KINSHIP, COOPERATION, AND THE EVOLUTION OF MORAL SYSTEMS*

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Across the social sciences, a key question is how societies manage to enforce cooperative behavior in social dilemmas such as public goods provision or bilateral trade. According to an influential body of theories in psychology, anthropology, and evolutionary biology, the answer is that humans have evolved moral systems: packages of functional psychological and biological mechanisms that regulate economic behavior, including a belief in moralizing gods; moral values; negative reciprocity; and emotions of shame, guilt, and disgust. Based on a stylized model, this article empirically studies the structure and evolution of these moral traits as a function of historical heterogeneity in extended kinship relationships. The evidence shows that societies with a historically tightly knit kinship structure regulate behavior through communal moral values, revenge taking, emotions of external shame, and notions of purity and disgust. In loose kinship societies, on the other hand, cooperation appears to be enforced through universal moral values, internalized guilt, altruistic punishment, and an apparent rise and fall of moralizing religions. These patterns point to the presence of internally consistent but culturally variable functional moral systems. Consistent with the model, the relationship between kinship ties, economic development, and the structure of the mediating moral systems amplified over time. *JEL* Codes: D00, D90.

I. INTRODUCTION

Social dilemmas pervade economic life. Be it in contexts such as public goods provision, social insurance, team production, or trade, effective cooperation produces socially desirable outcomes, yet defecting is often an individually rational strategy. This problem of cooperation is at the heart of a rich literature in economics, but it also features prominently in the neighboring social sciences, where researchers have labeled the presence of social

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dilemmas the "fundamental problem of human existence." Thus, a key question—posed, for instance, by the editors of *Science* as one of the 25 big questions facing science (Pennisi 2005)—is how societies manage to overcome this problem. Why are humans often extraordinarily cooperative even beyond close kin?

According to an influential recent body of theories in psychology, anthropology, and evolutionary biology, the answer is that humans have evolved moral systems: packages of functional psychological and biological mechanisms that regulate behavior in social dilemmas. These mechanisms are hypothesized to include (i) judgmental gods that are concerned with human morality (Norenzayan 2013); (ii) moral values related to justice, fairness, or loyalty (Haidt 2012); (iii) an intrinsic desire to punish cheaters, that is, negative reciprocity (Boyd et al. 2003); (iv) "moral emotions" of guilt and shame (Bowles and Gintis 2011); and (v) disgust emotions and associated moral demands for purity (Rozin, Haidt, and McCauley 1993). In short, this entire vector of traits that includes very different beliefs, values, emotions, and preferences is believed to have partly evolved to solve the economic problem of regulating cooperation and social insurance.

If such functional accounts are true, then why do we observe such a large variation in these mechanisms over time and across space? For example, why did a belief in moralizing deities first spread in many societies but now appears on the retreat in certain places? Why do psychologists frequently find cross-cultural heterogeneity in what is perceived as "moral" or in the emphasis people place on shame and guilt? Why do ideas related to disgust pervade some moral codes but not others? How do these moral systems interact with economic development?

This article addresses these questions by investigating the idea—often explicit or implicit in the theoretical literature–that heterogeneity in moral systems reflects the different economic needs that arise due to variation in the structure of extended family relationships (Greif and Tabellini 2017; Henrich forthcoming). Anthropologists have long noted that kinship systems differ in their tightness: the extent to which people are embedded in very large extended family networks. With tight kinship, effective cooperation is believed to take place within cohesive in-groups, while people outside the group are distrusted (Alesina and Giuliano 2013; Moscona, Nunn, and Robinson 2017a). Conversely, in loose kinship societies, people are said to enter productive interactions with strangers but do not place special emphasis

TABLE I
OVERVIEW OF MORAL SYSTEMS OVER TIME AS A FUNCTION OF KINSHIP TIGHTNESS

		Preindustrial period	Contemporary period
Domain	Characteristic	Higher or lower with loose kinship?	
Cooperation/trust	In-group favoritism	Lower	Lower
Religion	Moralizing god	Higher	Weakly lower
Moral values	Universal versus communal	Higher	Higher
Moral emotions	Guilt versus shame	Higher	Higher
Punishment	Third-party versus revenge	Higher	Higher
Emotion/value	Disgust	Lower	Lower
Economic outcomes	Income	Ambiguous	Higher

on helping the in-group. Crucially, these very basic cross-cultural differences in organizing society may be of such fundamental importance that they require different moral systems to regulate behavior.

To structure the analysis of moral systems and corresponding development outcomes as a function of heterogeneity in kinship structures, I develop a simple overlapping generations (OLG) model (loosely following Tabellini 2008). In the model, the young generation interacts in both prisoner's dilemmas (PDs) and social insurance problems. Agents are potentially endowed with universal moral values (relative to communal family-specific values) and emotions of disgust. Universal values are beneficial because they enlarge the scope of cooperation in the PDs in equilibrium. Disgust, on the other hand, serves as pathogen detection technology, where catching a pathogen leads to costs unless another agent is sufficiently universal to provide ex post social insurance. The initial stock of both universal values and disgust is 0, yet parents can expend costly effort to invest in both. Investment into a universal, impersonal morality is interpreted as raising a child to believe in a moralizing god. The setup is stylized yet has the advantage that it lends itself to a number of alternative interpretations. In particular, as illustrated in Table I and explained in Section III, I think of internalized guilt and impersonal third-party negative reciprocity as analogs of universal moral values. Conversely, I think of public shame and kinship-based monitoring through revenge taking as analogs of communal moral values. While it is arguably not obvious that all of the different values, beliefs, preferences, and emotions in Table I are related, this article's objective is to

document that they all form part of an internally consistent moral system that, in turn, depends on kinship tightness.

The key assumption in the model is that societies exhibit initial heterogeneity in the strength of extended family relationships. It is particularly interesting to compare equilibrium behavior between tight and loose kinship societies in "early" and "late" periods, which are interpreted as preindustrial and contemporary, respectively. These periods differ in that the (exogenous) economic efficiency of cooperating with strangers is assumed to be increasing over time, potentially capturing the effect of the Industrial Revolution. Thus, parents' optimal investment into their offspring's moral system is shaped by deep differences in kinship structures and current economic conditions.

Under some assumptions, this setup gives rise to the time-varying comparative statics predictions described in Table I. Initially, stronger kinship ties mean that a larger number of individuals are willing to cooperate even in the absence of universal values. As a consequence, loose societies have a higher incentive to begin teaching moralizing religion to induce a reasonably broad scope of cooperation early on. On the other hand, tight-kinship parents invest in disgust because they anticipate that if their child catches a pathogen, others outside the family would not be sufficiently universal to provide social insurance ex post.

As time passes, loose kinship societies build up an increasingly higher stock of universal values and eventually cooperate even with distant strangers. Thus, additional religious investment eventually becomes functionally redundant and ceases in the loose society. The tight society, on the other hand, exhibits the opposite pattern: as the economy undergoes exogenous technological change, broad cooperation yields increasingly higher efficiency gains, which increases the incentives of tight kinship parents to also build up a universal morality. They eventually find it optimal to start investing in moralizing religion. Therefore, in the later period, the tight kinship society is equally or more religious than the loose one. However, because the loose society started investing in moralizing religion earlier, it is still more universal. Thus, the loose society disproportionately benefits from the positive productivity shock because their accumulated universal values allow them to reap the efficiency gains of broad cooperation with strangers. These model mechanics highlight that understanding the relationship between extended family ties and societal income requires understanding the corresponding moral

systems as mediators, in particular the build-up of a universal, impersonal morality.

I investigate these model predictions by linking various cross-cultural data sets on moral variables to an anthropological index of the tightness of historical kinship systems. Based on information in the Ethnographic Atlas (EA), an ethnographic data set on the structure of 1,311 ethnic groups around the world (Murdock 1967; Giuliano and Nunn 2017a), this index measures the extent to which people in preindustrial societies were embedded in large, interconnected extended family networks. Working with a historical measure of kinship tightness allows me to study not only how contemporary moral variables vary across societies but also the dynamic evolution of some of these traits, as called for by the model.

To construct the index of kinship tightness, I rely on information on local family structures and descent systems, both of which anthropologists often use to characterize kinship systems. For these dimensions, I follow Henrich (forthcoming) in identifying two societal characteristics in the Ethnographic Atlas that reflect strong extended family networks: the presence of extended family systems and postmarital residence with parents (family structure) and the presence of lineages and localized clans (descent systems). In line with the results from a principal component analysis, I aggregate these four variables such that the score of kinship tightness loads positively on the presence of extended family systems and postmarital residence with parents as well as on the presence of lineages and localized clans.

The model assumes that societies differ in their kinship tightness for exogenous reasons. To lend credence to the idea that at least a significant part of the variation in kinship ties indeed reflects environmental characteristics, the empirical analysis begins by testing a variant of what cultural psychologists refer to as the "pathogen stress hypothesis." Following the approach by Cervellati, Chiovelli, and Esposito (2016), the idea is that a high local prevalence of pathogens makes traveling risky because it increases the risk of coming in contact with infected organisms, including disease-carrying mosquitoes. Thus, environments that are more conducive to diseases are hypothesized to induce tighter family ties because they facilitate highly localized interactions. To test this theory, I link various established measures of malaria and tsetse suitability to variation in kinship tightness across historical ethnic groups. The results show that disease suitability

explains a substantial fraction of the variation in kinship systems, including in within-Africa analyses.

Having established that family systems indeed seem to have ecological determinants, the analysis turns to studying the structure of moral systems, first across historical ethnic groups and then across contemporary societies. To further facilitate a potential causal interpretation of the results, both the historical and contemporary analysis make use of the within-country techniques that have been employed in the literature to address the most obvious forms of endogeneity concerns.

The analysis begins by considering variation across historical ethnic groups in the Ethnographic Atlas. In the data, relative to tight kinship societies, those with loose kinship ties exhibit (i) lower in-group favoritism; (ii) a higher probability of honoring a moralizing god; (iii) a lower emphasis on communal moral values; (iv) a lower emphasis on purity concerns (disgust); and (v) stronger global (as opposed to village-level) institutions. These patterns closely correspond to the mechanics of the model and suggest that the broader scope of cooperation in historical loose kinship societies was supported by belief in judgmental gods, corresponding universal values, and large-scale impersonal institutions. In a series of robustness checks, I verify that similar results hold in analyses that leverage variation across ethnic groups that reside within the same country and even within pairs of groups that occupy neighboring ethnic homelands (following Michalopoulos and Papaioannou 2013a).

Next I analyze variation across contemporary societies. To this end, I follow Giuliano and Nunn (2017a) and Putterman and Weil (2010) in matching historical populations to contemporary countries. Furthermore, the analysis exploits individual-level within-country variation (i) by linking contemporary ethnic groups in the World Values Survey to historical ones in the Ethnographic Atlas, and (ii) in analyses in the Global Preference Survey (Falk et al. 2018) and Moral Foundations Questionnaire (Graham et al. 2013) that leverage variation across migrants (Fernández 2007; Giuliano 2007).

In a series of across- and within-country analyses, ancestral kinship tightness is strongly predictive of contemporary variation in morality variables in line with the model. For example, the analysis provides suggestive evidence that the relationship between kinship tightness and belief in judgmental deities reverses relative to the historical analysis: members of loose kinship

societies are less likely to report that they believe in hell, which is arguably one of the core features of moralizing religions.

As implied by the model, the structure of contemporary moral systems is otherwise closely in line with the historical ones: societies with loose ancestral kinship ties (i) exhibit lower in-group favoritism as expressed in the difference between trust in in-group and out-group members in the World Values Survey; (ii) have more pronounced universal relative to communal moral values in the Moral Foundations Questionnaire; (iii) place a lower emphasis on notions of purity and disgust, also in the Moral Foundations Questionnaire; (iv) report stronger emotions of guilt than of shame in a cross-cultural psychological questionnaire on emotions; and (v) exhibit a higher willingness to engage in impersonal (altruistic) third-party punishment relative to direct revenge punishment in the Global Preference Survey. Again, these results hold in across- and within-country analyses. Thus, similar to the historical analysis, impersonal cooperation with strangers in societies with loose ancestral kinship ties is supported by universal values, internalized guilt, and impersonal punishment but does not rely on disgust. On the other hand, enforcement in tight kinship societies relies on psychological mechanisms like shame and communal values that correspond to localized monitoring.

In summary, a key novelty here is that a very basic aspect of differences in social organization across cultures is supported by a perhaps surprisingly broad array of psychological and biological mechanisms in a way that is arguably not obvious ex ante. In fact, I further verify that the various relationships between morality-related variables and kinship tightness indeed reflect internally consistent moral systems linked to impartial cooperation versus favoritism: when I construct a summary statistic of all moral variables, this "moral kernel" is strongly related to both kinship tightness and in-group favoritism in economic decisions.

In a final step, the analysis turns to investigating the relationship between kinship tightness and development, again motivated by the model predictions. First, prior to industrialization, ethnic group-level kinship tightness is essentially uncorrelated with proxies for local population density. Similarly, in cross-country regressions, the correlation between population density and kinship tightness prior to the Industrial Revolution is small and flat over time. These patterns suggest that tight kinship is at least not negatively associated with development in its early stages. However, beginning with the onset of the Industrial Revolution, this

relationship exhibits a sharp, sudden change, becoming strongly and significantly negative. These patterns are reminiscent of the idea that the universalizing moral systems associated with loose kinship constituted a structural advantage once technological change increasingly rewarded specialization, residential mobility, knowledge exchange in labor markets, and trade with strangers (e.g., Henrich forthcoming; Greif and Tabellini 2017; De la Croix, Doepke, and Mokyr 2018).

This article ties into the literature on family ties in economics (Alesina and Giuliano 2013; Akbari, Bahrami-Rad, and Kimbrough 2016; Bau 2016; Gorodnichenko and Roland 2017; Schulz 2016; Lowes 2017; Moscona, Nunn, and Robinson 2017a,b). The literature has established that strong family ties are related to in-group-oriented cooperation, that is, in-group favoritism, lower generalized trust, and higher in-group trust. The key distinguishing features of this article are the study of the dynamic evolution of the moral systems that maintain and enforce these patterns, highlighting that an entire vector of various conceptually different cultural traits forms an internally consistent system. In economics, moral systems have mostly received theoretical attention (Greif 2006; Tabellini 2008; Greif and Tabellini 2017), while evolutionary researchers outside of economics have long theorized about a functional role of morality (e.g., Haidt 2012; Tomasello 2016; Henrich forthcoming).[1] More broadly, this article is part of the literature that highlights the endogeneity of culture (Bisin and Verdier 2001; Alesina, Giuliano, and Nunn 2013; Doepke and Zilibotti 2014; Galor and Özak 2016; Lowes et al. 2017; Becker 2018; Michalopoulos and Xue 2018).

The remainder of the article is organized as follows. Section II explains the concepts used in this study. Section III presents a stylized model of the evolution of moral systems as a function of initial heterogeneity in kinship tightness. Sections IV and V present the data and discuss the origins of variation in kinship tightness, respectively. Sections VI–VIII study the relationship between kinship tightness and morality in historical and contemporary data. Section IX discusses the relationship between kinship tightness and development over time. Section X concludes.

1. In an article that is subsequent to mine, Schulz et al. (2018) also study the link between kinship and psychology. They replicate some of my results and shed light on the role of the Catholic Church.

