R-squared	0.266	0.344	0.267	0.357	0.357	0.402
Observations	86	59	86	70	70	57
Continent dummies	YES	YES	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES
			Panel B: Dep. Var. = $1^{\mathbf{st}}$ PC			
Wheat suitability	-0.316**	-0.259***	-0.364**	-0.334**	-0.370*	-0.303**
	(-3.631)	(-11.370)	(-3.652)	(-3.314)	(-3.175)	(-4.722)
ln (*population density* 1500)			-0.195		-0.189	-0.089
			(-1.480)		(-1.247)	(-1.021)
Urbanization rate 1500*AD*				0.126	0.149	0.065
				(1.388)	(1.862)	(0.728)
R-squared	0.414	0.495	0.433	0.438	0.461	0.539
Observations	86	59	86	70	70	57
Continent dummies	YES	YES	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. The intercept estimate is not shown.*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The continent dummies included are Asia, America, Africa and Europe (Oceania is the excluded group). For the estimations involving only the Old World sample, the continent dummies are Asia and Europe (Africa is the excluded group).

Table 9: Controlling for the Effect of State History (Cross-Country Analysis)

	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Dep. Var. = FAMILY			
Wheat suitability	-0.423**	-0.431**	-0.434**	-0.400**	-0.423**	-0.399**
	(-3.143)	(-3.415)	(-3.167)	(-3.680)	(-3.365)	(-3.239)
State $1-1500AD$	0.130					
	(0.502)					
State $1-1950AD$		-0.034				
		(-0.164)				
State $1-1500AD-mig.\,adj.$			0.139			
			(0.551)			
ST_Presence $1-1500AD$				0.195		
				(0.759)		
ST_Autonomy $1-1500AD$					0.077	
					(0.318)	
ST_Coverage $1-1500AD$						0.276
						(1.023)
R-squared	0.284	0.276	0.289	0.292	0.279	0.306
Observations	82	82	82	82	82	82
Continent dummies	YES	YES	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES
			Panel B: Dep. Var. = 1^{st} PC			
Wheat suitability	-0.325**	-0.335**	-0.329**	-0.301**	-0.326**	-0.298**
	(-3.418)	(-3.545)	(-3.429)	(-3.178)	(-3.485)	(-3.082)
State $1-1500AD$	0.062					
	(0.314)					
State $1-1950AD$		-0.107				
		(-0.620)				
State $1-1500AD-mig.\,adj$			0.058			
			(0.285)			
Existence $1-1500AD$				0.178		
				(0.791)		
Autonomy $1-1500AD$					0.015	
					(0.080)	
Coverage $1-1500AD$						0.270
						(1.120)
R-squared	0.434	0.439	0.435	0.446	0.433	0.461
Observations	82	82	82	82	82	82
Continent dummies	YES	YES	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. The intercept estimate is not shown.*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The continent dummies included are Asia, America, Africa and Europe (Oceania is the excluded group).

Table 10: Controlling for the Effect of State Capacity (Cross-Country Analysis)

	(1)	(2)	(3)	(4)	(5)	(6)
	FAMILY (col 1-3)			1^{st} PC (col 4-6)		
Wheat suitability	-0.40**	-0.41**	-0.38*	-0.32**	-0.31**	-0.27**
	(-2.94)	(-2.93)	(-2.32)	(-3.65)	(-3.28)	(-3.02)
Access to credit	0.08			-0.08		
	(1.58)			(-1.36)		
Investor protection		0.03			-0.00	
		(0.34)			(-0.03)	
Income tax / GDP			0.11			0.02
			(1.34)			(0.40)
R-squared	0.251	0.249	0.273	0.399	0.395	0.435
Observations	84	84	59	84	84	59
Continent dummies	YES	YES	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES

