Family Characteristics and Economic Development

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Abstract

This paper links economic development to age-old family characteristics through the propensity to invest and thus increase human productivity. Inequality among siblings favors investment in physical capital, while a high status of women and strong parental authority favor investment in human capital. To test this theory, a family score is built according to the presence of these three characteristics in the traditional family type of each country. This family score as well as basic family characteristics are significantly associated with better economic outcomes (GDP per capita as well as proxies for investment in human and physical capital). These relationships are robust to other factors already identified as playing a role, such as geography, ethnic fractionalization, genetic diversity, religion, and formal institutions. Reverse causality is rejected by both historical anthropology and an instrumental investigation.

Key words: Economic development, Family model, Cultural Economics, Reversal of fortune.
JEL codes: N10, N30, N50, O10, O50, Z10.

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I Introduction

The explanation of the large differences in economic development between human communities remains a fundamental economic issue. Williamson (2000) highlighted the crucial role of informal institutions. This paper explores the role of the first and most common institution arranging relationships among humans: the family. The family institution arranges the relations between wife and husband (high or low status for women), parents and children (parental authority or freedom of children) and among siblings (equality or inequality).

Observed arrangements between family members vary significantly across human communities. Contrary to common belief, families in the past were not systematically an association of several generations and siblings. For instance, the traditional English family has been Nuclear (consisting only of parents with non-adult children) since at least the 13th century (Laslett et al., 1972). But traditional families in Japan or Russia for example exhibited a more frequent association of several generations in the same household.

Anthropologists study the organizations of families across the world by identifying characteristics which, when combined, lead to a specific family type. Following Le Play (1884), the work of Todd (1984, 2011) offers a classification based on thousands of anthropological studies, for almost all countries. Moreover, his book of 1984 (English version in 1987) assumed two theoretical relationships between family characteristics and economic development. He claims that increase in literacy occurs earlier in countries characterized by a high status of women and strong authority of parents over children.

We use this framework to propose three theoretical relationships between family characteristics and the propensity to invest. A family type characterized by a high status of women leads to a higher investment in human capital, as mothers play a key role in educating the next generation. A similar higher investment in human capital is achieved in a family type characterized by strong parental authority over children, because this authority also helps the transmission of human capital. These two causal links were already implicitly assumed by Todd (1984).

We assume a third relationship: the potential inequality of siblings favors investment in physical capital. This theoretical effect is supported by two mechanisms. First, inequality in inheritance maintains assets of a critical size for enabling investment, whereas strict equality leads to division into portions that are too small to invest. Second, investment allocation is more efficient because it is not biased by the need to transmit equal shares of wealth. Parents can concentrate their investments in non-divisible assets and help one child to invest in a project without any consideration of the need to transmit equal shares. These different propensities to invest, in both human and physical capital, according to family characteristics lead to different levels of productivity, which is the fundamental explanation of the differences in economic development.

Using Todd's classifications (1984, 2011), we document for each country the three family characteristics that are assumed to be relevant for explaining economic development. As all family arrangements around the world deal with these three issues, it is easy to determine whether a given characteristic is present. We build dummy series for each of them, namely relatively high status of women, strong parental authority and potential inequality among siblings. We then sum these three series to build a fourth, the 'family score', whose values vary from 0 to 3 according to whether 0, 1, 2 or 3 of these characteristics are present in the family type of a given country.

As predicted by this theory, these four series are highly correlated (with the expected positive sign) with the current GDP per capita in a cross-country analysis. We control for geographical variables known to be associated with economic development (percentage of arable land, land suitability for agriculture, absolute latitude, percentage of population at risk at contracting malaria, percentage of population living in tropical areas, distance from waterways, continent dummies, OPEC membership, Neolithic timing and geographical isolation). We then add variables controlling for the characteristics of people living in a given country (ethnic fractionalization, genetic diversity and the percentage of the population of European descent). Family series remain highly significant when using these controls either independently or all together. We also run a robustness check to exclude from the dataset those countries in which several family types are observed; when there were several family types in a given country, we used the dominant one.

Analysis of their effect channels shows that each of the three family characteristics contributes significantly to explaining GDP per capita when tested together, which implies that each of them plays a specific role. We confirm the respective roles of each characteristic. Both high status of women and strong parental authority are associated with higher investment in human capital (proxied by number of scientific articles per capita and number of years of schooling). Inequality of siblings is associated with a higher level of investment in physical capital as measured in public accounting across countries.

Since religions provide rules about how a family should be arranged, one might ask whether family type differs from religious affiliation. The narrative suggested here shows that there are actually three cases of relationships between religion and family structure: i) independence, ii) religion influences the family type and iii) existing family type influences the development of religions. Moreover, our results remain robust when controlling for religious affiliation in each country.

Another issue investigated here concerns formal institutions as a potential alternative channel of the effects of family characteristics on economic development. We point out the effect of family characteristics on the propensity to invest, but another (non-exclusive) channel could also operate if the formal institutions are influenced by the family structures. To test this potential alternative channel, we add to our regressions an index to measure the quality of

institutions. Coefficients on our family series decrease but remain highly significant, so a direct effect of family characteristics cannot be rejected. A similar process rejects a potential channel through the legal regime since, for countries where the existing legal regime was not imposed, we may assume that family types had an impact. Finally, our results also remain robust to the control for state history.

A last concern comes from potential reverse causality, in which case economic development would lead to specific family types. Both historical anthropology and an instrumental investigation reject this hypothesis. For most countries, the family type documented in this paper has been the same for centuries. Besides, the best family types for current economic development appear to be the most primitive. These archaic family types benefitted from a reversal of fortune. Most innovations (technologies, formal institutions) were initially developed in the Fertile Crescent and China before spreading across Eurasia. According to Todd (2011), the same is true for the family model as an informal institution. We thus assume that family innovations spread within Eurasia by contagion. Consequently, the greater the distance from the two centers of innovation (the Fertile Crescent and China), the more archaic the family arrangement (reflected in a higher family score). We thus use the distance from innovation centers as an instrument for the family score. This instrumented family score appears to be highly significant in explaining GDP per capita. The direction of the causality is thus, without any doubt, from family characteristics to economic development.

The rest of this paper is organized as follows. The related literature is detailed in (II) before a presentation of the theoretical links between the three family characteristics and the propensity to invest in (III). The data we used are explained in (IV) and the distribution of the family characteristics around the world is illustrated in (V). Section (VI) contains our empirical tests of these theoretical links. The channels of these effects are more specifically explored in (VII). Section (VIII) deals with controls performed to detect alternative channels though religion and formal institutions. The potential reverse causality is rejected in (IX) on the basis of both anthropological evidence and an instrumental test. The last section concludes.

II. Related Literature

Interest in the link between family and economics is by no means new. Adam Smith and Alfred Marshall used family structure to help explain disparities in economic development (in Scott Smith, 1993: 7). Banfield (1958) used the term “amoral family” to describe the social and cultural environment that was shaping individual decisions in a small village in the south of Italy. More recent literature analyzed the link between marriage and economic outcomes (e.g. Jacoby, 1995; Tertilt, 2005).

Todd (1983, 1984) identified different consequences of family types on economic and social outcomes.[1] For example, Todd (1983) argues that certain family structures tend to result in different forms of government since formal institutions mirror family type. For instance, all countries where communism took power without foreign intervention (Russia, China, Yugoslavia and Cuba) were not characterized by an important proletarian class but by the same family type (called Communitarian), where brothers have equal status and remain under the authority of their father. Another relationship proposed by Todd (1983) is that democratic regimes are associated with the Nuclear family; Dilli (2015) confirms this relationship.

Following the seminal works of Todd, several authors link traditional family types to socio-economic outcomes currently observed. Mamadouh (1999) uses Todd's data to explain the difference in political culture within Europe. Dilli et al. (2013) show that long-lasting institutions, especially family types, are important explanations of current variations in gender equality. Bertocchi and Bozzano (2014) identify family structure as a key factor of the gender education gap in Italy in the late 19th century. Tur-Prats (2019) identifies the Stem family (see below) as causing lower domestic violence today in Spain. Diebolt et al. (2016) and de la Croix and Perrin (2016) stressed the significant effect of family types on fertility rate and school enrollment in 19th century France.

As in our paper, other research focuses more on economic consequences. De Vries (2008) stressed the role of the Nuclear family in the economic development of northern Europe. Algan and Cahuc (2005) showed that family culture is responsible for cross-country heterogeneity in employment rates in Europe. Duranton et al. (2009) used Todd's family types to explain regional differences in economic outcomes across Europe such as household size, educational attainment, social capital, labor force participation, sectorial structure, wealth, and inequality. Kick et al. (2000) investigate the link between family and economic growth. The main idea of the latter paper is close to ours since the authors look for economic growth as consequences of family characteristics, even though they study rather different family variables (e.g. marriage rate, illegitimate births).

An important stream of research using family as an explanatory variable focuses on the difference between Nuclear versus large kinship families as leading to different forms of cooperation. Greif (2006) identified the European family organization as being at the origin of the large non-familial organizations such as the state and large firms. Greif and Tabellini (2010) stress the clan and the city as two different ways of sustaining cooperation in China and Europe. Schulz et al. (2019) point out the impact of Catholic family doctrine on the development of specific traits, especially individualism.

Numerous studies demonstrate different consequences of the strength of family ties. Alger and Weibull (2010) develop a model explaining the strength of family ties by the ecological environment; a hostile environment leads to weak family ties. Alesina and Giuliano (2010)

[1] Following Todd, we use family, type, structure, form and model indistinguishably to describe the same reality.

show that strong family ties imply more reliance on the family (which provides goods and services) and less on the market and on the government. Alesina and Giuliano (2011) establish an inverse relationship between family ties and political participation, as family and political institutions provide similar kinds of services. Galasso and Profeta (2010) demonstrate that family type influences the design of pension systems in different countries.

Other studies refer to the European Marriage Pattern (EMP). In the 1960s, Hajnal identified a specific marriage pattern west of a line between St Petersburg and Trieste, characterized by high female age at marriage, a high percentage of singles and the Nuclear family. Several studies attribute to EMP a crucial role in explaining the economic success of western Europe (especially England) compared to the rest of the world (e.g. Voigtlander and Voth, 2006; de Moor and van Zanden, 2009; Foreman-Peck, 2011). Dennison and Ogilvie (2014), however, pointed out that the concept of EMP remains unclear, while emphasizing the diverging views about the timing of the emergence of the EMP, the geographical area concerned, and the mechanisms favorable to growth supported by the EMP.

Recent studies agree that there were greater variations within Western Europe, especially frequent non-nuclear households (Stem and Communitarian families), than in Hajnal's original view. Moreover, several areas on the edges of Asia do exhibit similar characteristics (Todd, 2011). Carmichael and van Zanden (2015) proposed a "Girlpower version" of the EMP characterized by Nuclear family, monogamy, exogamy, and a relatively strong position of women in marriage (no arranged marriages). Carmichael et al. (2015b) built an index for the "Girlpower version" of the EMP, demonstrating a close relationship between their version and economic development in modern Europe. Carmichael et al. (2019) extend this analysis to Eurasia using family characteristics to build a female-friendliness index that they instrument by the distance from China, North India and Iraq to explain current GDP per capita. Carmichael et al. (2019) rely on similar intuitions, data and methods to those of our investigation but focusing on the effect of the family system on female agency.

In this paper, we add to this literature by focusing on basic family characteristics rather than family types (types are specific combinations of family characteristics) and by looking for an effect on worldwide comparative economic development through three theoretical links between family characteristics and investment in both human and physical capital.

III. A THEORY OF THE FAMILY ORIGIN OF ECONOMIC DEVELOPMENT

The living standard of a given country depends on human productivity (Gordon, 2016) which depends in turn on investment in both physical and human capital. The role of investment in physical capital in economic growth has long been demonstrated and formalized, by Solow (1956). The importance of human capital formation has been underlined for instance in the Unified Growth Theory (Galor, 2011). There is as yet no firm consensus explaining the

divergence between countries regarding the amount invested in both kinds of capital. Family characteristics offer an answer; Family characteristics → Propensity to invest → Economic development.

The family structure of a given population evolves very slowly over time as shown in different ways by Alesina and Giuliano (2010), Reher (1998) and Todd (2011).[2] We assume that traditional (for a few centuries) family characteristics still exist, "transmitted from generation to generation and they have persisted through history to the present day" (Alesina and Giuliano, 2014) and influence current human behavior.

A. Strong parental authority increases investment in human capital

Family types differ in how parents and children interact. In several types, parents, or at least the father, exert strong authority over children. Children remain subject to their parents' authority long after reaching adulthood and even after marrying. In some cases, the new couple lives in the house of the parents and under their authority until they inherit it. When they produce their own children, three generations cohabit (parents, children and grandchildren). This cohabitation leads to complex households with more than one couple living together.

This authority allows the parents to invest in the human capital of their children more intensively and for a longer period compared to family structures where children become independent earlier. The importance of such investment is stressed by Henrich (2016). Moreover, when three generations are living together, the grandparents are also likely to complement the parents' transmission of human capital.[3] The cohabitation with the new couple provides an incentive for parents, even non-altruistically, to invest in their heirs as human capital because they profit directly from the extra income this investment generates for the extended household. Conversely, in family types not characterized by this strong parental authority, children become independent early with looser ties with their parents; as a result, they have accumulated a smaller stock of human capital through transmission from parents.

[2] For a discussion on the intergenerational transmission of values from parents to children through institutions and beliefs, see Bisin and Verdier (2000) and Guiso et al. (2006).

[3] Carmichael et al. (2017) find a positive effect of having a grandparent in a household; in the 19th century this increased the chance of a child attending school.