II. Concepts

If only by their sheer breadth, the literature outside of economics that deals with the enforcement of human cooperation and social insurance suggests that a broad range of psychological, biological, and institutional features evolved to support a given cooperation regime. These packages of interrelated tools are sometimes referred to as "moral systems" (Alexander 1987; Haidt 2012), and I adopt this terminology.

Although a broad set of theories share the idea of a functional role of psychological and biological mechanisms, these theories are scattered across the social sciences and have not been integrated into a coherent body of theories that can be looked up in a textbook. Part of this article's contribution is to unite many conceptually related theories into one framework, but this also generates a difficulty, because the selection of variables and hypotheses is nontrivial.[2] The selection of concepts is driven by the literature. My goal is to include the most important psychological and biological moral mechanisms in the literature, conditional on these mechanisms being plausibly culturally variable.[3] Below, I describe (my understanding of) these variables in the light of recent literature. In Section III, I incorporate these mechanisms into a formal model to spell out how they depend on the structure of kinship systems. While there is no way for me to rule out that I have overlooked a key mechanism in the literature, it is perhaps helpful for transparency that the article largely builds on the writings of the following people (who probably occupy a similar position in the space of evolutionary research): Henrich (forthcoming) on kinship; Norenzayan (2013) on moralizing gods; Haidt (2012) on moral values; Tomasello (2009, 2016) and Bowles and Gintis (2003) on emotions and morality more broadly; Fehr and Gächter (2002) and Boyd and Richerson (2009) on punishment; and Rozin, Haidt, and McCauley (1993) and Tybur et al. (2013) on disgust.

2. While I highlight the role of kinship tightness throughout, this does not preclude that, in principle, evolved differences in moral systems could also feed back into the structure of kinship systems, contributing to the formation of internally consistent systems (Tabellini 2008; Greif and Tabellini 2017).

3. For example, I omit the role of social norms and empathy. There is broad agreement in evolutionary psychology that these are part of a society's moral system (Tomasello 2009, 2016), yet this insight is not helpful here because the type of social norms and empathy will arguably depend on the kinship system.

II.A. Moralizing Gods

Cultural psychologists, anthropologists, historians, and scholars of religious studies routinely emphasize the importance of religious practices and beliefs in sustaining cooperation. In this context, moralizing gods are believed to play a key role (Norenzayan 2013; Norenzayan et al. 2016). A god is said to be moralizing if they are concerned with and supportive of human morality by, for example, punishing wrongdoing or rewarding prosocial behavior. The notion that a god is judgmental is often implicit in contemporary discussions because—mostly due to the spread of the Abrahamic religions—today, a large majority of people live in societies that honor a moralizing god. Historically, however, this was not the case. Animistic religions, for example, usually featured gods that were not particularly interested in the actions of humans.

II.B. Communal versus Universal Moral Values

Moral and evolutionary psychologists argue that human morality—people's beliefs about "right" and "wrong"—partly evolved to solve social dilemma problems (e.g., Haidt 2012; Greene 2014; Tomasello 2016). Moral foundations theory (MFT, Graham et al. 2013), a particularly influential recent line of work in moral psychology, asserts that moral values consist of two structurally different types. First, some values are said to reflect "universal" impersonal principles, such as fairness, individual rights, and justice. These principles emphasize the welfare of all individuals in society equally. Second, morality is said to also include "communal" or "relational" values (such as in-group loyalty or the moral relevance of betrayal and respect) tied to particular groups or relationships.[4] Such communal values constitute a form of particularist morality, according to which the application of moral principles depends on context, including notions of us and them. Recent work has shown that the distinction between these two types of moral values is predictive of voting behavior and in-group favoritism in donations and volunteering (Enke 2017).

II.C. Emotions: Shame, Guilt, and Disgust

Evolutionary researchers routinely point to the importance of emotions in regulating behavior. Psychologists and

4. Haidt (2012) refers to these values as "individualizing" versus "binding."

anthropologists have long used the terms "shame" and "guilt" cultures (Benedict 1967; Bowles and Gintis 2011) to point out that societies inculcate different emotional responses to wrongdoing into their children. In this terminology, *guilt* refers to an emotion that is internalized and can be evoked even when nobody knows about the event. Shame, on the other hand, is called the "public emotion" and is evoked in front of others. Because emotions have partly distinct physiological consequences, cultural differences in emotions suggest a coevolution of psychology and certain aspects of biology (Sapolsky 2017).

Researchers have also pointed out cultural variability in demands for purity and the associated feelings of disgust. These are widely believed to reflect an evolutionary response to motivate the avoidance of contact with disease-causing organisms (Tybur et al. 2013). According to this argument, adverse low-level biological responses reflect warning signs against, for example, certain animals, rotten food, feces, vomit, and, in the sexual domain, sex after birth or during menstruation (because they are associated with exposure to bodily fluids). While disgust is usually classified as an emotion, a recent literature has pointed out that disgust-evoking behaviors are often moralized so that people also express moral values related to purity (Rozin, Haidt, and McCauley 1993).

II.D. Monitoring and External Punishment: Negative Reciprocity and Institutions

Many researchers have emphasized the role of negative reciprocity in sanctioning wrongdoings (e.g., Fehr and Gächter 2002; Boyd et al. 2003). The most important conceptual distinction here is that between second-party (revenge) and third-party (altruistic) punishment. Second-party punishment refers to direct revenge-taking by the victim or community. Conversely, altruistic punishment describes behavior for which people are willing to incur personal costs to punish wrongdoing, even if they did not personally suffer from the misconduct, and are an unrelated stranger. In this sense, in contrast to revenge taking, altruistic punishment is (often) an impersonal universalizing concept.

Conceptually similar to the distinction between impersonal and personal negative reciprocity is that between large-scale (impersonal) and local institutions. Institutions have long been recognized as critical for enforcing cooperation, and supratribal institutions in the EA have been shown to be related to

development outcomes (Gennaioli and Rainer 2007; Michalopoulos and Papaioannou 2013a,b). The distinction between local and large-scale institutions has received less attention. Local institutions operate at a group level, sanction wrongdoing within the group and are conceptually similar to revenge taking. Impersonal global institutions, on the other hand, universally sanction wrongdoing regardless of whether it took place within or across groups (note the correspondence to the unrelated bystander in the case of altruistic punishment).

II.E. Prior Evidence Outside of Economics

While researchers outside of economics have theorized about the structure and evolution of moral systems, empirical evidence is relatively scarce, in particular on the relationship between moral systems and kinship ties. Online Appendix B discusses the nature of the evidence on the concepts discussed above.

III. Model

III.A. Setup

This section presents a purposefully simple, stylized model to structure and motivate the empirical analysis. The purpose here is to transparently spell out how cooperation and social insurance problems might depend on kinship tightness and how psychological variables such as moral values or disgust mediate this relationship, evolve over time, and affect economic development. The model has the following key ingredients:

(i) Agents live on a circle on which distance reflects "familial distance," which is biological in nature. To capture the relationship between kinship and cooperation, agents play prisoner's dilemmas (PDs) with each other, where more distant matches are more efficient. Agents decide with whom they are willing to play the PD and whether to cooperate or defect in a given game.
(ii) Agents internalize the material payoffs of their match. To capture the trade-off between universal and communal moral values, agents care more about those that are close to them unless their parents invest in universal moral values by raising the child to believe in a moralizing god.
(iii) Apart from playing the PD, agents can contract a disease from a pathogen. Here, parents can invest in their

children's disgust as a detection technology that prevents them from getting sick.

(iv) We consider two societies (loose and tight) that only differ in the distance at which they (subjectively) still consider others "family" and hence fully internalize their welfare. Our interest is in how behavior in the games described above varies both across the tight-loose kinship dimension and over time.

More specifically, the model builds on Tabellini (2008).[5] The economy is populated by symmetric individuals who are uniformly distributed on the circumference of a circle of size 2, so that the maximum distance between any two agents is 1. Distance on the circle reflects biological distance. For example, the distance between two second-degree cousins is larger than that between two cousins.

In the model, the unit of interest is a society rather than an individual. I consider two societies, one with loose and one with tight kinship. These societies operate on separate but identical circles. That is, the definition of familial (biological) distance is constant across the two societies. The societies only differ in the distance d_f within which they still consider people members of their "family." Thus, d_f is not a biological parameter but instead captures individuals' subjective notion of what constitutes family. For reasons that will become obvious in Section V, we could also think of d_f as partly reflecting the level of pathogen threat in society.

We assume $d_f^{tight} > d_f^{loose} = 0$. Thus, each agent in a tight kinship society considers a strictly positive mass of the society "family," while agents in a loose kinship society do not. This assumption might reflect either of two stylized facts about tight kinship societies (see the discussion in Section IV): tight kinship societies could have a larger notion of the family, or, for a fixed notion of size, they could feel closer to a larger number of family members. Neither the model nor the empirical analysis is intended to distinguish between these alternative interpretations.

We consider an overlapping generations model with periods $t = 0, \ldots, T$. To map the model into the empirical analysis, our primary interest will be to compare equilibrium behavior across

5. See Bisin and Verdier (2001, 2017) for other canonical dynamic models in this literature.

TABLE II
PRISONER'S DILEMMA

	C(ooperate)	D(efect)
C(ooperate)	$x + g_t, x + g_t$	$-w + g_t, x + w + g_t$
D(efect)	$x + w + g_t, -w + g_t$	$0 + g_t, 0 + g_t$

the loose and tight societies in periods e and z, with $e \leqslant \bar{e} < z < \bar{z}$ (see Online Appendix C). I think of $t = e$ as preindustrial and $t = z$ as contemporary period. Each individual lives for two periods. When young, they (i) play a PD with another agent and (ii) take an individual decision in a social insurance context. When old, they educate the next generation.

1. Prisoner's Dilemma. Material payoffs in the PD in period t are summarized in Table II. Here, $x > 0$ and $w > 0$ are standard PD parameters. In addition, material payoffs include an efficiency gain g_t, which depends on the distance between agents: $g_t = \beta_t \times d_{i,j}$. The interpretation is that people from similar backgrounds share similar skills, so more distant matches imply a higher efficiency gain.[6] β_t is a time-varying efficiency parameter that makes broad cooperation increasingly efficient and can be interpreted as exogenous technological change. Note that g_t is added to each payoff cell in the PD and is hence strategically irrelevant for the decision whether to cooperate or defect. However, as we will see, g_t will affect parental investment in their children's values. For simplicity, we assume that $\beta_t = \beta_e > 0$ for all $t \leqslant \bar{e}$ and $\beta_t = \beta_z > \beta_e$ for all $t > \bar{e}$. This productivity shock then separates the "preindustrial" from the "contemporary" period and can be thought of as an analog of the Industrial Revolution.

Each agent is matched with exactly one agent to play the PD with. Unlike in the model of Tabellini (2008), where agents are matched randomly, in the present model agents have a choice with whom they are willing to play the PD, which determines the set of social relationships in society. At one extreme, agents could decide to only be matched with family members; at the other extreme, they could be willing to be matched with anyone in society.

6. g_t also affects payoffs in case both players defect. For example, if two agents agree to barter rice against wheat, both might supply less than originally agreed on (i.e., defect) but more than an otherwise identical agent at a smaller distance would have delivered given the smaller comparative advantage.

Formally, each agent determines a threshold distance $d^*_{i,t}$ (based on payoffs defined below) within which they are willing to play a PD with an agent. Later, I interpret $d^*_{i,t}$ as the scope of cooperation and trust in society. Agents are then matched to create maximum efficiency gains, conditional on the distribution of $d^*_{i,t}$. Because all agents are symmetric and we only consider symmetric equilibria, this implies that agents get matched at $d^*_{i,t}$. As discussed below and shown in Online Appendix C, in equilibrium, agents will choose the cutoffs $d^*_{i,t}$ such that both players decide to cooperate if and only if their distance is weakly below the cutoff. After being matched, agents pick $a^*_{i,t} \in \{C, D\}$.

Denote agent i's material payoffs by y_i. Apart from caring about their own material payoffs, agents potentially internalize the welfare of their matching partner. An agent weighs the payoffs of their match by their generic level of altruism $\gamma > 0$ (which is not match specific) and by how close the other agent is in familial terms. If the match lives far on the circle, an agent's concern for their match's welfare is lower, yet the sensitivity of altruism to distance depends on how pronounced the agent's universal moral values $\theta_{i,t}$ are: the more universal an agent's morality, the less he cares about distance in internalizing other agents' payoffs. Thus, $\theta_{i,t}$ is not about the level of prosociality but about its gradient as a function of distance. Specifically, the utility of child i who is born in period t from playing the PD with j is given by

$$U^C_{i,t,PD}(\theta_{i,t}) = y_i + \gamma y_j[1 - \mathbb{1}_{d_{i,j}>d_f} d_{i,j}(1 - \theta_{i,t})]. \tag{1}$$

If $d_{i,j} \leqslant d_f$ so that people consider each other family, we have $\mathbb{1}_{d_{i,j}>d_f} = 0$ and the agent fully internalizes the welfare of the other player with weight γ. On the other hand, if people do not belong to the same family, the extent to which i internalizes j's material payoffs declines as a function of distance on the circle, but this effect depends on $\theta_{i,t} \in [0, 1]$: the larger $\theta_{i,t}$, the more insensitive is an individual to distance. For example, if $\theta_{i,t} = 1$, an agent cares about all other agents to the same extent and therefore has a fully impersonal sense of morality; $\theta_{i,t}$ then measures the relative importance of universal over communal values. Later, I discuss how $\theta_{i,t}$ can be interpreted in other ways. We assume that the initial stock of universal values in society is 0; however, $\theta_{i,t}$ is amenable to parental investment. Children maximize equation (1) by first picking the threshold distance $d^*_t(\theta_{i,t})$ and then $a^*_t(d_{i,j}, \theta_{i,t})$.

Notice how this setup implies that, from a static perspective, the tight kinship society has favorable initial conditions because agents fully internalize the welfare of a strictly positive mass of other agents even without investment in universal values ($d_f^{tight} > d_f^{loose}$). Thus, in the absence of universal values, the socially efficient strategy (cooperate) is more likely to be played at distance $d_{i,j} > 0$ in the tight society, allowing for larger efficiency gains to be reaped.

2. Individual Decision Problem and Social Insurance. After having played the PD, an agent encounters a situation in which they need to take one of two actions, such as a decision about eating or not eating a certain food item. One of the two options leads to a normalized payoff of 0, but the other one implies exposure to a pathogen, which makes the agent sick. An individual does not necessarily have a way of determining which of the options is harmful. However, the individual potentially has access to an emotion of disgust, which is an intuitive warning sign. Disgust $\lambda_{i,t}$ is built up through parental investment and is initially 0. In the absence of disgust, the individual chooses randomly between the two options, with q the probability of choosing the pathogen good. The stronger an agent's disgust, the more likely they are to recognize which good is infested, so that the overall probability of choosing the harmful good is $(1 - \lambda_t)q$.