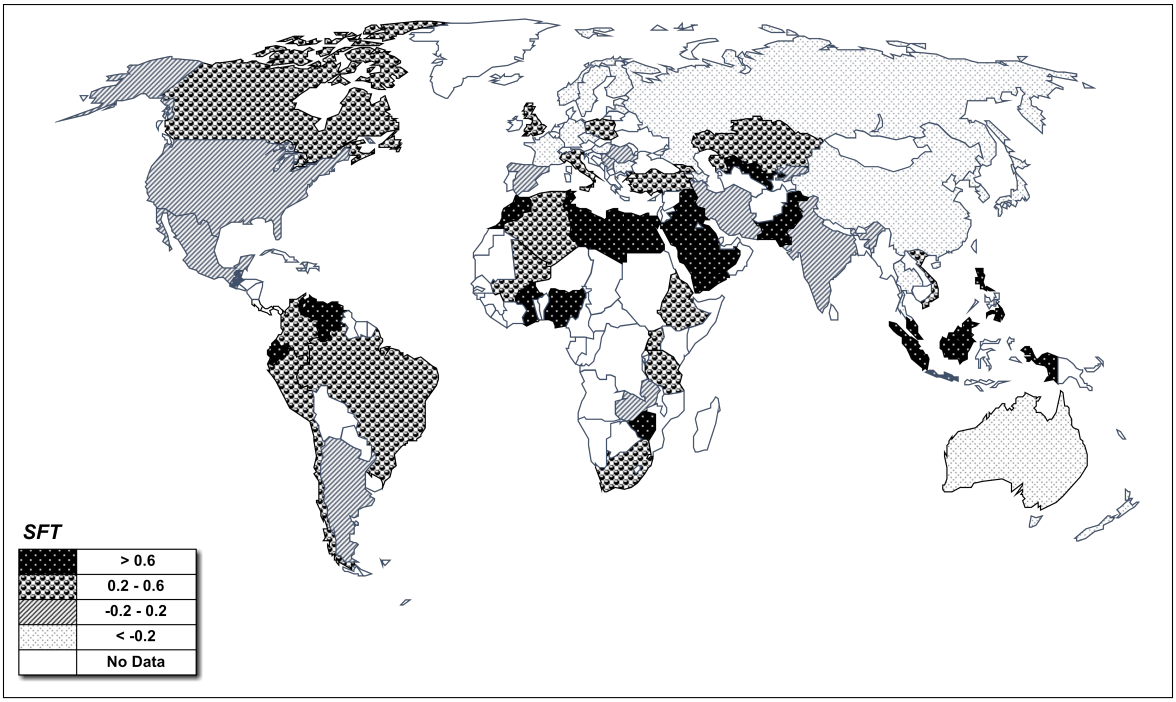
Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. The intercept estimate is not shown.*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The continent dummies included are Asia, America, Africa and Europe (Oceania is the excluded group).

Table 11: Evidence from the Children of European Immigrants

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Father's country (col 1-4)				Mother's country (col 5-8)			
	FAMILY	RESPECT	PARENT	1^{st} PC	FAMILY	RESPECT	PARENT	1^{st} PC
$Wheat\ suitability - father's\ country\ of\ origin$	-0.03*	-0.04**	-0.04**	-0.06***				
	(-1.74)	(-2.57)	(-2.48)	(-3.60)				
$Wheat\ suitability - mother's\ country\ of\ origin$					-0.04**	-0.05***	-0.06***	-0.08***
					(-2.20)	(-3.56)	(-3.78)	(-4.91)
R-squared	0.094	0.222	0.108	0.114	0.095	0.232	0.102	0.115
Observations	5854	5634	5720	5879	5748	5541	5628	5773
Individual characteristics	YES	YES	YES	YES	YES	YES	YES	YES
Geographic controls	YES	YES	YES	YES	YES	YES	YES	YES
Country fixed effects	YES	YES	YES	YES	YES	YES	YES	YES