B. High status of women increases investment in human capital

According to family type, women can enjoy a more or less equal role in the family compared to men. In some family types, the father is the sole head of the family, with both children and wife being under his authority (patriarchy). In other family types, women enjoy more equal (or, rarely, higher) status.

High status of women has a positive impact on investment in human capital because the mother plays a key role in the education of the children, and thus in the formation of the next generation's human capital.[4] In family types where women enjoy relatively high status, they are themselves likely to accumulate more human capital and thus to invest more easily in the human capital of their children. This high status also allows a woman to choose to marry later, after a longer period increasing her own human capital before becoming a mother and being able to help with this investment. Moreover, this investment is concentrated in a more limited number of children due to the reduced period of marital fertility. The potential late age at marriage (and thus procreation) allowed by high status of women favors quality in the trade-off between quantity and quality of children (Becker, 1992).[5]

C. Inequality among siblings increases investment in physical capital

Despite not using the term human capital, Todd (1984) already assumes the positive impact of strong parental authority and high status of women on economic development. We add inequality among siblings as a third family characteristic with a theoretical positive impact on development, but through investment in physical capital. In an equal family system, all the brothers, and sometimes the sisters, obtain similar rights, especially in terms of inheritance. In inegalitarian systems, parents can favor one particular child (often the eldest) at the expense of the others.

Potential inequality among siblings has a positive impact on investment in physical capital for two reasons. The first is the attainment of a critical size of wealth capable of supporting investments.[6] Inequality allows this critical size whereas a strictly equal inheritance would lead to a higher number of properties too small to allow investment. Second, the quality of the asset allocation is better, enabling both parents and favored children to grasp opportunities at any point in time. Parents can choose to concentrate their wealth in a specific asset that is difficult to share. Parents can also choose to finance the project of one child

[4] This channel operates in the theoretical model of Diebolt and Perrin (2013).

[5] In family systems characterized by low status of women, the marriage age remains low whatever the economic conditions.

[6] Kuran (2011) points out that under Islamic rule sharing inheritance among a large kinship makes it difficult to keep successful businesses intact across generations and does not allow capital accumulation.

during their lifetime, without the constraint of needing to maintain equality. Conversely, in family systems characterized by equality, investments are biased toward easily fractionable assets or multiple similar assets by the need for the future inheritance to be equally divided easily.

IV. Data

To characterize family characteristics of countries, we use the classifications of Todd (1984, 2011). Todd went through a very large number (about 70 pages of references are cited in his 2011 book) of anthropological, statistical, historical, archeological and legal studies about families around the world. He cross-references his observations to demonstrate his claims about family types. His main sources are anthropological data on rural areas before the emergence of modernity. Rural areas were chosen because the family characteristics can manifest themselves more easily, being free of urban constraints, and the pre-modern period because with the development of state redistribution, especially the welfare state, the nature of family relationships has become more difficult to observe, even while continuing to exist in a less visible form.

Todd's data were partially used by Duranton et al. (2009), Alesina and Giuliano (2014), Dilli et al. (2013), Bertocchi and Bozzano (2014) and Galasso and Profeta (2010). The latter shows the consistency of Todd's classification of family structure with the data used by Alesina and Giuliano (2010) taken from three questions of the *World Value Survey*. Todd's data are also consistent with the anthropological classification of Murdock (1969) and come out favorably when trying to solve discrepancies between the two datasets, according to a careful comparison undertaken by Rijpma and Carmichael (2016).

To identify family type characterized by strong parental authority, Todd looks at the statistical prevalence of complex households (cohabitation between three generations). Even in a theoretical world where cohabitation is assumed to be systematic, the prevalence of three-generation households is capped due to infertility, material constraints, deaths and other life accidents. But census data enable the easy identification of countries where such cohabitation is frequent compared to others where it is exceptional. Equality among siblings is assessed using data on inheritance laws and practices. Inheritance can be strictly egalitarian, strictly inegalitarian (e.g. primogeniture) or can permit inequality (e.g. freedom to testate at will). In the two last cases, family systems are called inegalitarian.

To assess the status of women, Todd uses two indicators: equality in inheritance, and choice of location when a new household is set up. First, rules and practices of inheritance can transmit assets through males (patrilineal), females (matrilineal) or both (bilateral). In the last two forms of transmission, women enjoy higher status than in patrilineal families. Second, when the status of the women is low, the new household systematically settles close to the

family of the husband (i.e. the woman moves to where her husband's family is located, which is called patrilocal); or even *into* the family of her husband if the model is also characterized by authority (cohabitation of generations). When the status of women is high, the new household settles indifferently close to the parents of the wife or of the husband (bilocal) or in few cases systematically close to the family of the wife (matrilocal).

Combinations of different characteristics define a family type according to Todd's classification. His initial classification distinguished four main family types, but fifteen were used in his most recent book (Todd, 2011). Whatever the number of family types developed, it is always possible to identify the presence of the three basic family characteristics we focus on. We build three dummy series each with a value 1 when the family structure of a given country is characterized by strong parental authority, high status of women and potential inequality among siblings. These three series are used alone and also combined in a fourth series called 'Family score' as the sum of these three basic series. The family score is thus comprised between 0 and 3. For a few countries, Todd does not provide any data; we therefore exclude these cases (mainly Oceania Islands). For countries where several family types are observed (India, Italy, USA, etc.), we retain the characteristics of the dominant type for the whole country.[7]

Most of the other data are from Ashraf and Galor (2013). We retain this data set since it has been compiled for a recent decisive paper in the field using numerous control variables. Details of this dataset are available in Ashraf and Galor (2013). The main explained variable, income per capita in each country in 2000, is taken from the *Penn World Table* (Heston et al., 2006).

V. Distribution of family characteristics across the world

We describe a few of the most salient distributions of these family characteristics around the world.

A. Strong parental authority

Authority is a feature of Germanic, Russian, Chinese, Japanese, and Korean families, for example, but they differ regarding inequality among siblings. Authority in German, Korean and Japanese families is associated with potential inequality among siblings (combination called the Stem type) whereas Russian and Chinese families, for instance, require perfect equality (combination called the Communitarian type). But in both cases, parents can invest in next generation human capital more intensively and for a longer period. In the Communitarian type, all the sons are allowed to marry and bring their spouses into the parental household. This leads to large families splitting when the sustainable size is exceeded.

[7] In section VI, we offer a control for this simplification.

In the Stem type, only one heir is allowed to marry and bring his wife (or sometimes husband) into the parental household while other siblings can remain in the parental home but only while single. Parental authority is a frequent characteristic where the new couple needs to share the produce of the family farm to make a living.

In family types that are not characterized by authority, such as in Anglo-Saxon countries, children enjoy more freedom. Children leave early to settle in a new household and remain more independent from their parents. In the traditional English family for example, the children were able to set up their own household easily because of the availability of farm jobs due to the dominance of large farms owned by a few wealthy landowners. This led to an early labor market which could not exist in areas where agriculture is carried on by small family farms without any employees. These weak ties between parents and children in the traditional English family also led to early problems of rural poverty mainly involving old people (isolated from their children), which explains the precocity of the Poor Laws in England relative to other comparable countries (de Moor and van Zanden, 2009).

FIGURE I. STRONG AUTHORITY OF PARENTS OVER CHILDREN

Note: This figure shows the countries (in black) where family type is characterized by strong authority of parents over children

In most of the Muslim countries, the family is not characterized by strong parental authority despite being clanic. This is due to the endogamy of the "Arab marriage". This is a preference

for marriage between first cousins, if possible, the children of two brothers. Since the day of her birth, it is assumed that a girl will marry her older cousin. In many customs, the cousin enjoys a kind of right to his female cousin (Chelhod, 1965). Today, the rate of marriage between first cousins, close to zero in a large part of the world is, according to Weinreb (2008), between 23% in Algeria and above 50% in countries such as Iraq, Jordan, Pakistan, and Saudi Arabia. As a consequence of these rates, and adding marriages with more distant cousins, almost all individuals are integrated into a large kinship group called a clan.[8]

Paradoxically, this clanic organization does not require any authority. There is no need for a family chief to decide who is allowed to marry whom, since couple formation is only the result of the traditional practice of cousin marriage. Conversely, in the Stem or Communitarian types, the parents are required to give their consent when a child brings a spouse into the parental household. In the "Arab marriage", however, the choice of the spouse by this custom transforms fathers and uncles into passive executors of rules. There is no active authority but a passive execution. As a consequence, the Arab family is not characterized by either parental or purely paternal authority.

B. High status of women[9]

In Western countries, the status of women is relatively high. According to the Roman (Justinian) legal system, girls enjoyed similar rights to boys regarding inheritance; most of the time, a daughter received her share of inheritance at marriage as a dowry (not to be confused with a bride price paid by a groom or his family). The Catholic Church imposed the free consent of the bride. Women are active agents participating in society; for example, in large areas of Europe, there was an active labor market for women before the industrial revolution (De Moor and Van Zanden, 2009). Conversely, in countries characterized by the tradition of the "Arab marriage", the status of women, was, and is still low. A woman can be excluded from any contact with society exterior to the clan (whereas non-Arab marriage requires a minimum of random matching). She can be married very young if she already has a male cousin, and the new family do not need financial independence to settle because the clan provides resources.

In sub-Saharan Africa, polygyny is very prevalent, with few differences according to religious affiliation. In these countries, polygyny is not limited to a minority of wealthy men as in most Arab countries. In black Africa, the percentage of women living in polygamous unions varies

[8] Greif (2006, 2013) highlights the consequences of clanic organization, as opposed to the individualism of European family structures. This effect of the family model on the way humans cooperate (clan versus groups of individuals) is complementary to our approach. But the current paper only focuses on the effects of family structures on productivity.

[9] Of course, the status of women was still low compared to men in these countries. But the point is that the status of women was even lower in the traditional families of the other group of countries.

from 30 to 55% (Todd, 2011: 42). Comparing these African countries to a similar group of monogamous countries, Tertilt (2005) concludes that women in polygynous countries marry, on average, 5.1 years earlier than women in monogamous countries. The average age difference between husband and wife, a traditional indicator of women's status, is 6.4 years, compared to only 2.8 years in monogamous countries. Thus, the status of women in African countries is clearly low. The traditional family types in China and most of India also result in low status of women, leading to current observation of the famous "missing women" (Sen, 1990); conversely, women in southern Asia traditionally enjoy high status.

FIGURE II. HIGH STATUS OF WOMEN

Note: This figure shows the countries (in black) where family type includes relatively high status for women.

C. Inequality among siblings

Potential inequality of siblings is found in Northern Europe both in German and English families. But in the German case (as also in the Scandinavian, Austrian, Japanese, Korean or Swiss cases), this inequality is associated with parental authority (Stem family) whereas in England (as in Denmark and the Netherlands) the children enjoy more freedom (Absolute Nuclear type in Todd's classification). Many inheritances are actually egalitarian, but it is not forbidden to transmit the wealth in an inegalitarian way. The freedom to testate is evidence of this potential inequality. The English family model was exported by immigrants to the USA, Australia, Canada, New Zealand and less clearly to South Africa. In most of the

countries of South-East Asia, there are no rules forbidding unequal transmission. These countries are therefore also characterized by cases of inequality in inheritance.

In the rest of the world, strict equality is required, at least among brothers. Brothers in the Muslim world are all strictly equal, as stated in the Koran. Russia and China are also egalitarian in terms of inheritance, as they are in terms of the possibility of each son to bring a wife into the parental home. Latin Europe is also egalitarian, as was the Roman law. Latin America, following the Iberian colonizers, adopted the rule of equality. This has been reinforced by the adoption of French civil law, in which this equality is clearly affirmed. The potential effect when combined with legal origin is tested below.

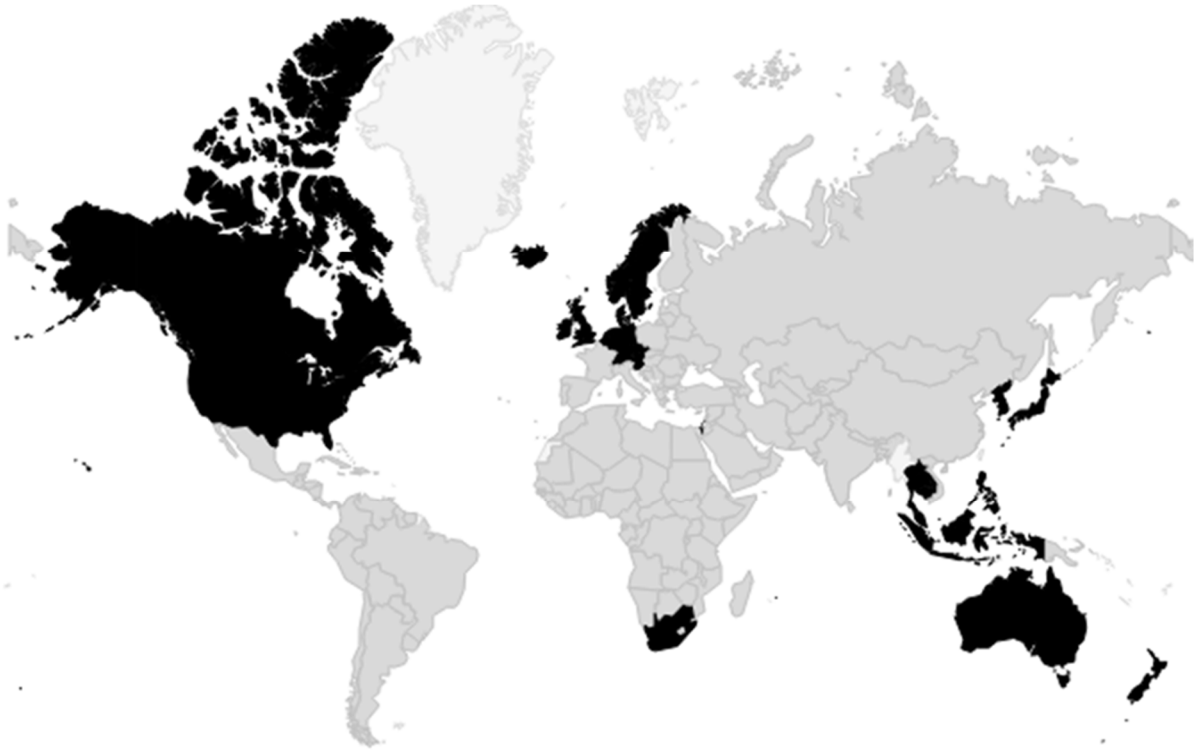

FIGURE III. POTENTIAL INEQUALITY AMONG SIBLINGS

Note: This figure shows the countries (in black) where family type includes potential inequality among siblings.