If an agent becomes sick, they suffer from disutility $-k$ unless another agent is willing to expend effort $v < k$ to help them (social insurance). Helping reduces k to 0. Since $v < k$, helping is socially efficient. Agent i can only help j if $d_{i,j} \geqslant d_g$, which captures the idea that those living nearby might also be affected by the disease. In deciding whether to help j, agent i evaluates the situation according to the utility function in equation (1). We assume that $d_g^{tight} = d_g^{loose} > d_f^{tight}$, that is, d_g is identical across societies but sufficiently large so that the family can never help a sick agent (otherwise the problem would be trivial). Thus, agents will only help others if their universal values are sufficiently high. In summary, agent i's utility from the decision problem is given by

$$U_{i,t,IDP}^{C}(\lambda_{i,t}, \theta_{-i,t}) = -q(1 - \lambda_{i,t})k\mathbb{1}_{v_{-i}=0}, \tag{2}$$

where $\mathbb{1}_{v_{-i}=0}$ is an indicator that takes the value 1 if no agent j is willing to help if i is sick. To keep the setup simple, the

individual decision problems occur sequentially across agents and are independent from each other. The assumptions stated above have the relatively immediate implication that disgust will be higher in tight kinship socities. The reason is that I assume that the family cannot help sick agents, but since in a tight society (with initially endogenously low θ_t) only the family would be willing to help, this means that parents need to invest in disgust to prevent their child from suffering utility losses.

Although the model motivates investment in disgust through an ex post social insurance problem, an alternative approach (with almost identical implications) would be to assume that if an agent gets sick, he infects everyone who lives sufficiently close and internalizes this externality. Then, tight kinship societies would place a higher emphasis on disgust because they have higher altruism towards the immediate family and would therefore want to prevent the disease from spreading to the entire kin group.

3. Parental Investment. In period t, each parent has one offspring who inherits $\theta_{i,t-1}$ and $\lambda_{i,t-1}$. That is, values do not depreciate over time. Additionally, a parent can invest in both $\theta_{i,t}$ and $\lambda_{i,t}$. Specifically, $\theta_{i,t} = \theta_{i,t-1} + h_t$, where $h_t \in \{0, h\}$ and h is "small" (i.e., a society cannot become fully universal quickly). Likewise, $\lambda_{i,t} = \lambda_{i,t-1} + m_t$, where $m_t \in \{0, m\}$ and $m < 1$.

I interpret parental investment into $\theta_{i,t}$ as raising their child to believe in a moralizing god. This interpretation seems valid in that moralizing religious teachings are often highly universalistic. Thus, in the model, moralizing religion corresponds to increasing the stock of universal values rather than the stock of moral values as such. Note that this simplified binary religious education decision need not necessarily be interpreted as moralizing god versus not religious but could capture different strengths of religious belief, or different degrees to which the respective religion is morally universalizing or inculcates internalized guilt (see below). For example, psychologists and anthropologists have argued that Christianity, particularly Protestantism, places a higher emphasis on guilt than Islam. In deciding whether to invest, parents maximize their utility U^P, which is given by the child's indirect utility (value function) minus costs of investment:

$$\max_{h_{i,t}, m_{i,t}} \; U^P_{i,t} = U^C_{i,t,PD}[\theta_{i,t}, d^*_{i,t}(\theta_{i,t}), a^*_{i,t}(\theta_{i,t}, d^*_t(\theta_{i,t}))] + U^C_{i,t,IDP}(\lambda_{i,t}, \theta_{i,t}) - c_\theta h_{i,t} - c_\lambda m_{i,t}. \tag{3}$$

Intuitively, this means that parents think through how their investment in universal values affects the equilibrium choices of $a^*_{i,t}$ and $d^*_{i,t}$, such as their child having access to a more efficient cooperation match if they invest in universal values.

4. Timeline. The timeline of the model within each period is as follows.

(i) Child is born and inherits $\theta_{i,t-1}$ and $\lambda_{i,t-1}$ from parent.
(ii) Parent picks $h^*_{i,t}$ and $m^*_{i,t}$ to potentially invest in their child's values $\theta_{i,t}$ and $\lambda_{i,t}$; child observes their own and everyone else's values.
(iii) Child picks distance $d^*_t(\theta_{i,t})$ within which they are willing to be matched in the PD.
(iv) Child gets matched at $d^*_t(\theta_{i,t})$ and plays $a^*_t(d_{i,j}, \theta_{i,t}) \in \{D, C\}$.
(v) Sequence of individual decision problems: child potentially catches pathogen; others decide whether to help.

III.B. Model Predictions

PREDICTION I. Fix periods e and z such that $e \leqslant \bar{e} < z < \bar{z}$. Under the parameter conditions discussed in Online Appendix C, in the symmetric Pareto-dominant subgame-perfect Nash equilibrium:

(i) In both periods:
  (a) The scope of cooperation d^*_t is larger in the loose than in the tight kinship society.
  (b) The loose kinship society has a higher stock of universal moral values θ_t.
  (c) The loose kinship society has a lower stock of disgust λ_t.
(ii) The tight society does not believe in a moralizing god (i.e., does not invest in universal values h^*_t) in $t = e$ but does believe in $t = z$. The loose society believes in $t = e$ but only believes in $t = z$ if $z < z'$.
(iii) The sign of the income difference between a loose and tight society is ambiguous in $t = e$; in $t = z$, the loose society is richer.

These predictions are also summarized in Table I. A detailed solution of the model is provided in Online Appendix C. Online Appendix C, Figure 5 illustrates the key patterns by calibrating

the model. The intuition behind the equilibrium is as follows. In terms of initial conditions ($t = 0$), the tight kinship society exhibits an advantage because the larger definition of the family implies that—in the absence of universal values—agents in the tight society cooperate at larger distances and hence reap larger efficiency gains. In $t = e$, investing in universal values therefore has a larger payoff for the loose society than for the tight one because, in the tight society, a one-time investment in universal values might increase the equilibrium distances of cooperation only by a very small amount relative to the distances implied by cooperating with family members. Because of these differential incentives, if β_e is not too large, only the loose society invests in moralizing religion h^* and develops a broader scope of morality. This initial difference in investment is important because, as shown in Online Appendix C, the model endogenously exhibits a type of strategic complementarity in investments in universal values over time: the efficiency gains of cooperating broadly are convex in $\theta_{i,t}$ (this is an outcome of the model). Thus, once the loose society has invested, it will keep investing until it is sufficiently universal to cooperate even at maximum distances. At this point, investment ceases and religiosity drops to 0.[7] This prediction of the model parallels qualitative theories about the evolution of prosocial religions outside of economics, which argue that investments in moralizing religions become functionally redundant once society has internalized universal moral values (Norenzayan et al. 2016).

Because the loose society is more universal, parents have lower incentives to invest in disgust because they anticipate that even if their child gets sick, other members of society will be sufficiently universal to be willing to help them. Finally, in terms of per capita income, in $t = e$, either the loose or tight kinship society might be richer. On the one hand, the loose society reaps larger efficiency gains in the PD; on the other hand, the tight society saves the costs of religious investment.

In $t = z$, the efficiency gain of cooperating broadly increases. If β_z is sufficiently large, the tight society finds it optimal to also invest in universal values, that is, to become religious. If the efficiency increase occurs sufficiently late ($z \geqslant \bar{z}$), the loose society

7. In its extreme form, this result is partly driven by the assumption that moral values do not depreciate. If values depreciate, religiosity will not be constant at 0, but it will still be weakly lower in the loose kinship society.

has already stopped investing in religion. Thus, in $t = z$, the tight society is weakly more religious than the loose one but has not yet developed the same level of universal values.

In terms of income, because the loose society has built up a higher stock of universal values, cooperation is more efficient so that the loose society is richer than the tight one. This prediction resonates with arguments about how the universal, impersonal morality of loose kinship confers increasing "advantages" as trusting strangers and cooperating broadly (e.g, trade, knowledge transfer in labor markets, residential mobility) imply higher efficiency gains due to technological change (e.g., Henrich forthcoming; De la Croix, Doepke, and Mokyr 2018; Greif and Tabellini 2017). In terms of the empirics, I think of $t = e$ as a preindustrial and $t = z$ as a contemporary period, where the productivity increase $\beta_z > \beta_e$ could reflect the Industrial Revolution. In terms of the model mechanics, note that the fact that β_t is assumed to increase over time is necessary but not sufficient to generate the result that the loose society ends up being richer than the tight one. The increase in β_t only generates differential income trajectories across societies because of the endogenously different investment decisions about θ_t.

Finally, note that the model clarifies that the ultimate unit of analysis is a society, rather than an individual. For instance, if an agent in the tight society suddenly developed loose kinship, this would not necessarily make them richer because the distant efficient tight kinship matches would still be unwilling to cooperate with him.

III.C. Alternative Interpretations of the Model

Similar to Tabellini (2008), the model assumes that individuals always internalize the welfare of members of their kin group (or more generally those that are close on the circle), which reflects values of loyalty to the kin group or local community. However, slightly less literal interpretations suggest that the model can also be understood through the lens of the other variables that are the object of interest in the empirical analysis, that is, emotions of shame versus guilt as well as punishment patterns through institutions or negative reciprocity.

First, given that within a kin group people know each other and interactions are localized, internalizing the welfare of those with small familial distance can also be understood as avoiding the

public shame of not internalizing (since not internalizing would result in defecting in the PD). According to this interpretation, agents internalize the welfare of those that are far away less because public shaming matters less in front of strangers.

Second, in the model, agents have lower utility if their kin group members have lower payoffs. This assumption could also reflect the idea that agents would have lower utility if they defect in a prisoner's dilemma game with a kin group member (so that the kin group member has lower payoffs) because defecting would yield immediate punishment due to the localized, repeated interaction. This punishment could take one of two forms: (i) it could happen through revenge punishment by the matching partner in the PD (negative reciprocity); or (ii) it could be carried out by the local community through village-level institutions. According to this interpretation, agents internalize the welfare of those who are far away less because the risk of getting punished through local revenge taking is lower. This interpretation highlights the differential role of monitoring in loose and tight societies: in tight societies, direct monitoring through the family is feasible because interactions are highly localized, thereby facilitating revenge punishment.

Just as internalizing the welfare of kin lends itself to various interpretations, so does θ. According to the most direct interpretation, individuals adhere to universal impersonal moral values that mandate the "right" behavior, irrespective of who the "other" is. Similarly, however, θ can also be understood as internalized guilt that metes out internal punishment even in anonymous one-shot interactions.

Finally, akin to the discussion of revenge taking above, θ can be understood as the risk of impersonal third-party punishment, either by unrelated bystanders (negative reciprocity as altruistic punishment) or through large-scale institutions. These third-party punishment interpretations appear justified because in the equilibrium of the model, all agents will have the same level of θ. A possible interpretation of parental investments into θ is therefore that they reflect investments into institution building or into people's willingness to engage in altruistic punishment. Note that these interpretations are consistent with the functional form in the utility function because if $\theta = 1$ (people are willing to engage in altruistic punishment, or global institutions are well developed), agents derive disutility even from defecting in PD's with agents that live very far away because they still get punished. Under this

interpretation, θ captures the importance of punishment (institutions) above the local level *relative* to punishment (institutions) at the local level.

In summary, to capture θ, the empirical analysis considers (i) moral values, (ii) guilt versus shame, (iii) altruistic versus revenge punishment, and (iv) global versus local institutions.

IV. Data

IV.A. Kinship Tightness

1. Ethnic Group-Level Data. The economics literature on the family and related concepts has mostly relied on a measure of family ties (Alesina and Giuliano 2013) and Hofstede's individualism variable (Gorodnichenko and Roland 2017). For the present purpose, both variables are suboptimal because they reflect contemporary country-level variation. In contrast, the model and empirical analysis will be explicitly dynamic and include analyses across historical ethnic groups. In addition, Alesina and Giuliano's variable of nuclear family ties is conceptually distinct from anthropologists' concept of extended kinship ties that I intend to capture here.

Thus, without any claim for superiority or inferiority, I develop a new measure of historical kinship tightness that allows for both historical and contemporary analyses. The measure is based on variables in the Ethnographic Atlas (EA), a data set that contains detailed information on the living conditions and social structures of 1,265 ethnic groups prior to industrialization (Murdock 1967). The EA is arguably the leading collection of anthropological knowledge on historical ethnic groups. Murdock constructed the data by coding ethnicities for the earliest period for which ethnographic data are available or can be reconstructed from written records. Following work in ethnography, Giuliano and Nunn (2017a) extended this data set to include an additional 46 ethnic groups, broadening coverage in Europe.

In the data, the average year of observation is 1900, but even for those groups for which information was sampled during the twentieth century, the data are meant to describe living conditions prior to intense European contact or industrialization.[8]

8. I exclude one group from the EA (the Babylonians) because the year of observation is 2000 BC, more than 4,000 years ago.

The EA contains information on the mode of subsistence, family structure and community organization, religious beliefs, language, and institutions, among others. In fact, for a subset of 186 ethnicities—the so-called Standard Cross-Cultural Sample (SCCS)—very detailed ethnographic information on local customs and beliefs is available.[9]

My goal is to develop an index of kinship tightness that captures the extent to which people are interconnected in tightly structured, extended family systems. This article follows the discussion in Henrich (forthcoming), which in turn is similar to the textbook treatments by Parkin (1997), Haviland (2002), and Schultz and Lavenda (2005). At a broad level, dimensions of kinship can be partitioned into family structure and descent systems. For each of these categories, I follow Henrich (forthcoming), who identifies two variables in the EA that measure the extent to which family structure and descent systems induce strong extended family networks. Online Appendix A provides all details of the underlying coding procedure and histograms for each variable.

(i) Family structure
   (a) *Domestic organization.* In the discussion of kinship ties, a key distinction exists between independent nuclear versus extended families. Living in extended family systems is considered an indication of the presence of large interconnected family networks. I generate a binary variable that equals 1 if the domestic organization is around independent nuclear families and 0 otherwise (Q8 in the EA).
   (b) *Postwedding residence.* Postmarital residences vary widely across cultures. Anthropologists argue that strong kinship ties are indicated by social norms that prescribe residence with the husband's (or wife's) group. Weak kinship ties, on the other hand, are indicated by couples living either by themselves or flexibly, with either the wife's or the husband's group. Accordingly, I generate a variable that equals 1 if the wife is expected to move in with the husband's group or vice versa, and 0 otherwise (Q11).

9. Murdock assembled the EA by relying on the records of different ethnographers, so that his own predispositions are unlikely to be a major source of bias in the data set. In addition, many of the theoretical developments that link social structure to enforcement devices took place relatively recently; as such, they are unlikely to have affected ethnographers' perceptions during the time of coding.

(ii) Descent systems

(a) *Lineages.* Descent groups are defined by people's ancestry. A descent system's defining characteristic is whether it features unilineal or bilateral descent. Unilineal descent systems track descent primarily through one line (maternal or paternal) as opposed to through both lines. A lineage (unilineal descent group) is thus a group of people who can trace the links uniting them back to a known common ancestor, alive or dead. Such groups are typically much larger than Western notions of what constitutes "family" and can include more than 1,000 people. Unilineal descent systems are said to induce particularly strong and cohesive in-groups because they make people feel close to a particular part of their family. In contrast, bilateral descent systems are ego-oriented. This means that people trace descent through both lines, so that everybody relates to a different family. For example, in a unilineal male descent system, the children of two brothers belong to the same lineage, yet they have different families in a bilateral system because they also partly associate with the mother's side of the family. Bilateral systems are believed to prevent the build-up of extended tight linkages because they potentially induce loyalties to two different families that only partly overlap. I construct a variable that equals 1 if descent is bilateral, and 0 otherwise (Q43).