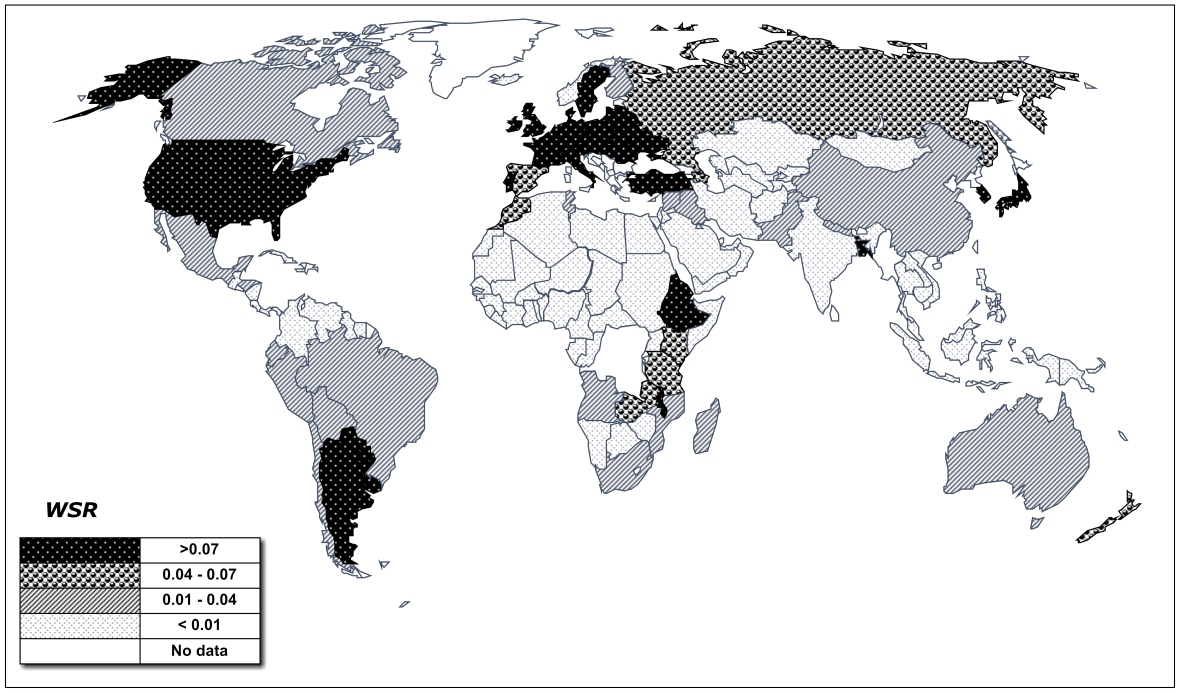
Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. The intercept estimate is not shown.*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Figure 1: Distribution of the Strength of Family Ties (*SFT*) across 95 Countries



Notes: The diagram shows the overall level of the strength of family ties (*SFT*). Darker areas represent stronger family ties. The data are compiled from various waves of the World Values Survey.

Figure 2: Spatial Distribution of Wheat Suitability Ratio (*WSR*) for 153 Countries



Notes: The data show the degree of agro-ecological suitability for wheat. Darker areas represent a higher level of wheat suitability. The data are compiled from the *Global Agro-ecological Zones database*.

APPENDIX

Table A1: Pairwaise (Country-Level) Correlations between Family Ties and Contemporary Economic Outcomes

Variable	Coefficient	P-value	Observations
$Avg.\ years\ of\ schooling$	-0.561***	0.000	60
$Democracy\ index$	-0.470***	0.000	64
$Private\ credit\ to\ GDP$	-0.309**	0.012	66
$Conflict\ incidence\ (low\ level)$	0.416***	0.001	64

Notes: Refer to Table A2 for the definitions of these contemporary variables. The strength of family ties is measured as the first principal component of FAMILY, RESPECT, and PARENT.