D. Family score

Adding the three series of dummy variables, we build for each country a family score ranging from 0 to 3. A few countries obtain a 3. They are the Germanic and Scandinavian countries, Ireland, Israel and in Asia, Japan and the two Koreas. With two positive family characteristics, another small group of countries achieves a 2. England, and thus the Anglo-Saxon countries, are in this case (they are characterized by high status of women and inequality among siblings) as well as a few other European countries such as Finland and the Baltic States. Most of the countries of East Asia are also characterized by a 2 (high status of women and inequality). A large group of countries enjoy only one positive characteristic, high

status of women for Latin Europe and Latin America, parental authority for Eastern Europe, Russia, China and India. Another large group of countries gets a zero. This is the case of most of the Muslim and African countries.

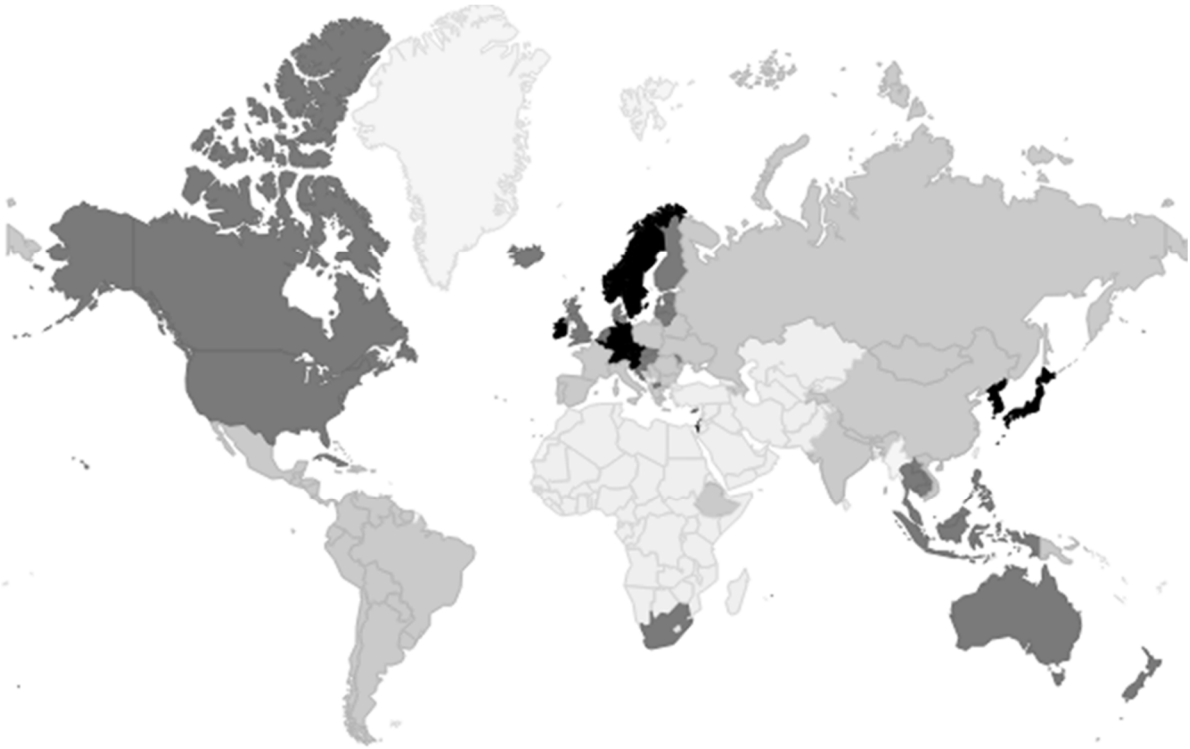

FIGURE IV. FAMILY SCORE ACCORDING TO THE PROPENSITY TO INVEST

Note: This figure shows the family score obtained by each country from 0 in pale grey to 3 in black.

VI. EMPIRICAL TEST OF THE FAMILY EXPLANATION OF CURRENT ECONOMIC DEVELOPMENT

A. Are family characteristics statistically associated with economic development?

To test the effect of family characteristics on current economic development controlling for other fundamental factors, we run this kind of regression:

$$\ln(y_i) = \propto + \beta_1 F_i + \beta_2 X_i + \varepsilon_i \quad (1)$$

where y_i is the income per capita of country i in the year 2000, F_i is a series measuring a family characteristic ('authority', 'women', 'inequality') or the 'family score' of the country i, X_i is a vector of control factors and, finally, ε_i is a country-specific disturbance term.

Table I. Family characteristics and economic development

	log income per capita in 2000				
	(1)	(2)	(3)	(4)	(5)
Women	1.26***			1.02***	
	(0.16)			(0.17)	
Authority		0.70***		0.46***	
		(0.21)		(0.17)	
Inequality			1.29***	0.56**	
			(0.22)	(0.23)	
Family score					0.72***
					(0.08)
Observations	177	177	177	177	177
R^2	0.28	0.06	0.17	0.33	0.32

Note: This table establishes the significant relationship between observed family characteristics and log GDP per capita in 2000 in the full 177-country sample. Heteroskedasticity-robust standard errors are reported in parentheses. *** Significant at the 1 percent level, ** Significant at the 5 percent level and * Significant at the 10 percent level.

Table I shows the result of unconditional OLS regressions of log income per capita in 2000 on the four 'family' series. Each of these series appears positively and significantly associated with current economic development on a full sample of 177 countries with data. Each of the three family series captures different effects, because they remain significant when tested altogether (Column 4). The cross correlation between the three characteristics is limited (0.47 between Inequality and Women, 0.10 between Women and Authority and 0.22 between Authority and Inequality). The three series are also significant when summed in the 'family score' series (Column 5). The relationship between the family score and GDP per capita is presented graphically in Figure I. All countries enjoying a family score of 3 are among the richest in the world except North Korea where the high propensity to development has not expressed itself, probably due to the socialist regime. On the other hand, countries recording a 0 family score are poor, except for oil producers.

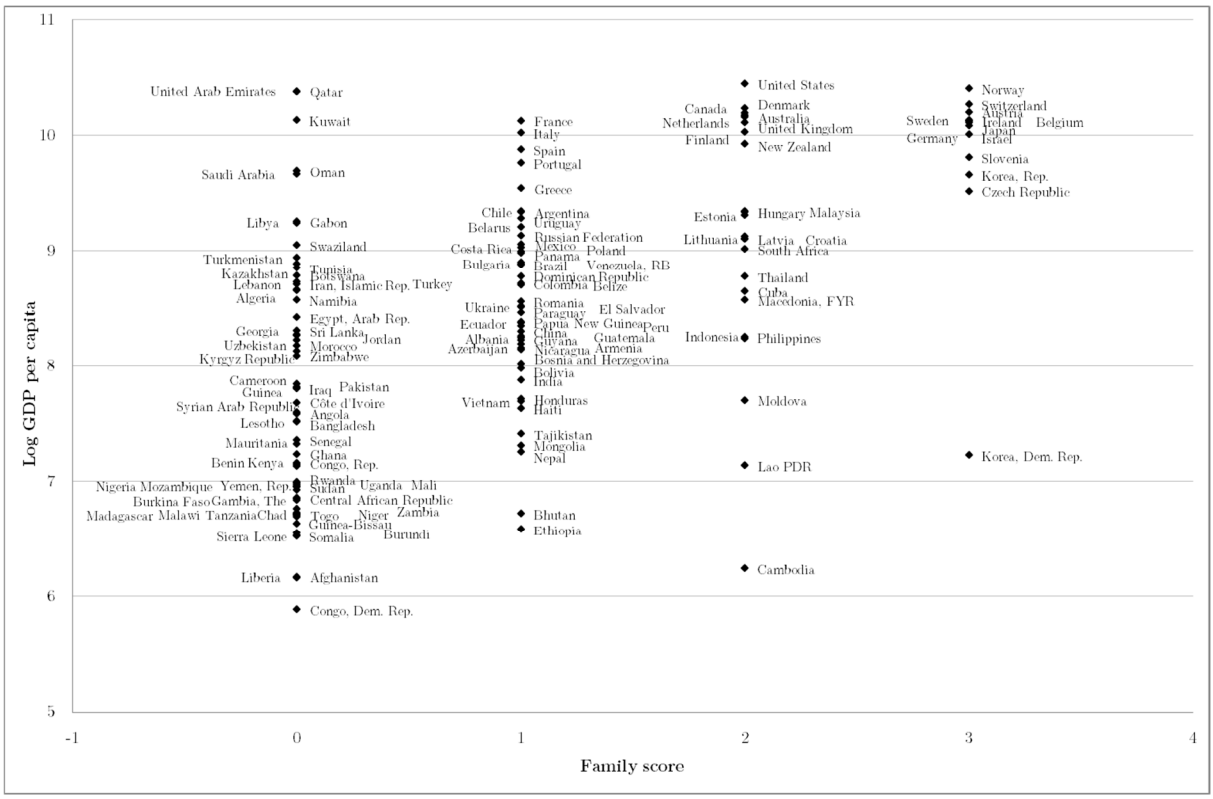

FIGURE V. FAMILY SCORE AND ECONOMIC DEVELOPMENT

Note: This figure shows the positive relationship between family score and GDP per capita across 177 countries.

B. Is the family explanation robust to geography?

Apart from family characteristics, countries are subject to different geographical conditions that have been identified in the literature as helping explain current income. Following Ashraf and Galor (2013), we control for different geographic factors. An agronomical index gauging the overall land suitability for agriculture and the percentage of arable land are frequently significant, while the absolute latitude never is (Table II, Column 1). The mean distance to waterways (which affects the cost of exchange) is always significantly associated with lower economic development. The risk of malaria is highly significant in most of our specifications, confirming it as a heavy burden unfavorable to economic development (Gallup and Sachs, 2001). By comparison, the percent of population living in the tropical zone, and thus suffering from other associated diseases, is not correlated with economic development. Unsurprisingly, a dummy variable for countries belonging to the Organization of the Petroleum Exporting Countries (OPEC) is significantly associated with a higher GDP per capita.

According to Diamond (1997), the main factor explaining divergence in economic development is a favorable environment for agriculture centuries ago, which is confirmed in a global sample by Olsson and Paik (2019). But our test finds no statistical link between time since Neolithic

transition and current economic development.[10] Finally, we also control for geographical isolation, as Ashraf and Galor (2010) demonstrate the advantage of a location avoiding invasions and roaming bandits; an effect confirmed in our investigation (Column 3).[11]

As our family score is partially correlated to continents, with most African countries in particular returning a zero, the family score could be just a proxy for the continents. We thus control using a dummy for each continent (Column 2). This also enables us to control for the Eurasian effect since according to Diamond (1997), the Asian and European continents each benefited from specific advantages. No one continental dummy is significant (non-reported).

Crucially, our family score remains highly significant using all combinations of geographic factors with, or without, continent dummies. The sign is as expected, i.e. the higher the family score, the more the country is economically developed. This combination of geographic factors and the effect of family structures explain a large part of the differences in current GDP per capita with an R^2 of 0.64 (Column 1).

C. Adding controls for the nature of peoples

Recent literature identifies three factors explaining the differences we observe in economic development related to the nature of peoples. The first is the ethnic fractionalization that we control for using the index of ethnic diversity proposed by Alesina et al. (2003). A second control is the index of genetic diversity developed by Ashraf and Galor (2013). Our last control is the share of population from European descent. This factor could be problematic because it is correlated with our family score. Europeans could have brought with them their family structure which, on average, scores higher than the rest of the world. However, we use this factor as control because Europeans could also have brought with them other inputs as well as family structure which then spread throughout the country. To control for these factors, we combine them (all together and independently) with the geographic factors previously used (Table II, Columns 4 to 8).

The family score remains significant at 1% when controlling for the three human factors taken together with and without dummies for continents (Columns 4 and 5). The ethnic fractionalization and the share of European descent are confirmed as significant with the expected sign, but genetic diversity is only significant when continents are not controlled for (Column 4). However, as will be demonstrated later in this article, both ethnic and genetic diversity are often significant when taken together, meaning that they capture complementary factors.

[10] We use the "Neolithic transition timing (ancestry adjusted)" series from Ashraf and Galor (2013). For convenience of interpretation, we have divided these values by 1,000.

[11] Due to the reduced number of observations of this factor, we leave it aside in the following investigations.

The family score is also significant at 1% when controlling for each human factor independently (Columns 6, 7 and 8). Our family score therefore captures other features than ethnic diversity, genetic diversity or the share of European ancestors. This is important for the share of European ancestors since Europeans brought with them several things alongside their family systems; our family score is not just a proxy for the share of European ancestors, because both series are significant when combined (Column 8).