(b) *Segmented communities and localized clans.* When lineage systems become too large to be traceable and memorized, they split into new, smaller lineages. In such cases, people across lineages often continue to recognize their "broad relatedness" even though they could not describe the specific path that connects them. Such systems are called clans. Clans serve an important function in building up very large extended family networks because they allow very distantly related people to feel connected. Clans may be more or less closely interconnected, partly depending on whether they determine geographical residency as opposed to being geographically dispersed. Accordingly, I code a variable that equals 1 if people are part of localized clans that live as segmented communities—such as in clan barrios—and 0 otherwise (Q15).

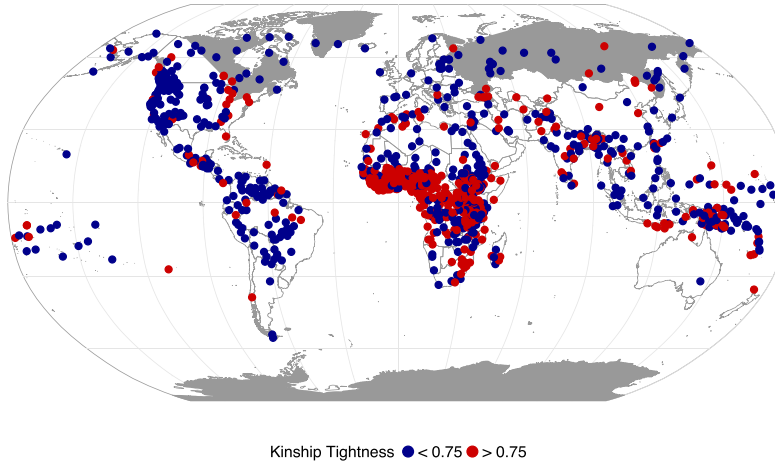

FIGURE I

Distribution of Kinship Tightness Index in the Ethnographic Atlas

To aggregate these four dimensions of kinship, I compute the unweighted average of all four binary variables, where I work with those ethnic groups for which at least three of the four variables are available:

$$\text{Kinship tightness} = \text{Ave. (Extended family, joint residence, unilineal descent, clans)}$$

The unweighted average has the appealing property that it closely corresponds to the results of a principal component analysis: the first principal component loads positively on extended families (weight 0.37), joint residence (0.46), unilineal descent (0.58), and the presence of segmented communities/clans (0.56). Thus, the index corresponds both to the structure of the data and anthropological notions of tight kinship. The resulting kinship tightness index (KTI) is normalized to be in [0, 1]. Figure I (color version available online) depicts the distribution of the KTI at the level of 1,227 historical ethnic groups.

2. Matching to Country Level. The literature has proposed two methods to match historical data to contemporary country-level populations. First, the ancestry-adjustment procedure of Putterman and Weil (2010) relies on a migration matrix that,

for each contemporary country, provides the population shares that descend from a given country of origin. Applying their technique to the present context requires averaging kinship tightness across all ethnic groups in the EA that reside within (contemporary) country borders and then matching these historical averages to contemporary populations.

Second, Giuliano and Nunn (2017a) propose a language-based matching (ancestry-adjustment) method. Here, contemporary populations are related to their ancestors in the EA through the language they speak. To illustrate, if the Ethnologue project reported that 80% of all U.S. residents spoke English and 20% Spanish, then the country-level score for the United States would consist of the weighted average score of those ethnic groups in the EA whose languages are closest to English and Spanish in the Ethnologue language tree.

Given that both methods have been successfully applied (but probably contain some measurement error), I combine the two approaches. In particular, whenever both approaches allow classification of at least 80% of the population, I average the two ancestry-adjusted values. Whenever only one approach allows me to classify at least 80% of the population, I use that approach. If neither approach allows me to classify at least 80%, the country value is missing. Online Appendix A provides additional details on the procedure and a map of the country-level distribution of ancestral kinship tightness.

3. Cross-Validation. The historical measure of kinship ties is novel and hence difficult to validate in detail. Still, two cross-validation exercises—one at the ethnic group and one at the country level—deliver encouraging results. First, by constructing a novel data set of folklore, Michalopoulos and Xue (2018) inter alia report that words related to family (and family members) show up significantly more often in the folklore of ethnic groups in the EA that have extended family households. Second, at the country level, ancestral kinship tightness exhibits a correlation of $\rho = 0.37$ with the contemporary strength of nuclear family ties (Alesina and Giuliano 2013).

IV.B. Levels of Analysis

The analysis leverages variation (i) across historical ethnic groups in the EA; (ii) across contemporary countries; (iii) across

contemporary individuals from different ethnic groups in the same country; and (iv) across (second-generation) migrants. The data for (i) and (ii) have already been discussed.

For (iii), I match respondents in the World Values Survey (WVS) to their ethnic group in the EA and assign them their ancestral kinship tightness score. While the ethnicity data in the WVS are often very coarse, 111 ethnic groups in 41 countries were described in sufficient detail for me to be able to match a total of 45,958 respondents to their ancestors in the EA. Thus, I can investigate the relationship between ancestral kinship tightness and respondents' trust or values by exploiting variation across contemporary ethnic groups within countries.

For (iv), I use the epidemiological approach and exploit variation in an individual's ancestral kinship tightness (from the country of origin), holding constant the current country of residence (Fernández 2007; Giuliano 2007). For this purpose, I work with information on second- and first-generation migrants in the European Social Survey (ESS), Global Preference Survey (GPS; Falk et al. 2018), and Moral Foundations Questionnaire (Graham et al. 2013). In these analyses, I restrict the sample of respondents to migrants and assign them the (average) kinship tightness score of the countries of birth of the parents (in the case of second-generation migrants) or of their own country of birth (in the case of first-generation migrants). This again allows an exploration of within-country variation in kinship tightness and moral variables.

V. On the Origins of Variation in Kinship Tightness

The model viewed cross-societal differences in kinship ties as primitive. To bolster this assumption, this section investigates the ecological and evolutionary determinants of kinship tightness. Specifically, I study (i) how kinship tightness evolved as societies transitioned from hunter-gatherer to agricultural or pastoral subsistence, and (ii) which ecological factors generate variation in kinship tightness conditional on subsistence mode.

V.A. Hunter-Gatherer versus More Advanced Subsistence Modes

Until recently, it was widely believed that tight kinship is an evolutionarily very ancient phenomenon, generated by the long human tradition of living in small hunter-gatherer groups.

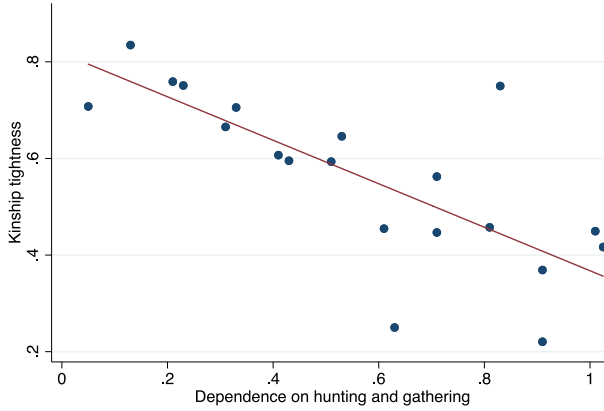

FIGURE II

Kinship Tightness and Hunter-Gatherer Subsistence

Bin scatter plot between kinship tightness and the extent to which the respective ethnic group subsisted on hunting and gathering (0–10) across ethnic groups in the EA.

However, this perspective has recently been overthrown. For example, small-scale anthropological studies show that hunter-gatherers predominantly reside with genetically unrelated individuals, flexibly form new groups, and have generally weak extended family ties (e.g., Blumberg and Winch 1972; Hill et al. 2011; Walker 2014). In contrast, as summarized by Gowdy and Krall (2016), more advanced production modes in agriculture and animal husbandry are believed to be characterized by stronger kinship ties. The reason is that sedentary agriculture or tending animals require medium-scale cooperation for the purpose of, say, harvesting crops under time pressure, building irrigation systems, or defending territory. Anthropologists argue that the resulting collective action problems can be overcome in large extended families. Figure II shows that in the EA data, ethnic-group-level kinship tightness is indeed strongly decreasing in the fraction of subsistence that is based on hunting and gathering ($\rho = -0.37$).

V.B. Pathogen Stress

While the strong relationship between kinship tightness and hunter-gatherer subsistence is informative about the trajectory of extended family ties over the course of human history, it is unhelpful in determining the origins of more recent

large-scale variation in kinship tightness, say, between Africa and Europe, or even within Africa, because the vast majority of contemporary humans descend from agricultural or pastoral societies.

In a series of articles, Fincher et al. (2008) argue that strong in-groups (of which tight kinship groups are an important case) are a result of pathogen threat. The idea is that under high pathogen threat, strong localized extended family ties are beneficial because they reduce the need to travel for cooperation and trade, and therefore minimize the risk of being exposed to infectious mosquitos that can only cover limited travel distances (also see Fogli and Veldkamp 2012). To see this, compare a tight kinship society as modeled in Section III (in which lots of highly localized interactions take place) with a loose kinship society, in which people leave their location to find an efficient cooperation partner. The geographical mobility that is implied by such travel increases the probability of being exposed to a disease.

Based on this and related ideas, Cervellati, Chiovelli, and Esposito (2016) study the determinants of ethnic fragmentation. They document that malaria stability is strongly negatively predictive of the size of historical ethnic groups, of the number of ethnic groups in contemporary villages, and ethnic endogamy.

This article takes this analysis a step further by considering the relationship between pathogen threat and the structure of extended family systems, as opposed to the size of the ethnic group (conditional on not being a hunter-gatherer society, community size and kinship tightness are uncorrelated in the EA, see Section IX). Thus, this article links kinship tightness to pathogens (i) across historical ethnic groups in the EA, (ii) by using predicted data on two pathogens that have received attention in the recent economics literature: malaria and the consequences of the tsetse fly (sleeping sickness and death for livestock). Given the distribution of kinship tightness visualized in Figure I, it is of interest to note that both of these pathogens predominantly or exclusively appear in Africa.[10]

10. Online Appendix D.2, Table 1 presents correlations between kinship tightness and a range of other societal characteristics including crop suitability, dependence on agriculture and animal husbandry, temperature, precipitation, distance from the equator, longitude, gender roles, and inheritance rules. The only robust correlations are with patrilineal inheritance, which is probably unsurprising given that lineages and clans are usually organized around patrilineal descent rules.

The analysis is based on three well-established measures of such pathogen threat: (i) the malaria stability index of Kiszewski et al. (2004), which is based on climatic factors and the dominant vector species to give an overall measure of how congenial the environment is to the spread of malaria; (ii) the shortest distance to one of the geographical origins of the sickle cell mutation, which provides resistance against malaria and is hence a proxy for historical malaria prevalence (Depetris-Chauvin and Weil 2018); and (iii) the tsetse suitability index of Alsan (2015), which is based on historical climate data. These variables are described in Online Appendix E.

Table III investigates the relationship between kinship tightness in the EA and pathogen threats. In the analysis, the unit of observation is an ethnic group in the EA. To account for potential nonindependence of observations, the standard errors are clustered at the language subfamily level.[11] This is a conservative procedure because it assigns the 1,246 ethnic groups with nonmissing language information to only 117 clusters. Because the set of clusters in within-Africa analyses is relatively small (24 clusters), the standard errors are bootstrapped in these cases, calculated based on 500 repetitions.

Columns (1)–(3) make use of the full sample of ethnic groups across continents. Here, kinship tightness is strongly and significantly related to the malaria ecology index of Kiszewski et al. (2004). Malaria ecology and the extent of dependence on hunting and gathering alone explain almost a quarter of the ethnic-group level variation in kinship tightness around the globe. Across analyses, the ecological variables are standardized into z-scores.

Columns (4)–(11) move to a within-Africa analysis that is called for because the sickle cell and tsetse data only apply to Africa. Here, the standard errors are bootstrapped (clustered at the language subfamily level). Throughout, the proxies for pathogen prevalence are strongly predictive of kinship tightness.[12] Figure III illustrates the relationship between kinship

11. In the EA, many observations have missing information on language subfamily, but information on language family. In such cases, I work with information on language family, which is more conservative.

12. Within-country analyses lack power in pathogen analyses because there is often little variation in the ecological factors that induce pathogens; see Alsan (2015) and Depetris-Chauvin and Weil (2018).

TABLE III

DETERMINANTS OF KINSHIP TIGHTNESS

	Dependent variable: Kinship tightness [0–1]										
	Full sample			Common sample (Africa)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Malaria ecology [std.]	0.12***	0.098***	0.033**	0.031**	0.030**					0.025**	
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)					(0.01)	
Dependence on hunting and gathering		−0.35***	−0.17*		−0.42**		−0.39**		−0.41**	−0.41**	−0.37**
		(0.09)	(0.10)		(0.19)		(0.16)		(0.18)	(0.16)	(0.15)
Shortest distance to origins of sickle cell mutation [std.]						−0.058**	−0.053***				−0.041**
						(0.02)	(0.02)				(0.02)
Tsetse suitability [std.]								0.035***	0.041***	0.038***	0.019**
								(0.01)	(0.01)	(0.01)	(0.01)
Continent fixed effects	No	No	Yes	No	No	No	No	No	No	No	No
Log [# of years since obs.]	No	No	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes
Observations	1,226	1,225	1,216	504	504	501	501	500	500	500	497
R^2	0.16	0.24	0.34	0.04	0.12	0.10	0.17	0.04	0.11	0.14	0.15

Notes. Historical ethnic group-level OLS estimates in the EA. Standard errors (in parentheses) are clustered at the language subfamily level. In columns (4)–(11), the standard errors are bootstrapped clustered, calculated based on 500 repetitions. The dependent variable is kinship tightness. Malaria ecology is taken from Kiszewski et al. (2004), distance to origins of sickle cell from Depetris-Chauvin and Weil (2018), and tsetse suitability from Alsan (2015). All ecological variables are standardized into z-scores. $^{*}p < .10$, $^{**}p < .05$, $^{***}p < .01$.

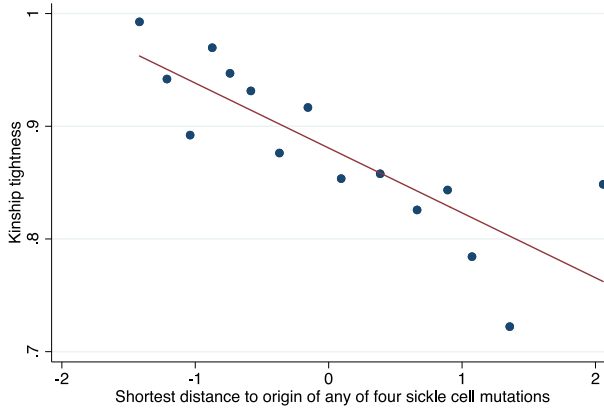

FIGURE III

Kinship Tightness and Distance to Origin of Sickle Cell

Bin scatter plot between kinship tightness and shortest distance to origins of sickle cell mutations in Africa (standardized into a *z*-score) across ethnic groups in the EA.

tightness and distance to the origins of sickle cell mutations.[13]

In sum, a significant portion of the variation in kinship tightness—both across and within continents—appears to be generated by ecological conditions that give rise to certain disease environments. Of course, these results should not be understood as suggesting that *only* the disease environment matters for kinship systems. Also, in light of the findings by Cervellati et al. (2016), it is clear that pathogen threat has diverse effects on ethnic groups other than their kinship system. Still, the results do suggest that it is at least partly environmental conditions that give rise to variation in kinship systems. This arguably provides some justification for the modeling assumption in Section III as well as the empirical approach of taking kinship systems as primitive to the analysis (also see Buggle and Durante 2017 for other evidence on the ecological determinants of family systems).[14]

13. Online Appendix D.1, Figures 6 and 7 provide analogous plots for malaria ecology and tsetse suitability.

14. These results also link to Giuliano and Nunn (2017b) who show that persistence in cousin marriage is weaker in societies that have historically had very volatile climatic conditions.