Table A2: Data Sources and Definitions

	[A.] Individual-level analysis	
Strength of family ties (SFT)	SFT is proxied using the following three variables constructed using survey data from various World Values Survey: (1) FAMILY (how important family is in a person's life; (2) RESPECT (if one thinks that he/she must always love and respect parents; and (3) PARENT (whether one thinks that parents should do their best for their children even at the expense of their own well-being). Their first principal component is also used.	WVS Database (2015)
Wheat suitability ratio (WSR)	It is defined as the share of arable land suitable and very suitable for wheat cultivation. The estimates take into account factors such as climate, soil and terrain conditions relevant to agricultural production. The data are measured at the country level.	GAEZ (2000)
Individual characteristics	Basic characteristics including age, age squared, marital status, gender, educational attainment (primary, secondary or tertiary), and income (low, middle or high) are included in the regressions to control for the influence of individual characteristics in the baseline regressions.	WVS Database (2015)
Religious denomination	The respondent is considered as a Buddhist, Hindu, Muslim, Orthodox, Protestant, or Catholic ("others" is the omitted group).	WVS Database (2015)
Religiosity	We construct five measures of religiosity from the WVS based on the following questions. The first asks "Independently of whether you attend religious services or not, would you say you are: (a) a religious person; (b) not a religious person; or (c) an atheist". We assign a value of 1 if the respondents choose (a) as their response and 0 otherwise. The second question asks "Do you believe in God? (a) yes; or (b) no". We assign a value of 1 if the respondents choose (a) as their response and 0 otherwise. The third question asks "How important is God in your life?" The answers can range from "not at all important" to "very important". The fourth question asks "Apart from weddings and funerals, about how often do you attend religious services these days?" The options can range from "more than once a week" to "never, practically never". The last question asks the respondents to rate the degree of importance of religion from "not at all important" to "very important". All variables are scaled to 0-1 where a larger value indicates a higher degree of religiosity. We take the average values of these responses as a summary index representing the overall level of religiosity.	WVS Database (2015)
Political engagement	The following survey responses are used to construct the political engagement variable: (1) "How important is politics in your life?" (2) "How often do you discuss political matters with friends?" (3) "Are you an active member of a political party?" (4) How interested would you say you are in politics?" (5) "Have you signed a petition?" (6) "Have you boycotted certain products?" (7) "Have you taken part in a peaceful demonstration?" (8) "Have you joined a strike?" All responses are recoded to take a value between 0 (no participation) and 1 (maximum participation). The average value of these responses is used to construct the measure of political engagement.	WVS Database (2015)
Ethnic group	Respondents are classified into Caucasian, Black, South Asian, East Asian or Arabic ("others" is the omitted group).	WVS Database (2015)
	[B.] USA cross-state analysis	
Strength of family ties (SFT)	Data from the following three responses are combined to obtain an overall measure of strength of family ties for each state in the U.S.: (1) the percentage of people living alone (reversed); (2) the percentage of elderly people (65 +) living alone (reversed); and (3) and the percentage of households with grandchildren in them.	Fincher and Thornhill (2012)
Wheat suitability ratio (WSR)	As defined above. Data are at the state level. Suitability index and mixed input is used.	GAEZ (2000)
Geographic controls	Some geographic effects, including latitude, precipitation, mean distance to lake, and mean elevation, are controlled for in the regressions.	GAEZ (2000); G-Econ (2008)
Real median household income	The average household income over the years 1984-1989. It is measured in 2015 CPI-U-RS adjusted U.S. dollars.	U.S. Bureau of the Census (2017)
School Enrolment Rate	The estimated public elementary and secondary enrollments as a percentage of the population aged between 5 and 17 in 1980.	U.S. Department of Education (1998)