This specification combining all geographic and human factors explains 72% of GDP per capita worldwide. The R^2 of the regression does not rise when controlling for continents, but the coefficient of the family score increases slightly (Columns 4 and 5). Consequently, to keep a parsimonious model, we will not use these continental dummies in the following specifications.

D. Robustness checks for countries with various family types and for GDP in 1950

Our measures could be biased by the choice to affect the dominant family type to a country characterized by different family systems. Indeed, 28 countries, such as Italy or the US, support a range of family types. We therefore control for this simplification by running our regression again but on a sub-sample excluding countries with different family types.[12] We focus on the most interesting specification, which includes all the control variables excepting the percentage of the population of European descent, since this could capture a share of the family score. The family score remains highly significant with a stable coefficient (Table II, Column 9), so we can conclude that the simplification of affecting the dominant family type to a country is not problematic.[13]

Our last control is for the economic development observed in the past rather than in 2000. As explained variable, we switch to the GDP per capita in 1950 as provided by the updated Maddison database (Bolt and Van Zanden, 2014). The number of observations is lower, but the family score remains highly significant (Table II, Column 10). In our theoretical framework, the family characteristics we focus on have a positive effect on current economic development but not necessarily on development centuries ago (especially when human capital was not a crucial factor). Thus, it does not make sense to test this theory using age-old measures of economic development.

[12] The countries excluded because of the presence of several family types are Belize, Bolivia, Brazil, Canada, Costa-Rica, Ecuador, El Salvador, France, Greece, Guatemala, Honduras, India, Israel, Italy, Madagascar, Mexico, Netherlands, Nicaragua, Paraguay, Peru, Portugal, Russia, South Africa, Spain, Sudan, United Kingdom, United States and Venezuela.

[13] See Rijpma and Carmichael (2016) for a discussion of such a simplification.

TABLE II. FAMILY CHARACTERISTICS AND ECONOMIC DEVELOPMENT CONTROLLED FOR GEOGRAPHY AND NATURE OF PEOPLES

	log income per capita in 2000									in 1950
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Family score	0.42***	0.33***	0.31***	0.24***	0.25***	0.39***	0.43***	0.27***	0.40***	0.34***
	(0.08)	(0.09)	(0.11)	(0.08)	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)	(0.10)
Log percentage of arable land	-0.08	-0.10	-0.12	-0.18**	-0.17**	-0.09	-0.16*	-0.13*	-0.23***	-0.03
	(0.07)	(0.07)	(0.18)	(0.08)	(0.08)	(0.07)	(0.08)	(0.07)	(0.08)	(0.12)
Log absolute latitude	0.04	0.01	0.78*	-0.12	-0.09	-0.01	-0.04	0.01	-0.17	0.15
	(0.11)	(0.11)	(0.41)	(0.11)	(0.12)	(0.11)	(0.12)	(0.11)	(0.14)	(0.19)
Log land suitability for agriculture	-0.15**	-0.16**	-0.26**	-0.14**	-0.15**	-0.16**	-0.09	-0.17**	-0.08	-0.11
	(0.07)	(0.07)	(0.12)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.11)
Mean distance to nearest waterway	-0.38***	-0.28**	-0.30	-0.28**	-0.30**	-0.33**	-0.41***	-0.32**	-0.46***	-0.38*
	(0.14)	(0.14)	(0.24)	(0.13)	(0.13)	(0.14)	(0.14)	(0.13)	(0.16)	(0.20)
% of pop. at risk of contracting malaria	-1.50***	-1.46***	-1.91***	-1.09***	-1.06***	-1.30***	-1.72***	-1.20***	-1.44***	-1.37***
	(0.21)	(0.24)	(0.49)	(0.24)	(0.25)	(0.22)	(0.24)	(0.22)	(0.26)	(0.32)
% of pop. living in tropical zones	0.01	0.18	0.49	0.04	0.09	0.01	0.04	0.10	0.09	0.42
	(0.24)	(0.26)	(0.58)	(0.25)	(0.27)	(0.24)	(0.27)	(0.23)	(0.30)	(0.42)
OPEC member	0.40*	0.46**	0.13	0.56***	0.58***	0.47**	0.38*	0.50**	0.58**	-0.12
	(0.23)	(0.22)	(0.38)	(0.21)	(0.21)	(0.23)	(0.23)	(0.22)	(0.24)	(0.29)
Log neolithic transition (ancestry adjusted)	-0.01	0.02	0.14**	0.00	0.01	-0.01	-0.02	0.00	-0.02	-0.04
	(0.03)	(0.04)	(0.07)	(0.03)	(0.05)	(0.03)	(0.03)	(0.03)	(0.04)	(0.05)
Geographical isolation			0.33***							
			(0.07)							
Ethnic fractionalization				-0.91***	-0.94***	-0.79***			-1.02***	0.25
				(0.27)	(0.28)	(0.30)			(0.34)	(0.40)
Genetic diversity				172*	140		199**		431**	-205
				(88.6)	(101)		(97.8)		(173)	(126)
Genetic diversity squared				-119*	-96.9		-135*		-295**	153*
				(62.6)	(71.2)		(69.2)		(120)	(89.2)
% of pop. of European descent				0.95***	1.43**			0.98***		
				(0.19)	(0.56)			(0.195)		
Continent fixed effect	No	Yes	No	No	Yes	No	No	No	No	No
Observations	145	145	69	145	145	145	145	145	117	135
R^2	0.64	0.70	0.53	0.72	0.71	0.65	0.65	0.69	0.69	0.51

Note: This table demonstrates the significant relationship between observed family score and log GDP per capita in 2000 (in 1950 in Column 9) controlling for geographic and human factors in samples of countries for which data are available. Heteroskedasticity-robust standard errors are reported in parentheses. *** Significant at the 1 percent level, ** Significant at the 5 percent level and * Significant at the 10 percent level.

VII. EXPLORING THE CHANNELS OF THE FAMILY CHARACTERISTICS EFFECTS

A. Family characteristics that help explain current GDP per capita

In addition to the result of the overall family score, one might wonder which characteristics of the family system are the most closely related to income per capita. We therefore use basic family characteristics as explanatory variables, retaining as geographical control variables

only those previously identified as significant.[14] As control for the nature of peoples, we retain genetic and ethnic diversity.

TABLE III. ECONOMIC DEVELOPMENT AND BASIC FAMILY CHARACTERISTICS

	log income per capita in 2000				
	(1)	(2)	(3)	(4)	(5)
Women	0.87***				0.59***
	(0.16)				(0.17)
Authority		0.02	0.32*		0.15
		(0.17)	(0.19)		(0.17)
Inequality				0.86***	0.50***
				(0.16)	(0.18)
Legal origin			-0.611***		-0.40**
socialist			(0.1925)		(0.18)
Log percentage of arable	-0.15**	-0.16**	-0.15*	-0.20**	-0.17**
land	(0.07)	(0.08)	(0.08)	(0.07)	(0.07)
Log land suitability for	-0.12*	-0.06	-0.03	-0.03	-0.07
agriculture	(0.07)	(0.08)	(0.07)	(0.07)	(0.07)
Mean distance to	-0.26*	-0.52***	-0.36**	-0.44**	-0.20
nearest waterway	(0.14)	(0.14)	(0.15)	(0.13)	(0.14)
% of pop. at risk of	-1.33***	-1.60***	-1.68***	-1.63***	-1.50***
contracting malaria	(0.18)	(0.20)	(0.19)	(0.17)	(0.18)
OPEC	0.47**	0.33	0.32	0.38*	0.45**
member	(0.22)	(0.24)	(0.23)	(0.22)	(0.21)
Ethnic	-0.89***	-0.98***	-0.95***	-0.77***	-0.78***
fractionalization	(0.29)	(0.32)	(0.31)	(0.29)	(0.27)
Genetic	234***	241**	264***	195**	195**
diversity	(84.2)	(93.8)	(91.1)	(83.7)	(83.7)
Genetic diversity	-159***	-168**	-184**	-131**	-131**
squared	(59.4)	(66.1)	(64.2)	(59.0)	(59.0)
Observations	145	145	145	145	145
R^2	0.68	0.61	0.63	0.71	0.71

Note: This table demonstrates the significant relationship between observed basic family characteristics and log GDP per capita in 2000, controlling for geographic and human factors in a 145-country sample for which data are available. Heteroskedasticity-robust standard errors are reported in parentheses. *** Significant at the 1 percent level, ** Significant at the 5 percent level and * Significant at the 10 percent level.

Among the basic family characteristics, high status of women and inequality among siblings are highly significant when taken alone (Table III, Columns 1 and 4) and when the three family characteristics are combined (Column 5). Conversely, the authority of parents over children is not significant (Columns 2 and 5). However, as will be demonstrated below, strong

[14] Due to the limited number of observations, we were obliged to retain a low number of explanatory variables. We thus exclude absolute latitude, the percentage of the population living in tropical areas and the years since the Neolithic transition as well as continent dummies, since they were never significant in any of the previous specifications.

parental authority plays a highly significant positive role in explaining investment in human capital. These paradoxical results can be explained by the fact that countries where parental authority is strong are also frequently associated with a socialist legal system (correlation coefficient of 0.57).[15] The potential development of these countries was thus hampered by the socialist policies applied for decades before the year 2000 when GDP per capita was measured. For the purpose of control, we add a dummy for socialist legal systems which led the parental authority series to become slightly significant with a strong increase of its coefficient (Column 3).

B. The effects of family characteristics on investment in human and physical capital

A second way to assess the channels of the effects of family characteristics consists in studying their relationship with proxies for investment in both human and physical capital in each country. Our theoretical framework assumes that high status of women and strong parental authority favor investment in human capital. We proxy the investment in human capital through the number of scientific articles per capita (1981-2000) and the number of years of schooling (the two series are from Ashraf and Galor, 2013).

Our 'women' series correlates significantly with both the number of scientific articles and the years of schooling after control for geographical and human factors (Table IV, Columns 1 and 5). Our 'authority' variable is only significant in explaining the number of years of schooling (Columns 6). But as previously explained, authority is highly correlated with a socialist legal origin; controlling for this characteristic, the authority series becomes also significant explaining the number of scientific articles (Column 3). Both a high status of women and a strong authority of parents have a positive impact on investment in human capital, but in different ways, since the two series are significant when tested together to explain scientific articles and years of schooling (Columns 4 and 7).

To investigate the theoretical positive effect of inequality of siblings on the investment in physical capital, we collect (from *the Penn World Table,* Feenstra et al., 2015), the share of gross capital formation and the capital stock amount that we combine with population to get a per capita figure. These data have been constituted for each country for the year 2000 and are assumed to be good measures of the investment in physical capital. The theoretical positive effect of inequality is verified since this series is highly significant in explaining these two measures of investment in physical capital (Columns 8 and 9).

[15] According to Todd (1983), the family structure influences political outcomes; when authority of parents is associated with equality among children (the Communitarian family), there is greater popular support for socialist regimes.

TABLE IV. FAMILY CHARACTERISTICS AND INVESTMENTS IN HUMAN AND PHYSICAL CAPITAL

	scientific articles per capita 1981-2000				years of schooling			share of capital	capital per capita
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Women	0.24***			0.22***	3.14***		6.11***		
	(0.04)			(0.04)	(0.51)		(0.47)		
Authority		0.02	0.14***	0.14***		2.01***	1.86***		
		(0.05)	(0.05)	(0.04)		(0.50)	(0.42)		
Inequality								0.03**	1.12***
								(0.02)	(0.18)
Socialist legal origin			-0.25***	-0.22***					
			(0.05)	(0.04)					
Log percentage of arable land	0.02	0.01	0.01	0.02	0.12	-0.16	-0.03	-0.01	-0.21**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.24)	(0.26)	(0.22)	(0.01)	(0.09)
Log land suitability for agriculture	-0.06***	-0.04*	-0.03	-0.04**	-0.10	0.27	-0.03	0.00	-0.05
	(0.02)	(0.02)	(0.02)	(0.02)	(0.23)	(0.24)	(0.21)	(0.01)	(0.08)
Mean distance to nearest waterway	0.02	-0.06	0.01	0.08**	1.58***	0.61	1.51***	-0.02	-0.43***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.47)	(0.48)	(0.43)	(0.01)	(0.16)
% of pop. at risk of contracting malaria	-0.06	-0.13**	-0.16***	-0.08*	-3.29***	-4.22***	-2.73***	-0.04**	-2.12***
	(0.05)	(0.06)	(0.02)	(0.05)	(0.63)	(0.64)	(0.59)	(0.02)	(0.21)
OPEC member	-0.10	-0.16*	-0.15**	-0.10	-1.55**	-1.76**	-1.09	0.02	0.41
	(0.07)	(0.08)	(0.07)	(0.07)	(0.74)	(0.80)	(0.69)	(0.02)	(0.27)
Ethnic fractionalization	-0.13*	-0.15	-0.12	-0.11	-0.54	-0.31	-0.19	-0.07**	-0.43
	(0.08)	(0.09)	(0.08)	(0.07)	(1.06)	(0.95)	(0.80)	(0.03)	(0.36)
Genetic diversity	33.7	38.5	47.6**	40.23*	1022**	491*	528**	14.7*	312***
	(23.2)	(26.1)	(23.9)	(21.4)	(420)	(276)	(233)	(8.63)	(104)
Genetic diversity squared	-22.3	-26.7	-33.1*	-26.9*	-705**	-341*	-360**	-10.4*	-216***
	(16.4)	(18.5)	(16.9)	(15.1)	(293)	(195)	(165)	(6.09)	(73.6)
Observations	128	128	128	128	128	128	128	133	133
R^2	0.34	0.23	0.31	0.45	0.63	0.56	0.69	0.28	0.71

Note: This table demonstrates the significant relationship between observed basic family characteristics and investments in human (scientific articles per capita and years of schooling) and physical capital (share of capital and capital per capita) in samples of countries for which data are available. Heteroskedasticity-robust standard errors are reported in parentheses. *** Significant at the 1 percent level, ** Significant at the 5 percent level and * Significant at the 10 percent level.