VI. Moral Systems across Preindustrial Ethnic Groups

VI.A. Baseline Evidence

1. Approach. Based on the model, both the historical and contemporary analyses study the relationship between kinship tightness and (i) the scope of cooperation and trust d^*; (ii) purity concerns/disgust λ; (iii) religious investment in belief in a moralizing deity h^*; and (iv) a number of variables that can be interpreted as capturing θ, such as universal relative to communal moral values, guilt versus shame, and the relative importance of impersonal third-party and revenge punishment. The study of income y follows in Section IX.

Throughout the article, the choice of covariates is guided by the model. In particular, the model rests on the assumption that the loose and tight society are identical "at baseline" (including that they are observed at the same point in time), except for their differences in kinship tightness. However, as documented above, kinship tightness mechanically varies between hunter-gatherer and more advanced subsistence modes, which should arguably be thought of as largely reflecting time variation rather than genuine cross-sectional variation of interest. Thus, to mirror the model assumptions, the empirical analysis controls for both historical dependence on hunting and gathering and log number of years since observation in the EA (the ethnic groups in the EA are observed at potentially different points in time). The analysis also includes specifications that control for continent and/or country fixed effects. Because these geographic fixed effects soak up some of the variation in pathogen environments that may ultimately induce variation in kinship tightness, these controls are potentially problematic. Thus, these specifications are best thought of as sensitivity checks. Throughout, I refer to an array of additional sensitivity analyses in the Online Appendix that gives a sense of the mechanical robustness of the results, but are less cleanly motivated by the model. Readers who prefer kitchen sink regressions over sparse and model-based sets of covariates are referred to these later analyses.

In the historical analysis, the unit of observation is an ethnic group in the EA. In all analyses, the standard errors are again clustered at the language subfamily level. Throughout, Figure IV is used to illustrate the results and compare quantitative magnitudes. Here, I compute average levels of a given outcome variable across ethnic groups, partitioned by whether kinship tightness is

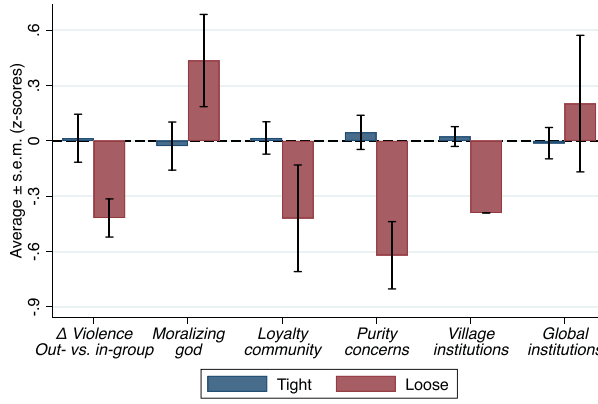

FIGURE IV

Historical Moral Systems

Moral systems across historical ethnic groups. The figure computes average levels of each outcome variable, separately for loose and tight kinship societies. Ethnic groups are classified as loose kinship if their kinship tightness index is smaller than 0.25. Standard error bars are computed based on clustering at the language subfamily level. Due to the smaller number of observations, the standard errors are bootstrapped based on 500 repetitions for the violence and loyalty variables. All dependent variables are standardized into z-scores. Color version available online.

above or below 0.25. All dependent variables are transformed into z-scores. Thus, we can see that the difference in the various outcome variables between relatively loose and tight kinship ties is usually 40–60% of a standard deviation.

2. In-Group Favoritism. For a subsample of ethnic groups in the EA (those in the SCCS), the data contain information on the acceptability of violence in a community, distinguished by whether violence is directed at members of the same society or against members of other societies. From these variables, I compute the difference between the acceptability of violence against out-group and in-group as a proxy for in-group favoritism.[15] Table IV, columns (1) and (2) document that tight kinship societies exhibit substantially larger in-group favoritism: moving kinship tightness from 0 to 1 implies an increase in in-group favoritism by more than one standard deviation. This result is in line with the model predictions, where d^* (the scope of cooperation) is larger

15. See Online Appendix E for details on the construction of this variable.

TABLE IV

ENFORCEMENT DEVICES OF COOPERATION IN HISTORICAL ETHNIC GROUPS

	Dependent variable:														
	Δ Violence		Religion			Morality				Institutions: jurisdictional hierarchy					
	[Out- versus in-group]		Moralizing god			Loyalty community		Purity (sex taboo)		Above local level			Village level		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Kinship tightness	1.27***	1.13**	−0.77***	−0.50***	−0.41***	1.16***	1.14***	0.83***	0.46**	−0.39*	−0.37***	−0.26*	0.83***	0.87***	0.76***
	(0.47)	(0.46)	(0.19)	(0.13)	(0.15)	(0.33)	(0.32)	(0.20)	(0.19)	(0.20)	(0.12)	(0.14)	(0.12)	(0.12)	(0.15)
1 if society has high god [std.]				0.30***	0.23***										
				(0.05)	(0.05)										
Dependence on hg	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log [# of years since obs.]	No	Yes	No	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes
Continent fixed effects	No	No	No	Yes	No	No	No	No	Yes	No	Yes	No	No	Yes	No
Country fixed effects	No	No	No	No	Yes	No	No	No	No	No	No	Yes	No	No	Yes
Observations	61	61	776	770	770	83	83	371	371	1,156	1,146	1,146	1,151	1,141	1,141
R^2	0.09	0.18	0.17	0.45	0.69	0.09	0.09	0.07	0.20	0.22	0.31	0.49	0.09	0.10	0.31

Notes. Historical ethnic group-level OLS estimates in the EA. Standard errors (in parentheses) are clustered at the language subfamily level. In columns (1), (2), (6), and (7), the standard errors are bootstrapped clustered, calculated based on 500 repetitions. The dependent variable in columns (1)–(2) is the difference between acceptability of violence against members from other societies and against members from one's own society. The dependent variable in columns (3)–(5) is a binary indicator for whether a society honors a moralizing god. In columns (6)–(7), the dependent variable is the extent to which historical ethnic groups emphasize loyalty to the local community and "we" feelings. In columns (8)–(9), the dependent variable is the length of postpartum sex taboos. The dependent variable in columns (10)–(12) is the number of levels of jurisdictional hierarchy above the local level. In columns (13)–(15), the dependent variable is a binary indicator for the existence of a village-level institution. Dependence on hg = dependence on hunting and gathering. All dependent variables are standardized into z-scores. $^{*}p < .10$, $^{**}p < .05$, $^{***}p < .01$.

in loose kinship societies. The two leftmost bars in Figure IV illustrate this result. When I control for the time since observation in the EA, the coefficient of kinship tightness decreases by about 10% but remains statistically significant.[16]

3. Moralizing Gods. Table IV, columns (3)–(5) study the relationship between religious beliefs (h^* in the model) and kinship tightness. The dependent variable is the z-score of a binary indicator that equals 1 if a society honors a moralizing god and 0 if the society has no high god or a god that is not moralizing. The results show that societies with high kinship tightness were significantly less likely to develop beliefs in moralizing gods (compare Figure IV). This result holds up when controlling for continent fixed effects and country fixed effects so that the analysis exploits relatively fine-grained geographic variation. Due to the large number of African ethnic groups in the EA, the within-country regressions almost exclusively rely on variation within African countries. Including control variables reduces the coefficient of kinship tightness from 77% to 41% of a standard deviation.

It is important to notice that the negative relationship between kinship tightness and religious beliefs is indeed specific to the moralizing aspect of religion. In particular, kinship tightness is unrelated to the presence of a high god per se: when I code a binary indicator that equals 1 if a society honors a high god (moralizing or not) and 0 in the case of the absence of a high god, kinship tightness is essentially uncorrelated with this index. Moreover, controlling for the presence of a high god does not affect the relationship between belief in a moralizing high god and kinship tightness (columns (4) and (5) control for the presence of belief in a high god). Thus, it is not the case that tight kinship societies do not have high gods—just not moralizing ones.

4. Communal Values. To study the link between kinship tightness and the structure of moral values, the analysis again relies on the detailed information contained in the SCCS. Specifically, a variable measures the extent to which people are loyal to their local community on a scale of 1–4. According to Ross (1983), who assembled these data, this variable is meant to measure the

16. The inclusion of continent fixed effects is not feasible here because bootstrapped clustered standard errors could not be reliably computed with continent fixed effects given the small number of observations.

degree of in-group loyalty and "we" feelings. This variable can be thought of as the inverse of θ in the model. Table IV, columns (6)–(7) show that kinship tightness exhibits a strong relationship with an emphasis on loyalty. An increase in kinship tightness from 0 to 1 implies an increase in importance placed on loyalty to the community of about 115% of a standard deviation.

5. Purity. To measure attitudes toward purity and disgust λ, the analysis considers sex taboos. It is widely understood in psychology that purity demands regarding sex are driven by emotions of disgust (Tybur et al. 2013). The ethnic groups in the EA exhibit large variation in whether and for how long they deem postpartum sex inappropriate. This is a five-step variable that ranges from "no taboo" to "more than two years." Columns (8) and (9) show that tight kinship societies have significantly more pronounced sex taboos. The coefficient estimates are sensitive to the inclusion of continent fixed effects, but range from 46–84% of a standard deviation.

6. Institutions. As outlined above, the analysis of governance structures requires distinguishing between institutions at the local (community) level and those that supersede separate groups, which I refer to as "global." The EA contains a five-step variable that measures the number of levels of jurisdictional hierarchies beyond the local community (no levels; petty chiefdom; large chiefdom; state; large state). In the literature, this is the standard variable used as a proxy for the institutional sophistication of historical ethnic groups (e.g., Gennaioli and Rainer 2007; Michalopoulos and Papaioannou 2013a,b; Giuliano and Nunn 2013).

However, the data also contain a variable that measures the levels of jurisdictional hierarchy at the local level, which is used less frequently in the literature. Local levels of hierarchy include the nuclear family, extended family, clan, and village. To avoid the pitfall of identifying a mechanical relationship between kinship tightness and local institutions because both variables include the structure of the extended family and clans, the analysis works with a binary indicator for whether a village-level institution is present. That is, I define local institutions as being present if "village" is a level of jurisdictional hierarchy, and 0 otherwise.

As hypothesized, kinship tightness is predictive of the structure of institutional setups (columns (10)–(15)): tight kinship

societies are more likely to have jurisdictional hierarchy at the village level, but less developed institutions at the supra-tribal level. Again, these results hold without controls, with continent fixed effects, and with country fixed effects. The coefficient estimates are consistently larger and more stable for the outcome variable of village-level institutions, where an increase in kinship tightness from 0 to 1 implies an increase in the probability of having a village-level jurisdictional hierarchy by about 80% of a standard deviation.

In summary, in preindustrial data, kinship tightness is systematically predictive of the various outcome variables in ways that are consistent with the model. In terms of quantitative magnitudes, the effect sizes differ across variables but are usually substantial. Across variables, moving kinship tightness from 0 to 1 is associated with a change in the dependent variables of about 80% of a standard deviation, on average.

Prior literature has proposed techniques to assess the potential role of unobservables from the variability in coefficient estimates across specifications (Altonji, Elder, and Taber 2005; Oster 2017). In the present context, these techniques may not be applicable because, based on the results in Section V, there are strong reasons to believe that some of the covariates may proxy the origins of the variation in kinship tightness. For instance, if the prevalence of pathogen suitability varies substantially across countries, then "controlling" for country fixed effects eliminates the variation that we are trying to capture. With these caveats in mind, I interpret the variability in coefficients in Table IV with care. We see that for some variables the coefficients are pretty stable (favoritism, loyalty, local institutions) but vary substantially for others (moralizing god, purity, global institutions).

7. Robustness Checks. Online Appendix D.3 contains three additional robustness checks. First, Table II presents specifications in which I control for the broad geographical and cultural regions variably coded in the EA (v91). Second, Tables 3 and 4 show analyses in which I do not control for dependence on hunting and gathering. Finally, Tables 5 and 6 control for malaria ecology. While this is arguably a bad control, the results nonetheless show that controlling for variation in disease environments does not significantly affect the results. Overall, the results in

these robustness checks are very similar to those presented in the main text.

8. Examples. Although the preceeding analysis covered all ethnic groups in the EA, it may be helpful to consider a few illustrative examples. Consider the case of contemporary China. Among the 14 ethnic groups in the EA that resided within current Chinese borders, the average kinship tightness score is 0.8. For example, the subgroup of Chinese whose linguistic roots are Min Chinese (a major subgroup of the ethnic majority Han) lived in extended families, continued to live with parents after marriage, and traced descent through a lineage. According to qualitative contemporary writings, "Chinese" culture was historically characterized by a strong emphasis on the extended family and a crucial importance of a relational rather than universal morality, which in turn implied a disregard for strangers (see, for example, the classic by Fei, Hamilton, and Wang 1992). In his analysis of Confucianism, Hwang (1999) highlights how "ethics for ordinary people" are guided by with whom one has a close relationship (*guanxi*), and associated demands for loyalty and respect. The family as a whole is understood as an analog of a single human body, with different family members representing a distinct part of the body. Because they are part of the same body, family members have an obligation to share and favor family over others. Moreover, in line with the negative relationship between kinship tightness and belief in a moralizing god discussed above, Confucianism does not feature an omniscient deity that constantly monitors human moral behavior and implements divine punishment. Consequently, all Chinese ethnic groups in the EA with nonmissing data are coded as not believing in a moralizing god. Attempts by Christian missionaries to convert the Chinese population have had limited success. On the other hand, most Western European ethnic groups readily converted to Christianity early on, and according to historical records the extended family played a relatively small role in ancient Rome, for example (Zimmerman 2008). The Ten Commandments might be viewed as an early example of (relatively) universalistic moral concerns.