Religious denomination	Religious denomination (Buddhist, Hindu, Muslim, Orthodox, Protestant, or Catholic) is first indicated using dummy variables. The average value of these variables is then taken at the state level.	WVS Database (2015)
Religiosity	As defined above.	WVS Database (2015)
Political engagement	As defined above except that responses to the question on "how often do you discuss political matters with friends?" are not available.	WVS Database (2015)
Total fertility rate	Total fertility rate is the estimated number of births that a woman would potentially have over her lifetime in 1980.	National Center for Health Statistics (1984)
Age dependency ratio	The ratio is calculated by dividing the sum of young-aged populations (0-14) and old-aged populations (65+) by the populations aged between 15 and 64 in 1980.	Minnesota Population Center (2016)
	C. Cross-country analysis	
Strength of family ties (SFT)	SFT is measured using FAMILY, RESPECT and PARENT, as descried above. Their first principal component is also used.	WVS Database (2015
Wheat suitability ratio (WSR)	As defined above. Data are at the country level.	GAEZ (2000)
Geographic controls	Some geographic effects, including island, landlocked, latitude, precipitation, mean distance to lake, and mean elevation, are controlled for in the regressions.	CIA, 2015; G-Econ (2008).
Extended controls	The list includes logged per capita real GDP in 1980, average years of schooling 1980, religious denomination (Muslim, Protestant or Catholic), average religiosity from 1981 to 2014 (average of five religiosity proxies from the WVS), average political engagement from 1981 to 2014 (average of eight political orientation proxies from the WVS), fertility rate in 1980, age dependency ratio in 1980, and legal origins.	McCleary and Barro (2006); La Porta et al. (2008); .Barro and Lee (2013); WDI (2015);
Urbanization rate in 1500	Share of population living in cities in 1500 AD.	Nunn and Qian (2011)
Population density in 1500	The population divided by land area in 1500 AD.	Acemoglu et al. (2001)
State history	An index of state history covering the period from 1 AD to 1500 AD, scaled to take values between 0 and 1. The latest version, v3.1, is used. An alternative period from 1 AD to 1950 AD and three sub-indices (including state presence, state autonomy and state) covering from 1 AD to 1500 AD, are also used.	Putterman (2012)
Access to credit	The ease of access to credit is measured using both the "strength of legal rights index" and the "depth of credit information index" in 2006. The distance to frontier (the distance of each economy to the best performing economy) score is used.	World Bank's Doing Business Database (2017)
Investor protection	Investor protection is measured using the "extent of conflict of interest regulation index" in 2006. The distance to frontier (the distance of each economy to the best performing economy) score is used.	World Bank's Doing Business Database (2017)
Income tax / GDP	Income tax raised by central government (including social security funds) as a share of GDP in 2000.	IMF's Government Finance Statistics Database (2017)
Per capita income	GDP per capita in 2000 converted to constant 2005 international dollars using PPP rates [on logs scale].	WDI (2015)
Institutional quality	The averaged ranking score in 2000 of the following World Bank's Worldwide Governance Indicators: voice and accountability, political stability, rule of law, control for corruption, regulatory quality and government effectiveness (scaled to 0 and 1).	Kaufmann et al. (2010)
Years of schooling	The average years of schooling for the population aged 15 or 25 years and above for the year 2000.	Barro and Lee (2013)
Democracy	Democracy index from the Polity IV project (average of 1991-2000)	Marshall and Jaggers (2010)
Private credit to GDP ratio	The ratio of credit extended by deposit taking financial institutions to the private sector as a percentage of GDP for the year 2000.	WDI (2016)

Conflict incidence	Incidence of low-level conflict.	Esteban et al. (2012)
Traditional plough use	Historical animal plow cultivation at the country level (estimated using the geographic distribution of ethnicities across the world)	Alesina et al. (2013)
Generalized trust	Fraction of respondents who answered "yes" the question: "Most people can be trusted." We take the average value for all available waves over the period 1981-2004.	WVS Database (2015)
Pathogen stress	The historical prevalence of pathogen, which is the average prevalence ratings of the following nine diseases: leishmanias, schistosomes, trypanosomes, leprosy, malaria, typhus, filariae, dengue, and tuberculosis. Epidemiological atlases were used to provide an estimate for the prevalence of each of these nine diseases in each of the 230 geopolitical regions.	Murray and Schaller (2010)
Temperature variability	The standard deviation of temperature of a country, in a unit of 10 degree Celsius per month over the period from 1961-1990, calculated using geospatial data at a 1-degree resolution	G-Econ (2008)
Individualism	A key dimension of culture, which is defined as "a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families". The index is provided on a scale of 0 to 1, with a higher value corresponding to a more individualistic culture.	Hofstede et al. (2010); The Hofstede Centre (2016)

Table A3: Summary Statistics

	Observations	Mean	Std. Dev.	Min.	Max.
World Values Survey (WVS)					
Wheat suitability	300168	0.117	0.174	0.000	0.771
FAMILY	300168	0.902	0.297	0.000	1.000
RESPECT	96446	0.864	0.343	0.000	1.000
PARENT	96182	0.738	0.440	0.000	1.000
United States					
Wheat suitability	50	44.567	17.590	14.362	86.512
Strength of family ties (SFT)	50	0.000	2.421	-3.840	10.216
Cross country					
Wheat suitability	86	0.137	0.200	0.000	0.771
FAMILY	86	0.907	0.062	0.681	0.991
RESPECT	63	0.845	0.108	0.501	0.993
PARENT	63	0.734	0.132	0.419	0.939
European Values Study (EVS) on immigrants					
Wheat suitability	5854	0.208	0.188	0.000	0.771
FAMILY	5854	0.861	0.346	0.000	1.000
RESPECT	5634	0.678	0.467	0.000	1.000
PARENT	5720	0.763	0.426	0.000	1.000