VIII. CONTROLLING FOR RELIGIOUS AFFILIATION AND FORMAL INSTITUTIONS

A. Is family structure different from religious affiliation?

One might expect family characteristics to merely be a consequence of religious affiliation. In fact, there are three kinds of relationships between the two phenomena. In some areas, the religion did influence the family structure but in others, religion and the family type observed are completely independent of one another. And in some cases, influence is in the opposite direction (i.e. the family structures have influenced the religion).

The influence of religion on the family seems clear for Islam, as the Koran provides a complete set of rules for organizing the family. According to Todd (2011: 30), the populations of North Africa were converted to their current family type at the same time as they were converted to Islam and then to the Arabic language. Equally, the Catholic Church would be the main explanation for the high status of west European women according to De Moor and van Zanden (2009) and, more broadly, the cause of several psychological traits observed in the west due to its family policy (Schulz et al., 2019).

But there are also many cases of independence between religion and the family structure. Despite being Muslim, Albanians remain exogamic with few marriages between cousins (Todd, 2011: 467). In contrast, the Christians of Bayreuth (Lebanon) are frequently married to their cousins (about 10% of marriages). Despite being Christians, the status of women in Georgia and Armenia is very low even today, as demonstrated by the sex ratio observed in 2000 which is respectively 118 and 120 boys for 100 girls due to selective abortion (Todd, 2011: 487). The most demonstrative case of independence between religion and family structure is South-East Asia. Most of the inhabitants of Burma, Thailand, Laos, Cambodia, Malaysia, Philippines and Java share the same family type whether they are Muslims, Christians or Buddhists.

A third form of relationship is the influence of a preexisting family structure on the religion adopted. Sometimes, a religion became dominant in areas where specific family types already existed. For example in Europe, Protestantism mainly succeeded where the Stem family was dominant (combination of 'authority' and 'inequality') according to Todd (1984: 256).[16] For Todd (2011), the family type promoted by the Catholic Church was a consequence of a preexisting family model (and not an exogeneous doctrine as assumed by Schulz et al., 2019); this direction of causality rebuts the criticism that, despite common texts, all Christians did not favor the same family model. According to Todd (1984), except in North-Africa, Islam became the dominant religion mainly where the "Arab marriage" was already present because the family rules laid down by the Koran are compatible with this family organization. For instance, the low status of women precedes Islam in a large part of the current "Arab world", as attested by the fact that girls were fully excluded from inheritance even before Islamization. According to Islamic law, girls inherit a smaller share than boys but, in many places, this rule is not respected with a total exclusion of girls, contradicting the Koran.[17]

Family structure as a consequence of religion is only one of three cases of potential relations. In this case, religion would be the fundamental factor of economic development reducing the family characteristics to a simple channel; Religion → Family Characteristics → Economic development. Besides, if family type causes religious affiliation, religion could be a channel of

[16] Protestants relaxed the Catholic ideal of free consent to marriage (the marriage is not a sacrament in the Protestant doctrine) granting a role to parents, which is a necessary practice in the Stem family.

[17] The Shiite version of the law is more favorable to daughters (Todd, 2011: 487).

its effect through, for instance, the development of specific cultural traits highlighted by Schulz et al. (2019); Family characteristics → Religion → Economic development. In these two cases, the effect of family characteristics on economic development through propensity to invest could be inoperant. We thus control for the share of the three main religions in the population of each country to check whether the religious affiliation is not the main driver of our observations as fundamental cause or as an intermediate channel.

TABLE V. FAMILY CHARACTERISTICS AND ECONOMIC DEVELOPMENT CONTROLLED FOR RELIGION

	log income per capita in 2000				
	(1)	(2)	(3)	(4)	(5)
Family score	0.41***	0.33***			
	(0.08)	(0.08)			
Women			0.53***		
			(0.18)		
Authority				0.03	
				(0.16)	
Inequality					0.78***
					(0.15)
% of pop		0.77***	0.49**	0.68***	0.81***
Catholic		(0.19)	(0.21)	(0.22)	(0.19)
% of pop		0.06	-0.14	-0.31	-0.11
Muslim		(0.24)	(0.24)	(0.26)	(0.22)
% of pop		0.91***	0.90***	1.10***	0.76**
Protestant		(0.32)	(0.33)	0.34**	(0.31)
Log percentage of arable	-0.19**	-0.12*	-0.09	-0.06	-0.12*
land	(0.07)	(0.07)	(0.07)	(0.08)	(0.07)
Log land suitability for	-0.08	-0.15*	-0.18**	-0.19**	-0.15**
agriculture	(0.07)	(0.08)	(0.08)	(0.08)	(0.07)
Mean distance to	-0.37*	-0.32**	-0.29**	-0.41***	-0.36***
nearest waterway	(0.13)	(0.12)	(0.13)	(0.13)	(0.12)
% of pop at risk of	-1.40***	-1.42***	-1.47***	-1.61***	-1.64***
contracting malaria	(0.18)	(0.17)	(0.17)	(0.18)	(0.15)
OPEC	0.48**	0.47**	0.47**	0.41*	0.39**
member	(0.22)	(0.20)	(0.21)	(0.21)	(0.19)
Ethnic	-0.71***	-0.59**	-0.68**	-0.67**	-0.53**
fractionalization	(0.29)	(0.27)	(0.27)	(0.28)	(0.26)
Genetic	134.7	236***	269***	296***	217***
diversity	(86.5)	(82.8)	(84.3)	(86.7)	(80.3)
Genetic diversity	-90.4	-162***	-184***	-205***	-147**
squared	(61.1)	(58.4)	(59.5)	(61.1)	(56.7)
Observations	143	143	143	143	143
R^2	0.68	0.73	0.71	0.69	0.75

Note: This table demonstrates that the effect of family characteristics on GDP per capita do not operate through religious affiliation in a sample of 143 countries for which data are available. Heteroskedasticity-robust standard errors are reported in parentheses. *** Significant at the 1 percent level, ** Significant at the 5 percent level and * Significant at the 10 percent level.

We run regressions similar to the previous one but with a lower number of observations (Table V, Column 1) to match the countries where data about religious affiliation are available. For each country, we then add the share of the population which is Protestant, Catholic and Muslim (Column 2). Columns 2 to 5 show that Catholicism and Protestantism are positively and significantly associated with economic development in all specifications, whereas Islam is mostly negative but never significant. We obtain an indication about the importance of the religious channel compared to the direct effect of family characteristics by looking at how β_1 of the family score changes when controlling for religious affiliations. The coefficient of the family score decreases by about one fifth after control for religion, attesting that part of the influence of the family system is confounded with religion. But the family score remains highly significant (Column 2), demonstrating the religion and family characteristics are fully independent of one another. Turning to the impact of basic characteristics, both high status of women and inequality among siblings are robust to the inclusion of religious affiliations, but strong parental authority is not. Overall, we demonstrate that the family characteristics we identify as theoretically favorable, even if often close to religious affiliation, have an independent and positive influence on economic development.

B. Is the effect of family structure through investment or does it operate via formal institutions?

Family structure could have influenced a society to build specific formal institutions. This idea goes back to Aristotle, explaining the prevalence of the monarchies at his time by the fact that each human is used to this form of government in his own family with his father as king.[18] Galasso and Profeta (2010) provide evidence of this kind of phenomenon. In this case the effect of the family structure would be intermediated through formal institutions rather than through its effect on propensity to invest; Family characteristics → Formal institutions → Economic development.

We run our regressions again using the global family score (Table VI, Column 1) and then the three basic characteristics (Column 3) but with a lower number of observations to match the institutional data available (108 observations). In columns 2 and 4, we add a measure of the quality of institutions (social infrastructure index of Hall and Jones, 1999). The coefficients of our family series strongly decrease, meaning that a part of their explanatory power acts through the quality of the institutions but remains highly significant. When basic characteristics are tested, only high status of women remains significant after controlling for institutional quality. The fact that the global family score and high status of women remain significant after controlling for the quality of institutions supports our theory of an effect on productivity through propensity to invest and not only through better formal institutions,

[18] Aristotle, *Politics*, in his introduction and in Part XIII.

even if this channel is also at work. This also offers a control for the ability of individuals to cooperate on a non-family basis.

Another set of controls is for legal origin, since this institutional feature has been identified as explaining differences in economic development (La Porta et al., 2008). For many countries, especially in Europe and for countries that have freely chosen a legal regime (like Latin America for the French civil law or several countries for a socialist regime), the legal regime could also be the result of such fundamental factors as family characteristics. Of course, for countries that inherited their institutions from colonizers (Acemoglu et al., 2001), the origin of the current legal system is unrelated to their family structures.

We run our classical regressions using the overall family score (Column 5) and the three family characteristics (Column 7) but with more countries than in the previous investigations. We then add a dummy for the British, French and socialist legal origins.[19] British and French legal origins do not have a significant effect, but a socialist origin is significantly associated with lower economic development. The parental authority variable remains nonsignificant whereas our family score, the high status of women and the inequality of siblings remain strongly significant with only a modest decrease of their coefficients, meaning that the legal origin variable is a very limited channel, if any, for the impact of family characteristics.

Finally, Borcan et al. (2018) point out the hump-shaped relationship between economic development and state history. For these authors, the oldest-established states currently suffer low productivity due to accumulated over-centralization, while very young states are unable to offer sufficient fiscal and institutional capacity. Middle-aged states offer the appropriate context for economic growth. The effect of state history could be an alternative rationale to account for economic development or, as explained below, a companion outcome of family structure, as these two characteristics could result from a common diffusion of innovations from the earliest areas of civilization. Our family score (Column 9) as well as high status of women and potential inequality among siblings (Column 10) return approximately the same coefficients and significance after controlling for state history and state history squared.[20]

[19] We do not use the German and Scandinavian legal origin due to the insufficient number of cases.

[20] We use the data "statehiste00" from the Borcan et al. (2018) database. Values are divided by 10,000 for convenience of presentation.

TABLE VI. FAMILY CHARACTERISTICS AND ECONOMIC DEVELOPMENT CONTROLLED FOR FORMAL INSTITUTIONS

	log income per capita in 2000									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Family score	0.53***	0.26***			0.40***	0.43***			0.402***	
	(0.07)	(0.07)			(0.08)	(0.09)			(0.0814)	
Women			0.63***	0.47***			0.58***	0.57***		0.54***
			(0.17)	(0.15)			(0.18)	(0.18)		(0.20)
Authority			0.20	0.15			-0.05	0.06		-0.07
			(0.17)	(0.14)			(0.15)	(0.20)		(0.15)
Inequality			0.67***	0.18			0.59***	0.46**		0.63***
			(0.17)	(0.16)			(0.18)	(0.19)		(0.16)
Social infrastructure		1.85***		1.85***						
		(0.27)		(0.28)						
French legal origin						-0.06		-0.29		
						(0.30)		(0.32)		
UK legal origin						-0.10		-0.30		
						(0.30)		(0.31)		
Socialist legal origin						-0.63**		-0.61**		
						(0.28)		(0.28)		
State history									-2.95	-1.74
									(2.01)	(2.12)
State history squared									0.00	0.00
									(0.00)	(0.00)
Log percentage of arable land	-0.22***	-0.21***	-0.21***	-0.19***	-0.19**	-0.17**	-0.18**	-0.17**	-0.11	-0.10
	(0.06)	(0.05)	(0.06)	(0.05)	(0.08)	(0.07)	(0.07)	(0.07)	(0.08)	(0.07)
Log land suitability for agriculture	-0.01	0.02	-0.02	0.00	-0.08	-0.05	-0.08	-0.06	-0.10	-0.08
	(0.06)	(0.05)	(0.06)	(0.05)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Mean distance to nearest waterway	-0.29	-0.26*	-0.29	-0.24	-0.37***	-0.21	-0.30**	-0.22	-0.32**	-0.26*
	(0.19)	(0.16)	(0.19)	(0.16)	(0.14)	(0.14)	(0.13)	(0.14)	(0.15)	(0.14)
% of pop. at risk of contracting malaria	-1.30***	-0.98***	-1.26***	-0.91***	-1.35***	-1.50***	-1.46***	-1.51***	-1.47***	-1.57***
	(0.19)	(0.16)	(0.19)	(0.17)	(0.18)	(0.18)	(0.19)	(0.19)	(0.21)	(0.25)
OPEC member	0.25	0.34**	0.24	0.36**	0.49**	0.45**	0.45**	0.45**	0.47**	0.41*
	(0.18)	(0.15)	(0.18)	(0.15)	(0.22)	(0.21)	(0.21)	(0.21)	(0.21)	(0.23)
Ethnic fractionalization	-0.57**	-0.64***	-0.65**	-0.65**	-0.79***	-0.75***	-0.78***	-0.71**	-0.87***	-0.83***
	(0.27)	(0.22)	(0.27)	(0.22)	(0.29)	(0.29)	(0.28)	(0.28)	(0.30)	(0.30)
Genetic diversity	261***	211***	253***	224***	161*	199**	170**	197**	107	119
	(73.1)	(60.9)	(73.7)	(61.6)	(86.2)	(84.3)	(84.2)	(84.5)	(79.1)	(80.9)
Genetic diversity squared	-180***	-146***	-174***	-154***	-109*	-135**	-114*	-133**	-71.1	-77.8
	(51.8)	(43.1)	(52.1)	(43.6)	(60.8)	(59.5)	(59.4)	(59.6)	(56.3)	(57.6)
Observations	108	108	108	108	145	145	145	145	140	140.000
R^2	0.82	0.88	0.83	0.88	0.67	0.70	0.70	0.70	0.70	0.72

Note: This table demonstrates that the effect of family characteristics on GDP per capita does not operate through quality of formal institutions and legal origins for samples of countries for which data are available. The effects of family characteristics are also robust to the state history of each country. Heteroskedasticity-robust standard errors are reported in parentheses. *** Significant at the 1 percent level, ** Significant at the 5 percent level and * Significant at the 10 percent level.