VI.B. Neighboring Ethnic Homeland Analysis

Whenever feasible, given the number of observations, the main analysis included specifications with country fixed effects,

TABLE V
ANALYSIS OF NEIGHBORING ETHNIC GROUPS

	Dependent variable:					
	Religion		Institutions: jurisdictional hierarchy			
	Moralizing god		Above local level		Village level	
	(1)	(2)	(3)	(4)	(5)	(6)
Kinship tightness	−0.34**	−0.38***	−0.0066	−0.028	0.64***	0.65***
	(0.13)	(0.12)	(0.09)	(0.08)	(0.20)	(0.19)
1 if society has high god [std.]		0.12***				
		(0.04)				
Match FE	Yes	Yes	Yes	Yes	Yes	Yes
Dependence on hg	Yes	Yes	Yes	Yes	Yes	Yes
Log [# of years since obs.]	No	Yes	No	Yes	No	Yes
Observations	2,468	2,465	7,582	7,573	7,601	7,592
R^2	0.80	0.80	0.75	0.75	0.60	0.60

Notes. Historical neighboring ethnic group-level OLS estimates in the EA. Standard errors (in parentheses) are clustered at the language subfamily level. The analysis includes all ethnic group pairs that (i) reside within the same country, (ii) whose centroids are at most 500 km apart, and (iii) do not share the same kinship tightness index. The dependent variable in columns (1)–(2) is a binary indicator for whether a society honors a moralizing god. In columns (3)–(4), the dependent variable is the number of levels of jurisdictional hierarchy above the local level. The dependent variable in columns (5)–(6) is a binary indicator for the existence of a village-level institution. Dependence on hg = dependence on hunting and gathering. All dependent variables are standardized into z-scores. $^{**}p < .05$, $^{***}p < .01$.

so that the analysis exploits fine-grained geographical variation. To take this idea a step further, the analysis follows Michalopoulos and Papaioannou (2013b) in conducting a neighboring ethnic groups analysis. For this purpose, I match each ethnic group with each other group and then keep those matches that (i) reside within the same country, (ii) are neighbors, defined as having centroids at most 500 km apart from each other, and (iii) do not exhibit exactly the same kinship tightness score.[17] Given the small number of ethnic groups for which the EA contains data on in-group favoritism, loyalty, and purity, the analysis focuses on religious beliefs and institutional setups.

Table V reports the results. The analysis includes match fixed effects (neighboring ethnic group pair fixed effects) so that the

17. Online Appendix D.4, Table 8 reports robustness checks for maximal distances of 400 and 600 km. The reason I define matches based on geographic distance rather than on actually being adjacent is that in contrast to Michalopoulos and Papaioannou's analysis of Africa, no global map is available that depicts the ethnic homelands of all ethnic groups in the EA. Murdock's map only covers Africa.

regressions only exploit variation within neighboring ethnic group pairs. To account for nonindependence of observations, the standard errors are again clustered at the language subfamily level. Overall, the results mirror those obtained in the main analysis, except that the relationship between kinship tightness and jurisdictional hierarchy above the local level is not statistically significant (but has negative coefficient estimates).

VI.C. Spillover Effects?

The model in Section III and the analyses in the preceding sections focused on the dynamics within a given society. However, neighboring societies likely interact to some extent, generating the potential for spillover effects. In particular, a potential effect of kinship tightness on the outcome variables may depend on whether the neighboring societies have loose or weak kinship ties.[18]

For the purposes of this analysis, for each ethnic group, I compute the average kinship tightness score of all neighboring ethnic groups, defined as groups that reside at most 500 km away.[19] To investigate potential spillover effects, Online Appendix D.5, Tables 9 and 10 regress dependent variables with sufficiently many observations on (i) kinship tightness, (ii) the neighbors' average kinship tightness, and (iii) their interaction.[20] In more than half of the regressions, the coefficient of the interaction term is statistically significant in the expected direction. For instance, a society is substantially less likely to honor a moralizing god if both the society and its neighbors have tight kinship. This suggests that the adoption of a moralizing god by a neighboring group with weak kinship ties can spill over to nearby groups. Similarly, an ethnic group is more likely to have strong village-level institutions if the society and its neighbors have high kinship tightness

18. See Tabellini (2008) for a related theoretical analysis.

19. An ethnic group's kinship tightness score and the average score of the neighbors exhibit a raw correlation of $\rho = 0.66$. The partial correlation conditional on continent fixed effects is $\rho = 0.40$. Thus, ethnic groups with tight kinship structures tend to cluster together, which is one reason the historical analysis clusters the standard errors at the language subfamily level.

20. In interpreting the results, it is important to keep in mind that if kinship tightness of an ethnic group is measured with error (which is probably the case) and kinship tightness is spatially correlated, then the average kinship tightness of the neighbors may to some extent pick up the effect of an ethnic group's own kinship tightness.

scores. Similar patterns hold for demands for purity (postpartum sex taboos).

VII. Moral Systems across Contemporary Societies

VII.A. Empirical Approach

The analysis assesses the model predictions for the "late" (contemporary) period $t = z$, that is, that loose kinship societies exhibit a (i) broader scope of cooperation (lower in-group favoritism) d^*; (ii) weakly lower probability of honoring a moralizing god h^*; (iii) higher emphasis on universal moral values, internalized guilt, and altruistic punishment θ; and a (iv) lower emphasis on disgust λ.

The model in Section III clarifies that in the present context, the unit of observation is a society, rather than an individual. Accordingly, as in the historical analysis, the regressions of interest ultimately need to leverage variation across societies, which in the contemporary context arguably corresponds to countries. However, while cross-country regressions correspond to the model mechanics, they have the disadvantage that they are potentially subject to small numbers of observations and omitted variable concerns. Thus, following standard lines of reasoning in the literature about the intergenerational persistence of values, the analysis employs (i) cross-migrant analyses that leverage variation in ancestral kinship tightness across countries of origin, controlling for the current country of residence (Fernández 2007; Giuliano 2007) and (ii) analyses across individuals from different ethnic groups within countries. Still, to reiterate, these individual-level analyses are only an empirical tool to tighten the identification of a relationship between kinship tightness and outcomes and are not meant to suggest that, conceptually, the unit of observation is an individual.

I use Figure V to illustrate the results. Here, I partition countries by whether their ancestral kinship tightness is above or below 0.25 and compute average levels of the various moral outcomes (standardized into z-scores) for both subsets. The construction of these variables is described below. We can see that the difference in the various outcome variables between relatively loose and tight kinship ties is usually 70–100% of a standard deviation.

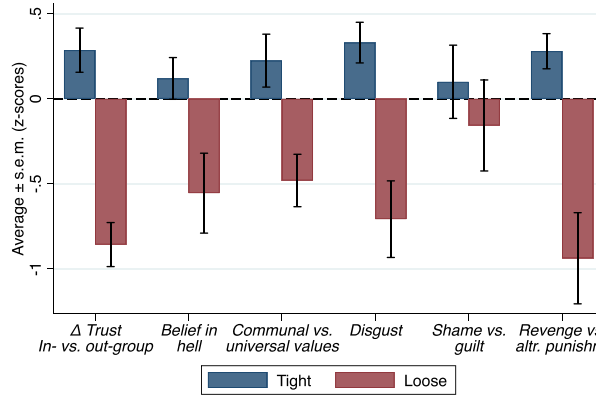

FIGURE V

Contemporary Moral Systems

Moral systems across contemporary countries. Color version available online. The figure computes average levels of each outcome variable (plus standard error bars) separately for loose and tight kinship societies. Countries are classified as loose if their ancestral kinship tightness index is smaller than 0.25. The difference between in- and out-group trust and belief in hell are from the WVS; communal versus universal moral values and the moral relevance of disgust from the MFQ; shame versus guilt from ISEAR; and revenge versus altruistic punishment from the GPS. See the text and Online Appendix E for information on the construction of these variables. All dependent variables are standardized into z-scores.

VII.B. The Radius of Trust

I start by considering the scope of cooperation d^*. To proxy for the extent to which people are willing to enter productive relationships with in- and out-group members, I consider their trust beliefs, which in terms of the model can be understood as an equilibrium belief about whether the other agent would cooperate. The negative relationship between generalized trust and family ties as well as the positive relationship between trust in family and family ties are well documented in the literature (e.g., Alesina and Giuliano 2013; Moscona et al. 2017a). Still, to validate one of the core model predictions—that the gradient of trust between in- and out-group is steeper in tight kinship societies—I consider a set of six survey questions in the WVS that elicit people's trust beliefs with respect to six specific groups. These questions ask respondents about their level of trust in their family, their neighbors, people they know, people they meet for the first time, people of another religion, and foreigners, respectively.

Delhey, Newton, and Welzel (2011) propose that these variables can be used to construct indices of average in-group and average out-group trust, where in-group means family, neighbors, and people one knows, and out-group all remaining groups. My main dependent variable is the difference between in-group and out-group trust.[21]

Given the focus of the article on extended family systems, another perhaps natural way to partition the set of six groups is by distinguishing between family and everyone else. Accordingly, as an additional dependent variable, I construct the difference between trust in the family and the average trust in all other groups.

Table VI studies the relationship between kinship tightness and the trust gradient. Columns (1)–(4) report cross-country regressions and columns (5)–(8) individual-level within-country regressions in the WVS that leverage variation across individuals from different ethnic groups. Throughout, kinship tightness is significantly related to the difference between in-group and out-group trust.[22] In terms of quantitative magnitudes, an increase in ancestral kinship tightness from 0 to 1 implies an increase in in-group versus out-group trust by more than 100% of a standard deviation in cross-country analyses, and of 17–40% of a standard deviation in individual-level regressions. Because the dependent variables are all standardized into z-scores at their respective level of aggregation, the difference in coefficient magnitudes is at least partly mechanical, as individual-level measurement error or idiosyncratic factors artificially increase the variability of the outcome variable. Within each set of regressions, the coefficient estimates are stable across specifications.

21. Akin to results in the literature, kinship tightness is not just predictive of in-group versus out-group trust but also of higher in-group favoritism in behavior (as in Bertrand and Schoar 2006), see Online Appendix D.7. Online Appendix D.8 discusses the relationship between kinship tightness and behavior toward/trust in the "anonymous other."

22. Online Appendix D.14, Tables 28 and 29 breaks these patterns down into the six different groups. The results reveal that kinship tightness is positively correlated with trust in family and neighbors. On the other hand, it is negatively correlated with trust in all other groups, and the corresponding point estimates become consistently more negative as social distance increases. Online Appendix D.9, Table 14 shows that the results are robust when using the set of covariates proposed in Alesina and La Ferrara (2002).

TABLE VI

TRUST IN IN- AND OUT-GROUP ACROSS COUNTRIES AND ETHNIC GROUPS

Variation is across:	Countries				Ethnic groups (WVS)			
	Dependent variable: Δ Trust in:							
	In- versus out-group		Family versus others		In- versus out-group		Family versus others	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Kinship tightness	1.46***	1.44***	1.03***	1.24***	0.40***	0.35***	0.17***	0.21***
	(0.33)	(0.36)	(0.35)	(0.46)	(0.06)	(0.07)	(0.04)	(0.06)
Country-level controls	No	Yes	No	Yes	No	No	No	No
Continent fixed effects	No	Yes	No	Yes	No	No	No	No
Country fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Wave fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Individual-level controls	No	No	No	No	No	Yes	No	Yes
Ethnicity-level controls	No	No	No	No	No	Yes	No	Yes
Observations	72	70	72	70	21,813	21,758	21,813	21,758
R^2	0.23	0.56	0.12	0.34	0.08	0.09	0.07	0.08

Notes. OLS estimates, robust standard errors in parentheses. Columns (1)–(4) report country-level regressions. Columns (5)–(8) report individual-level regressions in the WVS and kinship tightness is assigned based on respondents' ethnicity; here, the standard errors are clustered at the ethnic group level. In columns (1)–(2) and (5)–(6), the dependent variable is the difference between average trust in in-group members (family, neighbors, people one knows) and in out-group members (strangers, people of another religion, foreigners). In columns (3)–(4) and (7)–(8), the dependent variable is the difference between trust in family and the average trust in all other five groups. Country-level controls and ethnicity-level controls both include log number of years since observation in the EA and historical dependence on hunting and gathering. Individual-level controls include gender and age fixed effects. All dependent variables are standardized into z-scores. $^{***}p < .01$.

TABLE VII

BELIEF IN HELL ACROSS COUNTRIES AND ETHNIC GROUPS

Variation is across:	Countries				Ethnic groups (WVS)			
	Dependent variable: Belief in hell							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Kinship tightness	1.16***	0.87***	0.88***	0.47**	0.26***	0.18***	0.17***	0.20***
	(0.35)	(0.24)	(0.25)	(0.24)	(0.04)	(0.02)	(0.03)	(0.04)
Belief in god [std.]		0.67***	0.69***	0.70***		0.30***	0.30***	0.34***
		(0.11)	(0.11)	(0.09)		(0.04)	(0.04)	(0.03)
Country-level controls	No	No	Yes	Yes	No	No	No	No
Continent fixed effects	No	No	No	Yes	No	No	No	No
Country fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Wave fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Individual-level controls	No	No	No	No	No	No	Yes	Yes
Ethnicity-level controls	No	No	No	No	No	No	No	Yes
Observations	79	79	78	78	26,220	25,752	25,722	23,891
R^2	0.12	0.57	0.58	0.76	0.40	0.46	0.46	0.41

Notes. OLS estimates, robust standard errors in parentheses. Columns (1)–(4) report country-level regressions. Columns (5)–(8) report individual-level regressions in the WVS and kinship tightness is assigned based on respondents' ethnicity; here, the standard errors are clustered at the ethnic group level. The dependent variable is whether the respondent believes in hell. Country-level controls and ethnicity-level controls both include log number of years since observation in the EA and historical dependence on hunting and gathering. Individual-level controls include gender and age fixed effects. All dependent variables are standardized into z-scores. $^{**}p < .05$, $^{***}p < .01$.

While these results may be unsurprising in light of prior literature, they still show that tight kinship societies trust their family more even though it is probably the case that a larger number of individuals are considered "family."

VII.C. Religious Beliefs

In this section, I study belief in moralizing deities (h^* in the model). Simple cross-religion analyses are infeasible in contemporary data for two reasons: (i) due to the spread of the Abrahamic religions, the number of independent religions is very small, and (ii) classifications of the extent to which modern religions are moralizing are not readily available. I partially circumvent these problems by analyzing whether respondents in the WVS report that they believe in hell.[23] This approach appears justified in that postmortal punishment is one of the key characteristics of moralizing religions. Of course, this analysis should be viewed as tentative because there are few genuinely independent observations (religions).

With this caveat in mind, Table VII investigates the relationship between ancestral kinship tightness and belief in hell.

23. The WVS also contains a question that elicits belief in heaven. However, the number of observations is substantially lower than for belief in hell. When I compute the average of belief in hell and belief in heaven, the results are similar.

Columns (1)–(4) report cross-country regressions, and columns (5)–(8) report the results of individual-level analyses that again leverage variation across respondents from different ethnic groups within countries in the WVS. Again, all dependent variables are standardized into *z*-scores at their respective levels of aggregation. The results document that kinship tightness is consistently positively related to a belief in hell. Notably, the relationship between kinship tightness and belief in hell continues to be significant when controlling for respondents' belief in god. That is, respondents in the WVS were not just asked whether they believe in hell but also whether they believe in god. Thus, it appears as though the descendants from historically loose kinship societies are less likely to believe in strongly moralizing aspects of religion, conditional on their degree of religiosity. Note that this aligns with the results in the historical analysis, where kinship tightness was negatively related to belief in a moralizing god, controlling for whether the society had a high god—except that as in the model, the relationship reverses over time.

Overall, the results arguably provide some insight into the evolution of religious beliefs and the extent to which the relationship between kinship tightness and moralizing religion flips over time, as indicated by the model. At the same time, the results need to be taken with a grain of salt because of nonindependence of religions and because the proxy for the presence of belief in a moralizing deity is imperfect.