Table A4: Exclusion of Large Countries (Cross-Country Analysis)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Exclude China	Exclude India	Exclude Japan	Exclude United States	Exclude Canada	Exclude Russia	Exclude all 6 large countries
Wheat suitability	-0.30**	-0.32**	-0.31**	-0.32**	-0.31**	-0.33**	-0.31**
	(-3.25)	(-3.61)	(-3.75)	(-3.71)	(-3.16)	(-3.83)	(-3.33)
Island	-0.08	-0.08	0.16**	-0.07	-0.07	-0.06	0.16**
	(-1.94)	(-2.09)	(4.13)	(-1.86)	(-1.80)	(-1.48)	(3.10)
Landlocked	-0.10**	-0.07	-0.06	-0.07	-0.06	-0.10**	-0.14**
	(-4.12)	(-1.45)	(-1.06)	(-1.18)	(-1.04)	(-2.78)	(-4.56)
Latitude	-0.42	-0.44	-0.37	-0.42	-0.45	-0.44	-0.42
	(-1.34)	(-1.36)	(-1.19)	(-1.31)	(-1.28)	(-1.28)	(-1.07)
Distance to coast	-0.02	-0.04	-0.05	-0.04	-0.05	0.03	0.04
	(-0.12)	(-0.19)	(-0.30)	(-0.21)	(-0.27)	(0.16)	(0.15)
Precipitation	-0.18**	-0.17**	-0.17**	-0.17**	-0.18**	-0.17**	-0.18**
	(-2.81)	(-2.90)	(-2.91)	(-2.90)	(-3.50)	(-2.98)	(-3.03)
Elevation	-0.13	-0.18	-0.18	-0.18	-0.17	-0.19	-0.14
	(-1.27)	(-1.85)	(-1.76)	(-1.80)	(-1.57)	(-2.07)	(-1.29)
R-squared	0.421	0.422	0.429	0.414	0.416	0.411	0.444
Observations	85	85	85	85	85	85	80
Continent dummies	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. The intercept estimate is not shown.*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The continent dummies included are Asia, America, Africa and Europe (Oceania is the excluded group).

Table A5: Analysis using Alternative Cereal Crops (WVS Individual Data)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Panel A: Dep. Var. = FAMILY			
Wheat suitability				-0.06***	-0.06***	-0.72***	-0.71***
				(-5.40)	(-6.01)	(-5.30)	(-5.26)
Rice suitability	0.02***			0.02**			0.01
	(3.43)			(2.20)			(1.51)
Maize suitability		0.00			0.01		0.01
		(0.42)			(1.13)		(0.69)
Barley suitability			-0.06***			0.66***	0.65***
			(-5.43)			(4.80)	(4.75)
R-squared	0.019	0.018	0.021	0.021	0.021	0.022	0.022
Observations	228629	228629	228629	227498	227498	227498	227498
No. of countries	85	85	85	84	84	84	84
Wave dummies	YES	YES	YES	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES	YES
				Panel B: Dep. Var. = 1st PC			
Wheat suitability				-0.09***	-0.09***	-0.54***	-0.52***
				(-7.56)	(-8.16)	(-5.53)	(-5.46)
Rice suitability	0.02**			0.01			0.00
	(2.08)			(0.72)			(0.24)
Maize suitability		-0.00			0.01		0.01
		(-0.02)			(1.04)		(0.86)
Barley suitability			-0.08***			0.45***	0.44***
			(-7.48)			(4.53)	(4.44)
R-squared	0.016	0.016	0.022	0.023	0.023	0.023	0.023
Observations	228876	228876	228876	227745	227745	227745	227745
No. of countries	85	85	85	84	84	84	84
Wave dummies	YES	YES	YES	YES	YES	YES	YES
Baseline controls	YES	YES	YES	YES	YES	YES	YES
Clustered std. errors	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors are used and t-statistics are reported in the parentheses. The coefficients are standardized beta coefficients. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. The intercept estimates are not shown.