IX. THE DIRECTION OF CAUSALITY: THE REVERSAL OF FORTUNE OF THE PRIMITIVE FAMILY

A. Historical anthropology shows that family systems predate economic development

One could ask whether the correlation we have demonstrated between family characteristics and economic development is not due to a reverse causality in which the economic development causes specific family characteristics. This potential reverse causality can easily

be rejected by investigating the history of family structures. To study the long-term history of family structures, anthropologists examined a variety of evidence. This deep analysis is facilitated when documents are available such as old codes (starting with the Code of Hammurabi, which deals with many aspects of family life) and contracts; especially sales agreements, because we can observe whether sales of properties after death of parents include all siblings or one specific heir to assess inequality among siblings, and whether the wife signs with her husband to indicate the status of women.

The lack of written records means that other types of evidence are required. For example, the genetic kinship of male and female human remains exhibits the matri, patri or bilocality of family settlements, testifying to the status of women. Statues of women can also be used to assess the status of women according to their number, the importance of the decorations compared to those of men and the activities represented. Similar observations are obtained from tombs. Inequality among siblings can also be supported by family portraits where one of them is given greater importance.

Reverse causality (i.e. from economic development to family structures) can be rejected by the timeline. In most of the countries, the family structures we used in this study had existed for centuries before economic take-off. The family types precede the economic development, so the causality should run from family types to economic development. It does not mean that family structures are fixed, but they evolve very slowly compared to other institutions (Level 1 institutions, according to Williamson, 2000).

B. A reversal of fortune

The losers of yesterday are the winners of today. Date of first writing (the beginning of history) is a good measure of past success. The oldest text in Japanese (the Kojiki) dates only from 712 CE. It is even later in non-Romanized Europe: during the 8th century CE for the eastern part of Germany (after the conquest by Charlemagne), in the 10th-11th centuries for Russia, about one century later for the Scandinavian areas and only during the 13-14th centuries for the Baltic countries. These countries clearly lagged way behind Mesopotamia (around 3300 BCE) or Egypt (3000 BCE). However, these countries are now incomparably wealthier than the winners of yesterday.

Several explanations have been proposed by scholars studying this reversal: environmental degradation (Diamond, 2005), peripheral regions were less exposed to raids by roaming armies and to incursions by migrating peoples (Ashraf and Galor, 2010), over-centralization of the earliest states (Borcan et al., 2018), and areas where agriculture first arose developed autocratic societies driving more individualistic inhabitants to flee and to replace populations abroad, leading to the rise of more individualistic societies (favorable for economic development) at the margins of Eurasia (Olsson and Paike, 2019).

The history of family organizations provides another explanation for this reversal. Areas that were backward preserved archaic family forms that are today more supportive of economic development while early starters developed new complex family forms that impede modern growth. According to Todd (2011), there has been a gradual complexification of family structures over time from the Nuclear family to the "Arab marriage" type. The primitive form is the Nuclear family observed in England but also in many hunter-gatherer peoples (Todd, 2011: 19); a group of Nuclear families in a horde is anthropologically similar to the juxtaposition of Nuclear families observed in villages in modern Europe.[21] Ancient DNA analysis show that Neolithic Europeans families were nuclear (Bentlery et al. 2008; Haak et al., 2008).

Three successive innovations provided stronger ties leading to more complex forms of families. From the primitive Nuclear form, the first step of complexity led to the Stem family (parental authority and inequality among siblings, since only one married child remains in the parental home), then the Communitarian family appeared (parental authority and equality, since all the married sons can bring their spouses into the parental household). The third and last development is the "Arab marriage" in which the children of two brothers marry one other (Todd, 2011: 518). The complexity of family types run from the Nuclear form (one couple), to the Stem form (two couples), the Communitarian (more than two couples) and the "Arab family" (a clan of numerous couples). Of course, this constitutes an oversimplification omitting variations on these types such as the exact status of women in each local version.

Although the long-term history of family systems follows this scheme, this gradual complexification is not only time-dependent. Environmental constraints and opportunities can favor a given development. For instance, the evolution toward the Stem family (only one of the offspring inherits the farm) appears only in a context of limited land resources. Regarding this aspect, the gradual complexification of family structures can be complementary to the functionalist approach, which claims that responses to ecological constraints explain family features such as the strength of family ties (Alger and Weibull, 2010), polygyny prevalence (Alger, 2015) and low status of women (through plow agriculture, see Alesina et al., 2013).

Regarding our basic family characteristics, complexification tends to decrease women's status (a stronger affiliation to the husband's family occurs at the expense of the affiliation to the woman's family, thus leading to reduced status of women), which in turn reduces investment in human capital, which is crucial nowadays. This effect is deeply investigated by Carmichael

[21] Status of women for instance is relatively high in hunter-gatherer societies (Hansen et al. 2015). Ancient DNA demonstrate a high female status during prehistorical Europe (see multiple references in Rasteiro and Chikhi, 2013).

et al., 2019.[22] Complexification also implies increasing egalitarian rules among siblings (to be sustainable, a large family requires equality among siblings) thus reducing the amount and quality of investment in physical capital. Concerning parental authority, the effect of complexification is not linear, with an increase of the authority in the first two steps of complexification before a fall in the ultimate evolution, the "Arab marriage". Overall, we can assume that the more primitive the family system, the higher its family score.

There is therefore no one family type that is universally better, but according to the context, the characteristics of one family type can be an advantage or a handicap. An interesting illustration concerns industrialization. The English family, characterized by freedom of children (and potential inequality), is better for the launch of the industrial revolution as each younger generation was free (no attachment to the parental household nor automatic inheritance) to seek work in the new industrializing cities looking for unqualified labor. Young English people could easily move away from their family's property as the separation of children from parents was the norm. Conversely, moving away from the family's property was seen as an unnatural rupture in family systems characterized by authority. At a later stage of economic development, however, the economy required more qualified people, and technological changes increased the demand for human capital, as assumed for example by Doepke and Tertilt (2009). At this stage of development, the German family model became better suited because the authority of parents over children staying at home for a longer time permitted higher investment in human capital. This could explain the rise of Germany compared to England during the second industrial revolution.

C. Instrumental variable test across Eurasia

In addition to the anthropological evidence provided above for the age-old origin of the family system (and thus, the direction of causality), we design an empirical test using an instrumental variable. Diamond (1997) provided a large amount of evidence regarding the spread of products, technologies and formal institutions across Eurasia after a single original invention (agriculture, writing, city, legal code, state, empire, etc.). Todd (2011) assumes the same process for the informal institution which is each family model, but at a very slow speed consistent with 'slow moving institutions' (Williamson, 2000). A higher degree of family complexification is invented once and then spreads very slowly through contagion between populations; this contagion could be both cultural and genetic.[23] The hypothesis of a gradual spread of family complexification is also supported by a similar process concerning another

[22] Hansen et al. (2015) demonstrate a strong negative association between years since the Neolithic transition and status of women, which is also consistent with the 'complexification of family system' channel we investigate here.

[23] Ancient DNA analysis show a clear decrease of the Neolithic genetic contribution with geographic distance from the Near East (Rasteiro and Chikhi, 2013).

family-related behavior. The European Fertility Project (Princeton) concluded that declining fertility spread gradually across regions in Europe (Lee, 2015). This diffusionist view is confirmed by Spolaore and Wacziarg (2014), who found strong relationships between genetic and linguistic distance from France (the innovator in terms of declining fertility) and the timing of the decline in fertility in a given country.

In Eurasia, the main innovations appeared independently in two innovative centers: the Fertile Crescent and China. Diamond (1997) cited "bio-geographic" advantages to explain why these two areas benefited from these innovations. Whatever the reasons, we assume that family innovations also emerged in these areas before spreading across Eurasia. This narrative is consistent with the presence of the more complex family form (the "Arab marriage") around the Fertile Crescent, while the Stem family was the dominant form in antique Mesopotamia (Todd, 2011). Outside the Fertile Crescent, less and less complex family forms are currently observed. Countries far from the Fertile Crescent have kept primitive forms of family systems; the "conservatism of peripheral areas" is a phenomenon well known in linguistics that Todd applies to family models (Todd, 2019: preface). The same is true around China, even if the complexification never reached the ultimate level represented by the "Arab marriage". Western Europe and East Asia, due to their peripheral location on the edges of Eurasia, are thus conservatories of the archaic forms of family organizations. Figure VI illustrates this modeling of the history of family complexification.

As a consequence, a relevant instrumental variable for measuring the archaism of the family type (and thus its family score) of a given country is the distance between its capital city and the two centers of innovations (Fertile Crescent and China). This instrument is a rough simplification. First, many other factors can accelerate or slow this diffusion (e.g. invasions, communication pathways, natural obstacles, language, etc.). Moreover, family score is only partially dependent on family archaism because while status of women and potential inequality decrease as a result of family innovations, parental authority is the first positive innovation. But overall, if the "evolution via contagion" view of family systems is broadly true, the greater the distance from the centers of innovation, the more archaic the family system should be. Moreover, we have assumed that the more archaic family (high family score) models currently enjoy better economic outcomes. Combining these two relationships, we assume: Distance from innovations → Family characteristics → Propensity to invest → Economic development.

We focus on Eurasian countries (including neighboring islands such as Japan and the UK) because the spreading of a family innovation throughout this landmass is assumed to be as easy as for other innovations, whereas other continents are split up by geographical barriers such as deserts and seas (Diamond, 1997). Moreover, Eurasia is made up of numerous countries, with almost entirely indigenous (for centuries) populations, which avoids the need to control for post-1500 migrations. In addition, focusing on Eurasia controls for Diamond's hypothesis that this area enjoyed a specific advantage, due mainly to geography.

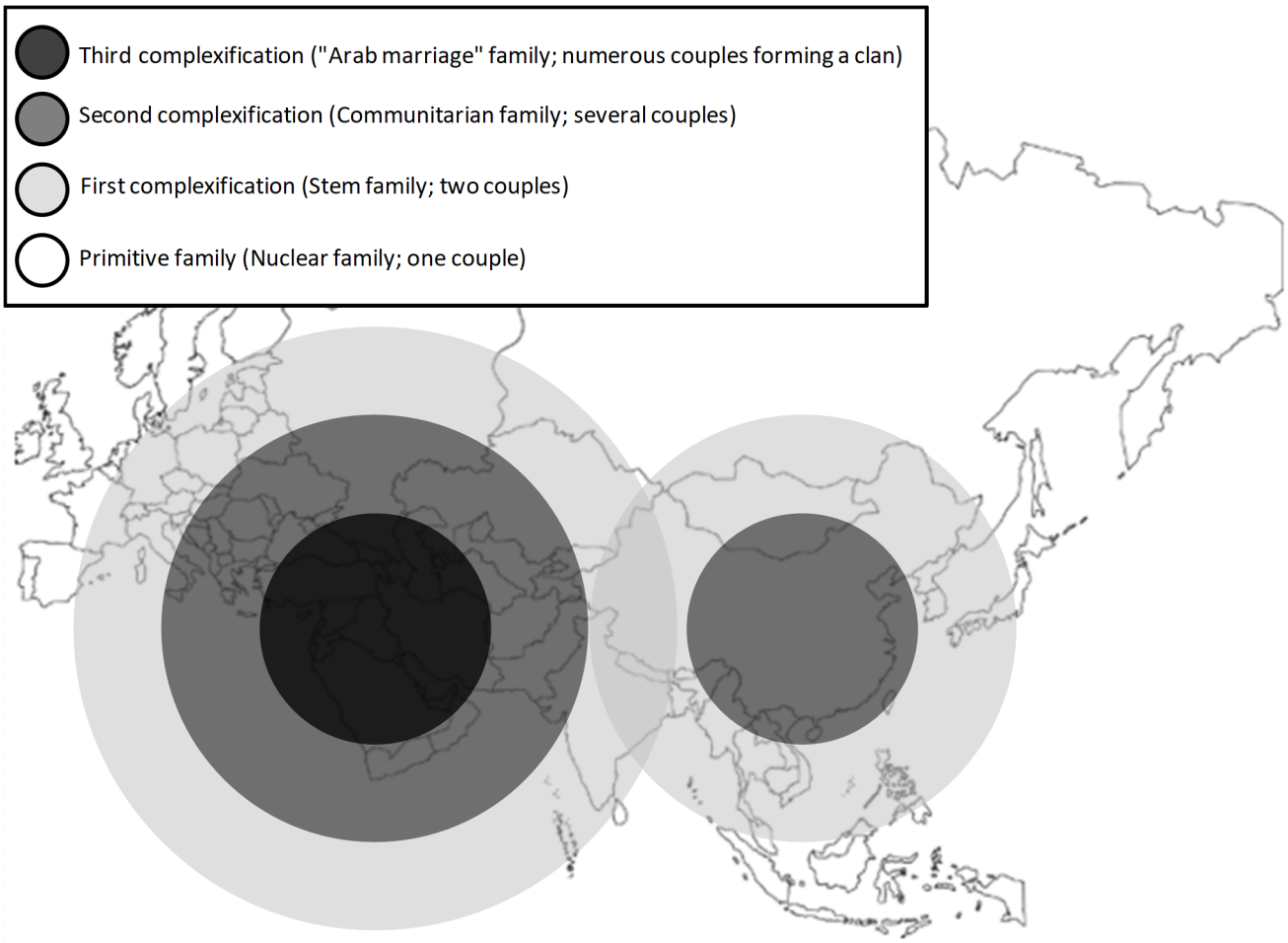

FIGURE VI. THEORETICAL DIFFUSION OF FAMILY COMPLEXIFICATION

Note: This scheme shows the theoretical diffusion across Eurasia of the successive innovations leading to complexification of family systems from the two centers of innovation, the Fertile Crescent and China. These centers introduced innovations that spread through contagion to the rest of the continent. Far from these two centers, at the margins of the continent, archaic family systems remain dominant. As a consequence, the further away a country is from the centers, the more primitive its family system will be.