VII.D. Communal versus Universal Moral Values

I continue by investigating the relationship between ancestral kinship tightness and contemporary moral values. In terms of data, the analysis follows a recent influential line of work in moral psychology that exploits variation in communal versus universal moral values in the MFQ (Haidt 2012; Graham et al. 2013, 2016). The MFQ was specifically designed with the goal of measuring variation in moral principles that include both (i) "universal" notions of fairness, justice, and inalienable individual rights and (ii) "communal" concepts such as loyalty to the in-group, betrayal, or respect.

The MFQ consists of 30 questions, which can be partitioned by whether they probe a respondent's agreement with universal, communal, or purity-related values. For now, the analysis focuses on the first two categories; I return to purity-related values below.

First, for ease of interpretation, I show the results for two specific survey items that intuitively reflect the trade-off between a communal and universal morality. These questions read as follows:

> When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking?
>
> (i) Whether or not someone was denied his or her rights (0–5).
> (ii) Whether or not someone showed a lack of loyalty (0–5).

To show that the results do not just reflect these specific survey items, I also construct a summary statistic of the relative importance of communal over universal moral values by computing the simple difference between agreement with communal and universal value statements, respectively (see Enke 2017 for a detailed justification and validation of this summary statistic in a U.S. voting context). This summary statistic can be thought of as the inverse of θ.

The MFQ data stem from a sample of self-selected respondents who chose to complete the MFQ at www.yourmorals.org between 2008 and 2018 ($N = 338{,}875$). As a result, in contrast to the data from the WVS and GPS, the data are (i) not nationally representative, and (ii) feature different sample sizes across countries. To circumvent these issues, I focus on an individual-level analysis that leverages variation across migrants within the same country of residence. This has the advantages that it (i) allows me to explicitly control for individual characteristics; (ii) does not rely on noisy estimates of country averages from small samples; and (iii) only leverages within-country variation. In total, I draw from data on 28,432 immigrants from 194 countries of birth. Still, for completeness, it should be noted that the country average of the relative importance of communal moral values is significantly positively correlated with ancestral kinship tightness ($\rho = 0.28$, $p < .05$).[24] This correlation is illustrated in Figure V.

Table VIII, columns (1)–(4) summarize the results of the migrant-level analysis. All dependent variables are standardized into z-scores. The regressions include country of residence fixed effects and year fixed effects. Columns (1) and (2) show that the

24. Throughout, when constructing country averages from the MFQ data, I restrict attention to countries with at least 50 respondents to reduce noise, see Online Appendix E.

TABLE VIII

MORAL VALUES ACROSS MIGRANTS IN THE MORAL FOUNDATIONS QUESTIONNAIRE

	Communal versus universal values				Disgust			
	Dependent variable: Moral relevance of:							
	Loyalty	Rights	Δ [Comm.—universal]		Disgust		Purity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Kinship tightness	0.11**	−0.23*	0.37***	0.29**	0.36***	0.39***	0.41***	0.41***
	(0.04)	(0.13)	(0.13)	(0.12)	(0.04)	(0.05)	(0.05)	(0.04)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	No	Yes	No	Yes	No	Yes
Country of origin controls	Yes	Yes	No	Yes	No	Yes	No	Yes
Observations	27,994	27,994	28,432	27,994	28,432	27,994	28,432	27,994
R^2	0.04	0.03	0.06	0.10	0.04	0.06	0.04	0.06

Notes. OLS estimates, robust standard errors (clustered at country of origin) in parentheses. An observation is an individual (migrant) in the MFQ. In columns (1)–(2), the dependent variables are the moral relevance of loyalty and individual rights, respectively (questions (i) and (ii) as denoted in the main text). The dependent variable in columns (3)–(4) is the relative importance of communal over universal moral values, constructed as the difference between agreement with communal and agreement with universal moral statements, see Online Appendix E. In columns (5)–(6), the dependent variable is the moral relevance of disgust, and in (7)–(8) the moral relevance of purity and decency (questions (iii) and (iv) as denoted in the main text). Individual-level controls include gender and age fixed effects. Country-of-origin controls include log number of years since observation in the EA and historical dependence on hunting and gathering. All dependent variables are standardized into z-scores. $^{*}p < .10$, $^{**}p < .05$, $^{***}p < .01$.

specific survey questions discussed above are significantly related to kinship tightness in opposite directions: migrants from tight kinship backgrounds place a significantly higher value on loyalty, but less value on an individual's universal rights. Columns (3) and (4) confirm that these results hold more generally in the full set of 24 survey items that elicit respondents' agreement with communal and universal value statements: on average, higher kinship tightness produces a lower relative emphasis on universalizing moral concepts. The point estimates imply that moving kinship tightness from 0 to 1 is associated with an increase in the relative importance of communal values by about 30% of a standard deviation.

VII.E. Disgust and Purity

To study the link between historical kinship tightness and disgust λ, two complementary approaches are employed. First, I consider the extent to which people moralize concepts related to disgust; this is possible because the MFQ contains questions on disgust- and purity-related concepts. Second, I study self-reports of individuals' perceived emotions of disgust using a cross-cultural psychological data set on emotions.

1. Moral Value Judgments. As mentioned, the MFQ elicits agreement not only with communal and universal moral value

statements but also with respect to notions that relate to purity and disgust. This is because—as pointed out by Rozin, Haidt, and McCauley (1993) and other psychologists—people often assign moralizing notions of "right" and "wrong" to behaviors and phenomena that evoke disgust. For example, the MFQ contains the following two survey items to measure disgust and purity concerns:[25]

> When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking?
>
> (iii) Whether or not someone did something disgusting (0–5).
> (iv) Whether or not someone violated standards of purity and decency (0–5).

Table VIII, columns (5) through (8) summarize the relationship between responses to these questions and ancestral kinship tightness in the sample of migrants in the MFQ. Again, the dependent variables are standardized into z-scores. Throughout, the relationship is strong and statistically highly significant, conditional on country of residence fixed effects, individual-level controls, and country of origin controls. That is, migrants from countries with historically tighter kinship systems place substantially higher weight on moralizing aspects related to disgust. The point estimates imply that moving kinship tightness from 0 to 1 is associated with an increase in the moral relevance of disgust and purity-related concerns by about 40% of a standard deviation, and these coefficient estimates are very stable across the different variables and specifications.

To convey intuition for this result, Figure VII visualizes the relationship between kinship tightness and disgust by focusing on the sample of 13,723 migrants who reside in the United States (the MFQ is most popular in the United States). For each country of origin, I compute the average extent to which people moralize disgust (question (iii) from above) and plot it against the ancestral kinship tightness in the respective country.

Although the analysis has focused on variation across migrants to account for the nonrepresentative sample in the MFQ,

25. In total, the MFQ contains five questions that are intended to measure purity-related concepts. If I average responses across these five items, the results are very similar to, if not stronger than, the ones presented in Table VIII. The analysis focuses on the two survey questions mentioned in the main text only because they seem particularly appropriate for the research question at hand.

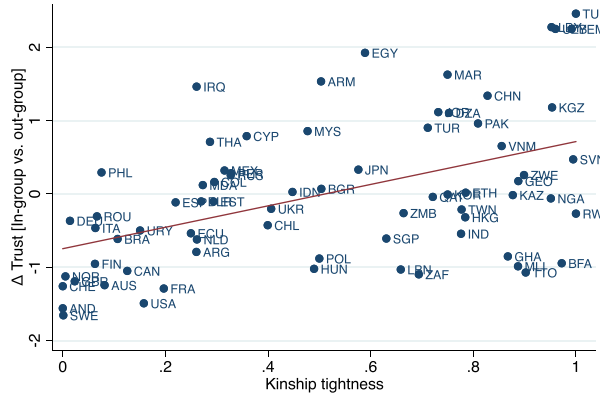

FIGURE VI

Kinship Tightness and In-Group versus Out-Group Trust

Relationship between kinship tightness and the difference between in-group and out-group trust across countries in the WVS.

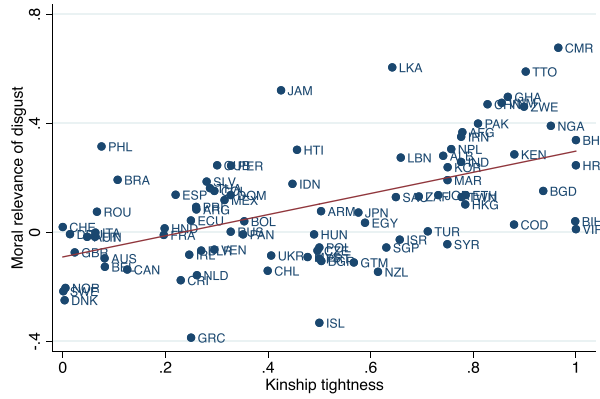

FIGURE VII

Kinship Tightness and Moral Relevance of Disgust

The figure depicts the relationship between kinship tightness and moral relevance placed on disgust (question iii in the main text) among migrants from different countries who currently reside in the United States. The figure is restricted to countries of origin with at least 20 observations because otherwise the estimate of country of origin averages is not very meaningful. All regressions include the omitted individuals.

the country-level relationships between kinship tightness and the moral relevance of disgust and purity are likewise strongly positive and highly statistically significant ($\rho = 0.53$ and $\rho = 0.47$, respectively, $p < .01$ in both cases). Figure V visualizes this cross-country pattern.

2. Emotions. Next I study the relationship between kinship tightness and disgust by focusing on people's perceived emotions of disgust. Of course, measuring emotions is an extremely challenging task even in laboratory experiments, so that any cross-cultural study has to rely on indirect data. The analysis makes use of the "International Survey on Emotion Antecedents and Reactions" (ISEAR; Scherer, Wallbott, and Summerfield 1986; Scherer and Wallbott 1994).[26] In this psychological questionnaire, university students across cultures were asked to describe how they experience emotions ($N = 2{,}626$; 36 countries). Among other questions, respondents described a situation in which they experienced disgust (as well as shame and guilt, see below). For each emotion, they were then asked to describe how long-lasting (minutes, an hour, several hours, a day or more) and how intense (not very, moderately, intense, very) the feeling was.[27] I convert responses to these questions to a scale of 1–4 and compute an individual-level summary statistic of the importance of disgust by averaging the z-scores of the length of disgust and intensity of disgust measures, respectively.

As in the case of the MFQ, the ISEAR sample is not representative of a country's population. To be better able to account for heterogeneity in observables across samples from different countries, I resort to an individual-level analysis. Table IX, columns (1)–(3) summarize the results. Each observation is an individual; ancestral kinship tightness is assigned based on country of residence, so the standard errors are clustered at the country level. Throughout, higher kinship tightness is linked to a higher importance of disgust, also conditional on individual- and country-level controls. Similar to the individual analyses

26. Wallbott and Scherer (1995) analyze these data and show that they are systematically related to Hofstede's (1984) cross-cultural indices.

27. The ISEAR questionnaire contains many more detailed questions. The questions that I use are the ones that are asked initially and that represent the broadest assessment. Follow-up questions, which I have not analyzed, include detailed questions about the physiological symptoms and expressive behaviors that were associated with or followed the emotion.

TABLE IX

EMOTIONS ACROSS COUNTRIES

	Dependent variable:							
	Disgust			Δ [Shame – guilt]				
	ISEAR (self-reports)			ISEAR (self-reports)			Google searches	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Kinship tightness	0.30*	0.32*	0.31*	0.27*	0.27**	0.20	0.79**	0.88**
	(0.17)	(0.17)	(0.17)	(0.14)	(0.13)	(0.17)	(0.35)	(0.35)
Individual-level controls	No	Yes	Yes	No	Yes	Yes	No	No
Country-level controls	No	No	Yes	No	No	Yes	No	Yes
Language fixed effects	No	No	No	No	No	No	Yes	Yes
Observations	2,570	2,567	2,490	2,626	2,623	2,545	72	71
R^2	0.01	0.02	0.03	0.01	0.01	0.02	0.42	0.45

Notes. OLS estimates, robust standard errors in parentheses. In columns (1)–(6), an observation is an individual in the ISEAR; here, the standard errors are clustered at the country level. In columns (7)–(8), an observation is a country-language pair; here, the standard errors are also clustered at the country level. In columns (1)–(3), the dependent variable is the average of (the z-scores of) the length and intensity with which an individual reports that they experience disgust. In columns (4)–(6), the dependent variable is the average of (the z-scores of) the difference in the length and intensity with which people report experiencing shame and guilt. In columns (7)–(8), the dependent variable is the difference between the relative frequency of Google searches for shame and guilt in a given country-language pair, see Online Appendix E. Country-level controls include log number of years since observation in the EA and historical dependence on hunting and gathering. Individual-level controls include gender and age fixed effects. All dependent variables are standardized into z-scores. $^{*}p < .10$, $^{**}p < .05$.

reported earlier, the coefficient estimates imply that moving kinship tightness from 0 to 1 is associated with an increase in disgust by about 30% of a standard deviation.

VII.F. Moral Emotions: Shame versus Guilt

To study the link between kinship tightness and the relative importance of shame and guilt, I again employ two complementary data sources: (i) self-reports from ISEAR, as before, and (ii) data from Google Trends.

1. ISEAR. First, recall that ISEAR also elicited the length and intensity of shame and guilt. From these data, I construct a summary statistic of the relative importance of shame over guilt. Specifically, I compute the difference in intensity and length of an emotion between shame and guilt and then average the z-scores of these two differences. This results in a summary statistic that equally weights intensity and length of the two emotions and again can be thought of as the inverse of θ.

Columns (4)–(6) show the results, where the regression methodology is the same as in the case of disgust. I find that individuals from countries with higher ancestral kinship tightness report more intense and longer-lasting emotions of shame than guilt. Again, the point estimates are in the ballpark of 30% of a standard deviation.

2. Google Trends. I develop a second measure of the relative importance of shame and guilt, which does not rely on self reports. To this end, I exploit the idea that online search patterns reveal the salience of psychological phenomena (Stephens-Davidowitz 2014), and analyze how often people entered shame and guilt into Google. Google Trends allows an assessment of this frequency relative to overall search volume, separately for each country. To avoid the potential bias that might arise from comparing search behavior across different languages, the analysis only relies on within-language variation. Accordingly, I restrict attention to languages that are an official language in at least two countries (otherwise, no within-language variation can be exploited) and that are covered by Google Translate, providing access to translations for shame and guilt from the same source. For example, in English, I entered "guilt" and "shame" separately into Google Trends and recorded how often (relative to total search volume) people across countries searched for either concept in the past five years. I repeated the same procedure for each language in the consideration set. In total, I gathered data on search frequency in 72 country-language pairs (consisting of 13 languages and 67 countries) and computed the difference in search frequency between shame and guilt.[28]

This empirical approach has two attractive features. First, by including language fixed effects, any measurement error or bias in the construction of the dependent variable that operates at the level of languages (say, through translation) is netted out. Second, by computing the difference between the use of shame and guilt, the analysis also implicitly differences out country-specific fixed effects that affect the (measurement of) the search frequency of both shame and guilt. For example, if the population of a given country generally never Googled emotions, then this would be netted out by taking differences.[29] At the same time, there are also reasons to exert care in interpreting the results. In particular it is unknown whether people across different countries Google "shame" and "guilt" because they actually feel these emotions or

28. See Online Appendix E for details.

29. This is also why I cannot study the relationship between disgust and kinship tightness using Google Trends data. I do not have a comparison emotion for disgust, so that any generic country-level variation in search behavior on Google that relates to emotions would confound the measurement of disgust.

more generally, whether search behavior on Google actually reflects the salience of concepts across countries and languages.