To build our instrument, we measure the aerial distances, in thousands of kilometers, between the capital city of each country and both Bagdad (heart of the Fertile Crescent) and Xi'an (heart of China, site of the famous Terracotta Army of the First Qin emperor). Our instrument is the mean of the distances between a capital and these two cities. We use the mean rather than the distance from the closest center of innovation because both centers diffused their innovations. The closest center is not always the origin of the contagion; for instance, according to Todd (2011: 307), the first complexification in Eastern Europe was introduced through the Hunnic invasions, i.e. with a Chinese origin, even though the Fertile Crescent was closer. Moreover, an area between the two centers, such as Afghanistan, received both influences and not only the one from the closest center. These combined effects led to

greater complexification for a country between the two centers of innovations; a characteristic that the mean distance captures.[24]

As an example of our instrument, for Bangladesh, the distances are 4,583 km between Dacca and Bagdad and 2,144 km between Dacca and Xi'an. Our instrument, the mean distance from these innovation centers, is therefore 3,363 km. For Tokyo the mean distance is 5,571 km. We assume that Japan has a more archaic family system than Bangladesh and thus a higher family score.

The average distance from innovation centers is an attractive instrument for testing family score because there is no theoretical reason to believe that GDP in 2000 is affected by the distance from the Fertile Crescent and China. However, we might expect this distance to capture other factors potentially able to explain economic development. Indeed, like the family system, the history of the state, the time since the Neolithic transition as well as geographical isolation could also be proxied by the distance from the innovation centers. Fortunately, these variables are observable, showing that the distance from the innovation correlates most closely with the family score (0.63); its correlation with history of state and geographical isolation are more limited (-0.35 and 0.32 respectively) while its correlation with the time since the Neolithic transition is nil (0.02). Moreover, we control for these alternative factors in the following IV investigation.

In the first stage, we use the mean aerial distance of one country from the centers of innovations D_i to instrument the family score F_i as follows:

$$F_i = \propto + \beta_3 D_i + \beta_4 X_i + \varepsilon_i \quad (2)$$

where F_i is the family score of the country i, D_i is the mean distance of the capital city of country i from Bagdad and Xi'an, X_i is a vector of control factors and, finally, ε_i is an error term.

As a second stage, our baseline equation explains GDP per capita by the estimated family score:

$$\ln(y_i) = \propto + \beta_1 F_i + \beta_2 X_i + \varepsilon_i \quad (3)$$

where y_i is the GDP per capita of country i in the year 2000, F_i is the instrumented family score of country i obtained from equation (2), X_i is the same vector of control factors and, finally, ε_i is a country-specific disturbance term.

[24] As a control, we also run the same exercise but using the distance from the closest center of innovation as instrument (see Column 12 of Table VII below).

As is evident from the F-statistic of the instrument in the first stage (Table VII), average distance from innovation centers is a strong instrument for the family score of a country. This distance alone explains 44% of the variation in the family score (Column 1). In the second stage, we use the fitted value of the family score instrumented by the mean distance from innovation centers to again run our regression explaining GDP per capita in 2000, but for a sample limited to 71 Eurasian countries. The instrumented family score (in other words, the part of the family score that is due to distance from innovation centers) is highly significant in explaining GDP, both alone (Column 7) and with control variables (Column 8). Figure VII shows the relationship between GDP per capita and our instrument (mean distance from innovation centers).

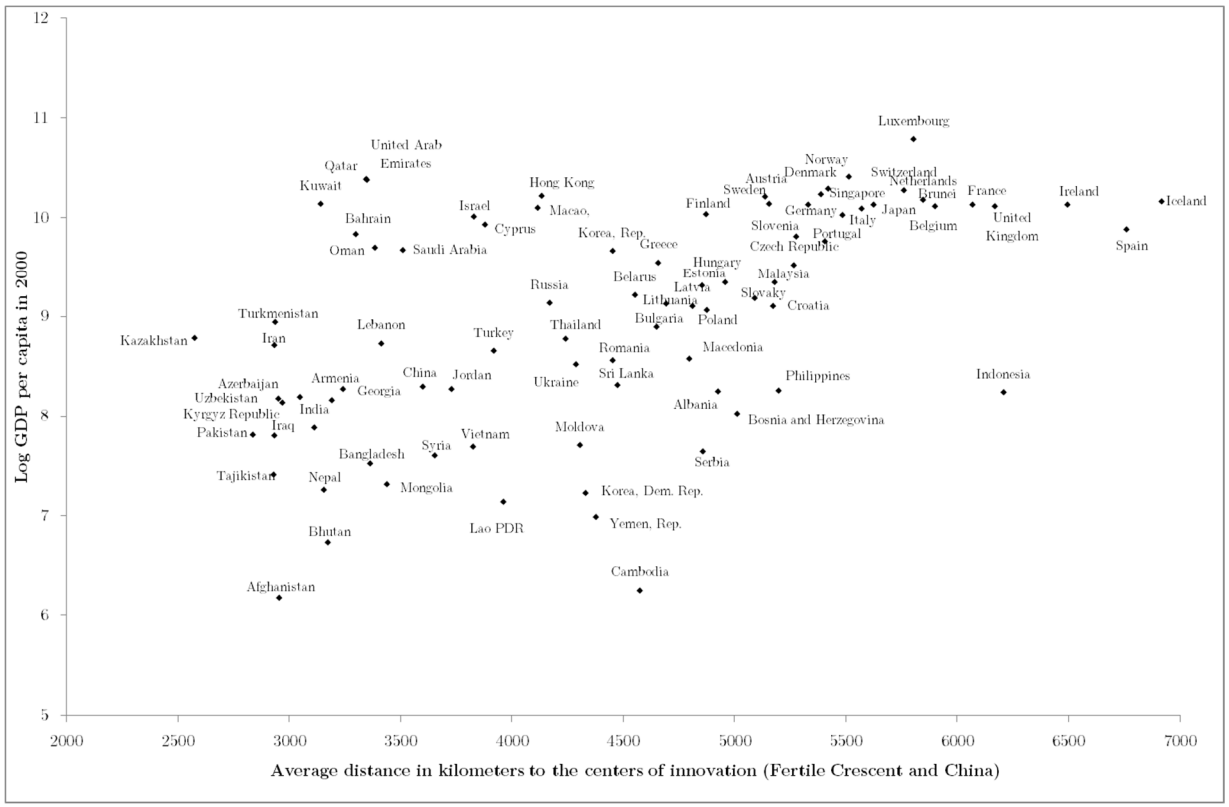

FIGURE VII. MEAN DISTANCE FROM INNOVATION CENTERS AND ECONOMIC DEVELOPMENT

Note: This figure depicts the positive impact of the mean distance from innovation centers (Fertile Crescent and China) on the GDP per capita across 79 Eurasian countries.

We also run our IV investigation purging in the first stage for the alternative factors that could also be captured by the distance from innovation centers. Including geographical isolation, our instrumented family score remains significant at 4%, but with a lower coefficient; in this sample reduced to 62 observations, geographical isolation appears significantly associated with GDP per capita, confirming that this aspect also plays a role

(Column 9).[25] State antiquity and time since the Neolithic transition appear to have no effect, while the instrumented family score remains significant at 1% (Columns 10 and 11).

For control purposes, we also follow the same process but using as instrument the distance from the closest center of innovation (Column 6) rather than the mean distance from the two centers. The result using this second instrumental variable confirms the significance of the family score but with a lower R squared (Column 12 compared to 8). Finally, it is interesting to note that both the coefficients and the Rs squared of the regressions using the instrumental variables are higher than was observed using the original family score on the same subsample (Column 13).

Table VII. Family characteristics and economic development in Eurasia using an instrumental variable

	First stage (Family score explained)						Second stage (GDP per capita explained)						Standard OLS
							IV	IV	IV	IV	IV	IV2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Family score							0.59***	1.26***	0.41**	1.47***	1.50***	1.78**	0.39***
							(0.15)	(0.33)	(0.19)	(0.46)	(0.46)	(0.85)	(0.09)
Average distance from innovation centers	0.66***	0.52***	0.33***	0.45***	0.43***								
	(0.08)	(0.13)	(0.08)	(0.17)	(0.15)								
Minimum distance to innovation centers						0.26***							
						(0.13)							
Geographical isolation			0.03						0.39***				
			(0.10)						(0.10)				
State history				-4.18						2.21			
				(0.00)						(9.41)			
State history squared				0.00						0.00			
				(0.00)						(0.00)			
Log Neolithic transition timing (ancestry adjusted)					-0.16**						0.26		
					(0.07)						(0.17)		
Log percentage of arable land		0.02	-0.06	-0.09	0.01	-0.07		-0.09	-0.01	0.10	-0.12	-0.09	-0.14
		(0.13)	(0.14)	(0.18)	(0.13)	(0.16)		(0.22)	(0.14)	(0.31)	(0.24)	(0.28)	(0.17)
Log land suitability for agriculture		-0.08	-0.02	-0.07	-0.05	0.03		-0.22	-0.33**	-0.11	-0.25	-0.22	-0.20
		(0.13)	(0.11)	(0.14)	(0.13)	(0.14)		(0.21)	(0.13)	(0.26)	(0.24)	(0.27)	(0.13)
Mean distance to nearest waterway		-0.25	-0.45**	-0.44*	-0.27	-0.66***		0.18	0.05	0.63	0.24	0.63	-0.50*
		(0.16)	(0.23)	(0.23)	(0.17)	(0.16)		(0.37)	(0.25)	(0.56)	(0.43)	(0.79)	(0.26)
% of pop. at risk of contracting malaria		-0.74	-1.05**	-0.60	-0.58	-1.09**		-0.36	-1.34**	-0.47	-0.48	0.37	-1.52**
		(0.42)	(0.46)	(0.52)	(0.38)	(0.45)		(0.85)	(0.55)	(1.04)	(0.92)	(1.40)	(0.70)
OPEC member		-0.83*	-0.54	-0.72	-0.76**	-0.66**		1.26*	0.21	1.06	1.25	1.61***	0.44
		(0.37)	(0.29)	(0.43)	(0.37)	(0.30)		(0.71)	(0.48)	(0.84)	(0.79)	(1.06)	(0.45)
Ethnic fractionalization		-0.25	-0.28	-0.35	-0.26	-0.68		-0.58	-0.73	-0.54	-0.77	-0.37	-1.21**
		(0.44)	(0.48)	(0.50)	(0.41)	(0.48)		(0.71)	(0.45)	(0.82)	(0.77)	(0.99)	(0.53)
Genetic diversity		-202	-27.6	-146	-496	-19.6***		641	32.3	558.7	1049	46.3	586
		(521)	(546)	(565)	(516)	(6.25)		(682)	(562)	(802)	(808)	(1063)	(462)
Genetic diversity squared		128	4.51	91.1	338.9			-426		-370	-716		-401
		(364)	(380)	(394)	(361)			(475)		(558)	(563)		(320)
Observations	71	71	68	67	72	71	71	71	62	66	71	71	71
F-test	63.4	8.81	6.75	5.93	8.75	7.03	16.4	14.5	12.0	3.2	3.9	3.19	9.13
R^2	0.44	0.50	0.46	0.45	0.52	0.40	0.16	0.63	0.62	0.28	0.29	0.20	0.51

Note: This table displays an instrumental test of the effect of family score on GDP per capita. In a first stage, the family score of a given country is instrumented by the mean distance of its capital city from the two centers of innovation (Fertile Crescent and China). In a second stage, the fitted value of the family score is used to demonstrate the causal effect of family characteristics on GDP per capita, while controlling for other fundamental factors. This analysis was performed on a sample of 71 (or fewer) Eurasian countries for which data are available. Heteroskedasticity-robust standard errors are reported in parentheses. *** Significant at the 1 percent level, ** Significant at the 5 percent level and * Significant at the 10 percent level.

[25] We do not use the geographical isolation measure in our previous investigations due to the small number of observations provided by this dataset.

X. Conclusion

This paper makes two contributions. First, we introduce three theoretical links from family characteristic to economic development through the propensity to invest in both human and physical capital. Strong parental authority leads to a higher investment in human capital as children remain under parental influence for a longer period. High status of women also enables them to invest more in human capital thanks to the crucial role played by the mother in the education of children. Inequality among siblings permits greater investment in physical capital, as a critical size of wealth is maintained and the grasp of opportunities is not discouraged.

The second contribution of this paper is to test the explanatory power of these theoretical effects on the differences we observe in current economic outcomes in the different countries across the world. The presence of these favorable characteristics is associated with higher GDP per capita. This association is robust to the control for factors previously identified by the literature as contributing to comparative development. These family characteristics seem to act mainly as a direct effect rather than through the building of better institutions or the influence of religions, as the family variable is also robust to controls for both institutions and religious affiliation.

Among the basic characteristics, high status of women and, even if less clearly, parental authority are associated with high investment in human capital proxied by scientific articles per capita and number of years of schooling. Inequality of siblings is associated with higher investment in physical capital as measured in public accounting. The direction of the causality from family system to economic development is demonstrated thanks to anthropological history and a test using the distance from family innovation centers as instrumental variable.

Do these findings have consequences in terms of policy recommendations? Here, economic development appears to be a consequence of the deep informal institutions represented by family characteristics. These informal institutions are very slow moving and, even if practically feasible, political decisions to change them could be seen as illegitimate. But, maybe changes of family organizations to converge through the one observed in US are already ongoing? According to Reher (1998), “changes of this past century have tended to make cultures and mentalities more uniform”. There is some evidence of a transmission of preferences via television. Chong et al. (2008) find that exposure to soap operas in Brazil led to a decrease in fertility. Oster and Jensen (2009) show how attitudes about the status of women changed with the arrival of cable television in rural India. Maybe Hollywood movies and soap operas have imperceptibly played a crucial role for decades to change family characteristics and thus support economic development?

References

Acemoglu, D., Johnson, S., Robinson, J.A. (2001) "The Colonial Origins of comparative Development: An Empirical Investigation," *American Economic Review*, 91(5): 1369-1401.

Alesina, A., De Vleeschauwer, A., Easterly, W., Kurlat, S., Wacziarg, R. (2003) "Fractionalization," *Journal of Economic Growth*, 8(2): 155–94.

Alesina, A., Giuliano, P. (2010) "The Power of the Family," *Journal of Economic Growth*, 15:93–125.

Alesina, A., Giuliano, P. (2011) "Family Ties and Political Participation," *Journal of the European Economic Association*, 9(5): 817-839.

Alesina, A., Giuliano, P. (2014) "Family Ties," in Aghion, P. and Durlauf, S. *Handbook of Economic Growth*, Elsevier: 177-216.

Alesina, A., Giuliano, P., Nunn, N. (2013) "On the origins of gender roles: women and the plough," *Quarterly Journal of Economics*, 128(2): 469-530.

Algan, Y., Cahuc, P. (2005) "The Roots of Low European Employment: Family Culture?" in *NBER International Seminar on Macroeconomics*, Pissarides, C., Frankel, J. (eds), Cambridge, MIT Press.

Alger, I., Weibull, J. (2010) "Kinship, Incentives and Evolution," *American Economic Review*, 100(4): 1725-1758.

Ashraf, Q., Galor, O. (2013) "The `Out of Africa' Hypothesis, Human Genetic Diversity, and Comparative Economic Development," *American Economic Review*, 103(1): 1-48.

Ashraf, Q, Galor, O., Özak, Ö. (2010) "Isolation and Development," *Journal of the European Economic Association*, 8(2-3): 401-412.

Becker, G. (1992) "Fertility and the Economy," *Journal of Population Economics*, 5(3): 185-201.

Bentley, RA., Wahl, J., Price, TD., Atkinson, TC. (2008) Isotopic signatures and hereditary traits: snapshot of a Neolithic community in Germany. *Antiquity* 82: 290–304.

Bertocchi, G., Bozzano, M. (2014) "Family Structure and the Education Gender Gap: Evidence from Italian Provinces," IZA Discussion Paper No. 8347.

Bisin, A., Verdier, T. (2000) "Beyond the melting pot: Cultural transmission, marriage, and the evolution of ethnic and religious traits," *Quarterly Journal of Economics*, 115(3): 955-988.

Bolt and van Zanden (2014) "The Maddison Project: collaborative research on historical national accounts," *Economic History Review*, 67 (3): 627–651.

Borcan, O., Olsson, O., Putterman, L. (2018) "State History and Economic Development: Evidence from Six Millennia," *Journal of Economic Growth*, 23 (1): 1-40.

Carmichael, S., van Zanden, J. L. (2015) "Towards an ethnographic understanding of the European Marriage Pattern: Global correlates and links with female status," CGEH Working Paper, 67.

Carmichael, S., Rijpma, A., van der Vleuten L. (2017) "Quantity versus Quality: Household structure, number of siblings, and educational attainment in the long nineteenth century," in van Zanden et al. (Eds) *Agency, Gender and Economic Development in the World Economy 1850–2000*, Routledge: chapter 4.

Carmichael, S., de Pleijt, A., van Zanden, J.L., de Moor, T. (2015b) "Reply to Tracy Dennison and Sheilagh Ogilvie: The European Marriage pattern and the Little Divergence," CGEH Working Paper, 70.

Carmichael, S., de Pleijt, A., van Zanden, J.L., de Moor, T. (2016) "The European Marriage Pattern and its measurements," Journal of Economic History, 76(1): 196-204.

Carmichael, S., de Pleijt, A., van Zanden, J.L., (2019) "Gender Relations and Economic Development: Hypotheses about the Reversal of Fortune in EurAsia" in Diebolt, C. et al. (Eds) *Cliometrics of the Family,* Springer (pp. 149-172)

Chelhod, J. (1965) "La mariage avec la cousine parallèle dans le système arabe," *L'Homme*, 5(3/4): 113-173.

Chong, A., Duryea, S., La Ferrara, E. (2008) "Soap Operas and Fertility: Evidence from Brazil," CEPR Discussion Papers, vol. 6785.

De la Croix, D., Perrin, F. (2016) "French Fertility and Education Transition: Rational Choice vs. Cultural Diffusion," IRES Discussion paper 2016-7.

De Moor, T., van Zanden, J. L. (2009) "Girl Power: The European Marriage Pattern and Labour Markets in the North Sea Region in the Late Medieval and Early Modern Period," E*conomic History Review,* 63: 1–33.

De Vries, J. (2008*) The Industrious Revolution. Consumer Behavior and the Household Economy, 1650 to the Present*. Cambridge, Cambridge University Press.

Dennison, T., Ogilvie, S. (2014) "Does the European Marriage Pattern Explain Economic Growth?" *Journal of Economic History*, 74(3): 651-93

Diamond, J. (1997) *Guns, Germs, and Steel: The Fates of Human Societies*, New-York: Norton.

Diamond, J. (2005) *Collapse: How Societies Choose to Fail or Succeed*, New York: Penguin Group.

Diebolt, C., Perrin, F. (2013) "From Stagnation to Sustained Growth: The Role of Female Empowerment," *American Economic Review, Papers & Proceedings* 103: 545-549.

Diebolt, C., Menard, A-R, Perrin, F. (2016) "Behind the Fertility-Education Nexus: What Triggered the French Development Process?" Working Paper of BETA, 2016-10.

Dilli, S. (2015) "Family Systems and the Historical Roots of Global Gaps in Democracy," *Economic history of developing regions*, 31(1): 82-135.

Dilli, S., Rijpma, A. and Carmichael, S. (2013) "Development Versus Legacy: The Relative Role of Development and Historical Legacies in Achieving Gender Equality," CESifo Working Paper No. 4411.

Duranton, G., Sandal, R., Rodriguez-Pose, A. (2009) "Family Types and the Persistence of Regional Disparities in Europe," *Economic Geography,* 85: 23-47.

Doepke M., Tertilt, M. (2009) "Women's Liberation: What's in It for Men?" *Quarterly Journal of Economics*, 124(4): 1541-1591.

Feenstra, R. C., Inklaar, R. Timmer, M.P. (2015) "The Next Generation of the Penn World Table," *American Economic Review*, 105(10): 3150-82.

Foreman-Peck, J. (2011), "The Western European marriage pattern and economic development," *Explorations in Economic History*, 48(2): 292-309.

Galasso V., Profeta P. (2010) "When the State Mirrors the Family: The Design of Pension Systems," CESIfo Working Paper 3191.

Galor, O. (2011) *Unified Growth Theory*, Princeton: Princeton University Press.

Gallup, J. L., Sachs, J.D. (2001) "The Economic Burden of Malaria," *American Journal of Tropical Medicine and Hygiene,* 64 (1–2): 85–96.

Gordon, R. J. (2016) *The rise and fall of American growth: the US standard of living since the civil war*, Princeton: Princeton University Press.

Greif, A. (2006) "Family Structure, Institutions, and Growth: The Origins and Implications of Western Corporations," American Economic Review, 96(2): 308-12.

Greif, A., Tabellini, G. (2010) "Cultural and institutional bifurcation: China and Europe compared," *American economic review,* 100(2): 135-140.

Greif, A., Tabellini, G. (2012) "The Clan and the City: Sustaining Cooperation in China and Europe," Working Papers 445, IGIER.

Guiso, L., Sapienza, P., Zingales, L. (2006) "Does Culture Affect Economic Outcomes?" *Journal of Economic Perspectives*, 20(2): 23-48.

Haak W, Brandt G, de Jong HN, Meyer C, Ganslmeier R et al. (2008) Ancient DNA, Strontium isotopes, and osteological analyses shed light on social and kinship organization of the Later Stone Age. *Proc Natl Acad Sci U S A* 105: 18226–18231.

Hall, R. E., Jones, C. (1999) "Why Do Some Countries Produce So Much More Output Per Worker Than Others?" *Quarterly Journal of Economics,* 114 (1): 83–116.

Hansen, C.W., Jensen, P.S., Skovsgaard, C.V. (2015) "Modern Gender Roles and Agricultural History: the Neolithic Inheritance," *Journal of Economic Growth* 20(4):365-404.

Henrich, J. (2016) *The Secret of Our Success*. Princeton: Princeton University Press, Heston, A., Summers, R., Aten, B. (2006) *Penn World Table Version 6.2*, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.

Jacoby, H. G. (1995) "The Economics of Polygyny in Sub-Saharan Africa: Female Productivity and the Demand for Wives in Côte d'Ivoire," *Journal of Political Economy*, *103*(5): 938–71.

Kick, E., Davis, B., Lehtinen, M., Wang, L. (2000), "Family and Economic Growth: A World-System Approach and a Cross-National Analysis," *International Journal of Comparative Sociology*, 41: 225–244.

Klasen, S., Wink, C. (2003) "Missing Women: Revisiting the Debate," *Feminist Economics, 9: 263–299.*

Kuran, T. (2011) *The Long Divergence: How Islamic Law Held Back the Middle East*, Princeton: Princeton University Press.

Laslett P., Wall, R. and others (1972) *Household and Family in Past Times,* Cambridge: Cambridge University Press.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. (2008) "The Economic Consequences of Legal Origins," *Journal of Economic Literature*, 46(2): 285-332.

Le Play, F. (1884), *L'organisation de la famille selon le vrai modèle signalé par l'histoire de toutes les races et de tous les temps*. Tours: A. Mame.

Lee, R. (2015) "Becker and the demographic transition," *Journal of Demographic Economics*, 81.1: 67-74.

Mamadouh, V. (1999) A political-cultural map of Europe. "Family structures and the origins of differences between national political cultures in the European Union," *GeoJournal,* 47: 477-486.

Murdock, G. P., (1969) *Ethnographic Atlas*, Pittsburg: University of Pittsburgh Press.

Olsson, O., Paik, C. (2019). "A Western Reversal Since the Neolithic: The Long-Run Impact of Early Agriculture," *Journal of Economic History*, forthcoming.

Oster, E., Jensen, R. (2009) "The Power of TV: Cable Television and Women's Status in India," *Quarterly Journal of Economics*, 124 (3): 1057–1094.

Rasteiro, R., Chikhi, L. (2013)) Female and Male Perspectives on the Neolithic Transition in Europe: Clues from Ancient and Modern Genetic Data. *PLoS ONE* 8(4): e60944

Reher, D. S. (1998) "Family ties in Western Europe: Persistent Contrasts," *Population and Development Review*, 24(2): 203-234.

Rijpma, A., Carmichael, S. (2016) "Testing Todd and Matching Murdock: Global Data on Historical Family Characteristics," *Economic history of developing countries*, 31(1): 10-46.

Scott Smith, D. (1993) "The curious history of theorizing about the history of the western nuclear family," *Social Science History*, 17(3): 325-353.

Schulz, J.F., Bahrami-Rad, D., Beauchamp, J., Henrich, J. (2019) The Church, intensive kinship, and global psychological variation. *Science* 366.707:1-12.

Seabright, P. (2010) *The company of strangers*, Princeton: Princeton University Press.

Sen, A. (1990) "More than 100 Million Women are Missing," *The New York Review of Books.*

Solow, R. M. (1956) "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, 70.1: 65–94.

Spolaore, E., Wacziarg, R. (2014) "Fertility and modernity," Working paper Tufts University.

Tertilt, M. (2005) "Polygyny, Fertility, and Savings," *Journal of Political Economy*, 113(6): 1341-1371.

Todd, E. (1983) La Troisième Planète, Paris: Seuil. English version: Todd, E. (1985) *Explanation of Ideology: Family Structure & Social System,* London: Blackwell.

Todd, E. (1984) L'enfance du monde, Paris: Seuil. English version: Todd, E. (1987) *The causes of progress: culture, authority, and change,* London: Blackwell.

Todd, E. (2011) *L'origine des systèmes familiaux Tome 1 L'Eurasie*, Paris: Gallimard.

Todd, E. (2019) *Lineages of Modernity: A History of Humanity from the Stone Age to Homo Americanus.* Cambridge: Polity Press.

Tur-Prats, A. (2019) "Family Types and Intimate Partner Violence: A Historical Perspective," *Review of Economics and Statistics*, forthcoming.

Voigtländer, N., Voth, H-J. (2006) "Why England? Demographic factors, structural change and physical capital accumulation during the Industrial Revolution," *Journal of economic growth*, 11(4): 319-361.

Weinreb, A.A. (2008) "Characteristics of Women in Consanguineous Marriages in Egypt, 1988-2000," *European Journal of Population*, 24: 185-210.

Williamson, O. (2000) "The New Institutional Economics: Taking Stock, Looking Ahead," *Journal of Economic Literature*, 38: 595-613.