Table IX, columns (7) and (8) present the results. Conditional on language fixed effects, kinship tightness is positively related to a higher search frequency of shame than guilt.[30]

VII.G. Revenge and Altruistic Punishment

To study the relative importance of altruistic and revenge punishment, the analysis makes use of the preference measures on negative reciprocity in the GPS. The GPS explicitly includes survey items to measure both people's propensity for altruistic and second-party punishment:

(i) How willing are you to punish someone who treats others unfairly, even if there may be costs for you? (0–10)
(ii) How willing are you to punish someone who treats you unfairly, even if there may be costs for you? (0–10)
(iii) If I am treated very unjustly, I will take revenge at the first occasion, even if there is a cost to do so. (0–10)

The dependent variable of interest is the difference between revenge and altruistic punishment, that is, the difference between the z-score of question (i) and the average z-score of questions (ii) and (iii). See Online Appendix E for details.

In the analysis, the outcome variables are again standardized into z-scores. Table X, columns (1)–(3) show that kinship tightness is significantly related to the relative importance of revenge punishment across countries. Columns (4)–(6) show that very similar results hold in individual-level migrant analyses that hold individuals' current country of residence constant. Here, I draw from data on 2,289 migrants from 139 different countries of birth. The coefficient estimates are again remarkably similar to those for the other dependent variables: about 120% of a standard deviation in cross-country and about 30% of a standard deviation in individual-level analyses.

In summary, kinship tightness is systematically linked to the moral outcome variables. In terms of quantitative magnitudes,

30. A potential concern with Google Trends analyses is that measurement error in Google search behavior is higher in poor countries. To address this, I rerun the regressions presented in columns (7) and (8), also controlling for log per capita income. In both regressions, kinship tightness remains statistically significant at the 5% level.

TABLE X

PUNISHMENT PATTERNS ACROSS COUNTRIES AND MIGRANTS (GPS)

Variation is across:	Countries			Migrants (GPS)		
	Dependent variable: Δ Willingness to punish [Revenge versus Altruistic]					
	(1)	(2)	(3)	(4)	(5)	(6)
Kinship tightness	1.20***	1.19***	0.83*	0.31***	0.29***	0.28***
	(0.36)	(0.39)	(0.49)	(0.11)	(0.11)	(0.10)
Country-level controls	No	Yes	Yes	No	No	No
Continent fixed effects	No	No	Yes	No	No	No
Country fixed effects	No	No	No	Yes	Yes	Yes
Individual-level controls	No	No	No	No	Yes	Yes
Country of origin controls	No	No	No	No	No	Yes
Observations	74	74	74	2,289	2,279	2,266
R^2	0.14	0.15	0.29	0.09	0.12	0.12

Notes. OLS estimates, robust standard errors in parentheses. Columns (1)–(4) report country-level regressions. Columns (5)–(8) report individual-level regressions in the GPS, and kinship tightness is assigned based on respondents' country of birth; here, the standard errors are clustered at the country of birth level. The dependent variable is the difference between the willingness to engage in revenge punishment and the willingness to engage in altruistic punishment. Country-level controls include log number of years since observation in the EA and historical dependence on hunting and gathering. Individual-level controls include gender and age fixed effects. The dependent variables are standardized into z scores. $^{*}p < .10$, $^{***}p < .01$.

in the contemporary cross-country regressions, moving kinship tightness from 0 to 1 is typically associated with a change in the dependent variables of more than 100% of a standard deviation. In the within-country regressions, the magnitudes are smaller. This is at least partly mechanical because the data are always standardized into z-scores, but some of the individual-level variation reflects measurement error. Still, in within-country analyses, the coefficient usually implies a change in the dependent variable of typically around 30% of a standard deviation.

VII.H. Robustness

1. Individual-Level Income and Education. All individual-level analyses only control for age and gender in terms of individual characteristics. Controlling for endogenous covariates, such as income or education, may be problematic because these variables may be a function of kinship tightness themselves. Still, as a sensitivity check, Online Appendix D.11, Tables 16–19 replicate all individual-level analyses in the WVS, GPS, MFQ, and ISEAR, also controlling for education and proxies for household income (if available). All results reported in the main text are virtually unchanged if these additional covariates are accounted for.

2. Religion. The model in Section III clarified that belief in a moralizing god is an important functional part of a

society's moral system. Thus, "controlling" for religion is conceptually problematic. Still, a relevant question is whether the results could all be generated by religious beliefs or specific religious denominations. To investigate this issue, the Online Appendix contains three sets of analyses. First, Online Appendix D.12, Table 20 replicates the baseline cross-country specifications and controls for the fraction of Catholics and Muslims in either 1900 or 2000. Second, as in the case of income and education above, Online Appendix Tables 21–24 replicate all individual-level analyses, also controlling for an individual's religious denomination in all data sets. In these two sets of sensitivity checks, the vast majority of results hold as described in the main text. Third, and finally, I investigate to what extent the moralizing god variable in the EA produces the same correlations as kinship tightness. As Online Appendix Table 25 shows, belief in a moralizing god is actually uncorrelated with in-group favoritism in violence, loyalty to the local community, and the strength of local institutions. It appears then that belief in a moralizing god is not the "deep" variable that generates all other results.

3. Malaria. The results in Section V suggest that pathogen threat may partly generate the variation in kinship tightness that is the object of interest in this article. Still, a relevant question is whether variables such as malaria ecology themselves generate variation in moral traits, without a direct structural role for kinship ties. To assess this issue, the regressions in Online Appendix D.13, Table 26 replicate the baseline cross-country regressions and control for malaria ecology (Kiszewski et al. 2004) and the fraction of the population residing in regions of high malaria risk (Gallup and Sachs 2001). These controls never have meaningful effects on the coefficient of kinship tightness and are rarely statistically significant themselves.

4. Excluding Africa. Given the high degree of kinship tightness in Africa, it is of interest to verify that the results also hold when all African societies are excluded from the sample (although the regressions above already accounted for continent fixed effects). Online Appendix D.15, Tables 33–38 show that indeed, very similar results hold when Africa is excluded from the analysis. This is true for the historical analysis in the EA, the

contemporary cross-country and cross-ethnic group analysis, and when excluding respondents of African origin from the migrant analyses.

5. Separate Kinship Tightness Proxies. Throughout, the analysis relied on the summary statistic of kinship tightness that encompasses multiple dimensions of kinship systems. To gain insight into whether any one of the components alone generates the results, Online Appendix D.16, Tables 39–48 replicate all analyses from above, separately for each of the four components. The results show that all proxies are reasonably predictive of the moral variables discussed above, but the presence of bilateral (versus unilineal) descent and of clans are particularly consistently related to the structure of moral systems.

VIII. Moral Systems and Cooperation

The argument of this article is that societies possess heterogeneous yet internally consistent moral systems and that these moral systems enforce different cooperation patterns across societies. A perhaps helpful way to see the link between kinship systems, resulting cooperation patterns, and a society's moral system is to collapse the "moral" outcome variables into a single summary statistic of a "moral kernel."[31] For this purpose, I compute the first principal component of the difference between in- and out-group trust, belief in hell, the relative importance of communal moral values, the moral relevance of disgust, and the difference between revenge and altruistic punishment at the country-level.[32] Figure VIII depicts the relationship between this moral kernel and kinship tightness ($\rho = 0.65$). Furthermore, the moral kernel is also highly correlated with the behavioral cross-country measure of family favoritism discussed in Section VII and Online Appendix D.7, that is, the fraction of jobs in large companies that are assigned based on family relationships ($\rho = 0.72$). Societies indeed appear to possess internally consistent systems of cooperation and morality that are well explained by historical family structures.

31. Online Appendix D.17, Tables 49–50 provide correlation matrices between all main variables, both in the EA and at the contemporary country level.

32. The shame–guilt variables have too few observations to be included in the construction of the index.

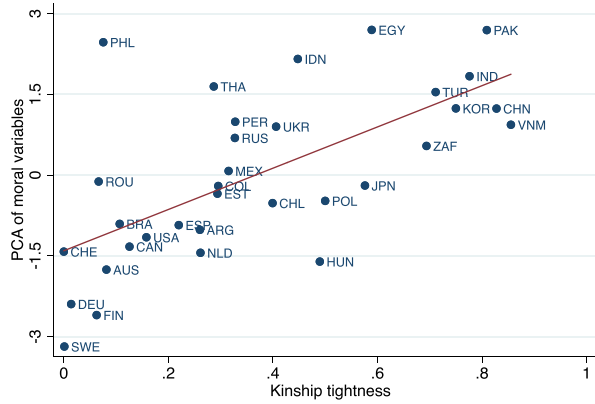

FIGURE VIII

Kinship Tightness and Morality Kernel

Relationship between kinship tightness and the morality "kernel," which is constructed as the first principal component of the difference between in- and outgroup trust, belief in hell, relative importance of communal over universal moral values, moral relevance of disgust, and the difference between revenge and altruistic punishment.

IX. KINSHIP TIGHTNESS AND DEVELOPMENT

Last, the article studies the relationship between kinship tightness and development, again through the lens of the model. This calls for a dynamic analysis. I begin by considering the relationship between kinship tightness and development in historical ethnic groups and then move on to a dynamic country-level analysis. The appropriate proxy for development in preindustrial times is population density (Ashraf and Galor 2011). I hence compute local population density in the year of observation of the respective ethnic group from the HYDE data set.[33] As alternative proxies for local development, I consider information in the EA on (i) the complexity of local settlements in eight ordered categories (from nomadic to semisedentary to separated hamlets to complex), and (ii) the mean size of communities in eight ordered categories (from below 50 to more than 50,000).

33. The HYDE data only contain population density by decade for years after 1700 and by century for earlier years. I compute local population density for the closest available year relative to the year of observation.

TABLE XI

ETHNIC GROUP-LEVEL POPULATION DENSITY AND KINSHIP TIGHTNESS

	Dependent variable:					
	Log [1 + Population density]		Complexity settlements		Size of community	
	(1)	(2)	(3)	(4)	(5)	(6)
Kinship tightness	0.60**	−0.26	0.94***	0.24	0.25	−0.21
	(0.30)	(0.17)	(0.26)	(0.15)	(0.35)	(0.16)
Dependence on hunting and gathering		−1.41***		−2.51***		−2.06***
		(0.20)		(0.20)		(0.23)
Continent fixed effects	No	Yes	No	Yes	No	Yes
Log [# of years since obs.]	No	Yes	No	Yes	No	Yes
Observations	1,172	1,171	1,186	1,176	613	607
R^2	0.03	0.48	0.08	0.46	0.01	0.37

Notes. Historical ethnic group-level OLS estimates in the EA, standard errors (in parentheses) are clustered at language subfamily level. The dependent variable in columns (1)–(2) is log population density from the HYDE data set in the closest available year relative to the year of observation of the respective group. In columns (3)–(4) and (5)–(6), the dependent variables are the complexity of settlements and community size in the EA, respectively. Other controls include distance from the equator and log number of years since observation. All dependent variables are standardized into z-scores. $^{**}p < .05$, $^{***}p < .01$.

Table XI summarizes the relationships between kinship tightness and these proxies for local development. If anything, kinship tightness is positively related to preindustrial development, although the positive coefficients mostly result from the confounding effect of dependence on hunting and gathering. Still, the relationship between kinship tightness and preindustrial development is at least not negative.

In a second step, I perform a dynamic analysis at the country level. Specifically, I regress country-level log population density in any given available year since 1500 CE on kinship tightness and analyze the evolution of OLS coefficients over time. To keep the analysis meaningful in light of the changes in population structures throughout the post-Columbian migration flows, I restrict the sample to those countries in which at least 50% of the current population are native, according to the migration matrix of Putterman and Weil (2010). To be able to compare the results with those in Table XI, each regression controls for ancestral dependence on hunting and gathering, although virtually identical results hold without this control variable.

The left panel of Figure IX presents the results. In this figure, each dot represents the regression coefficient of kinship tightness

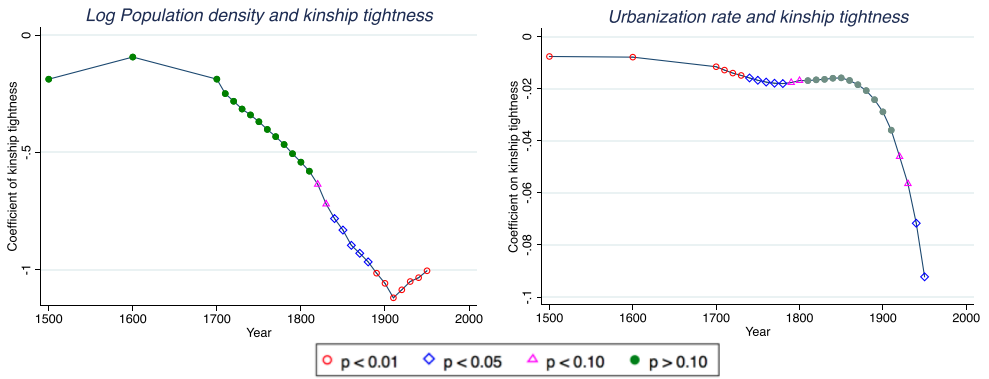

FIGURE IX

Kinship Tightness and Development over Time

The left panel shows the results of OLS regressions in which I regress country-level log population density in a given year on kinship tightness. Each dot represents the OLS point estimate for the regression in the respective year, and the color coding (color version available online) denotes levels of significance. In all regressions, the sample is restricted to countries in which at least 50% of the population is native, resulting in a sample of 123 countries. All regressions control for ancestral dependence on hunting and gathering. The right panel follows an analogous logic, except that the dependent variables are urbanization rates.

from a given year and the color coding is used to denote statistical significance.[34]

As Figure IX shows, the relationship between country-level population density and kinship tightness is initially small, statistically insignificant, and flat over time. However, around the onset of the Industrial Revolution, the kinship tightness coefficient rapidly increases in absolute size and becomes statistically significant. Moreover, a set of seemingly unrelated regressions shows that the regression coefficient in 1900 is statistically significantly larger than those in, for example, 1500, 1600, 1700, and 1800 ($p < .01$). That is, around the Industrial Revolution, a negative relationship between kinship tightness and development emerges. The right panel of Figure IX replicates the preceding analysis but uses urbanization rates instead of population density as the dependent variable. The resulting picture is very similar.[35]

Online Appendix D.18, Table 52 shows that the relationship between contemporary per capita income and kinship tightness is also strongly negative, which is robust to a wide range of covariates. In summary, the negative relationship between the strength of family ties and development today (documented also by Alesina and Giuliano 2013) appears to be a relatively recent phenomenon. These results dovetail well with the model presented in Section III, in particular the emphasis on the (time-varying) moral systems that might mediate this relationship.

X. Conclusion

This article has presented an analysis of cultural variation in moral systems, both cross-sectionally and over time. The results shed light on four separate issues. First, while it has been observed that a society's family system is related to in-group versus out-group cooperation patterns and trust, little was known empirically about how these different systems regulate and enforce cooperative behavior. This article has documented that an extremely diverse and seemingly unrelated set of characteristics—belief in moralizing deities, moral values, punishment strategies, shame,

34. Online Appendix D.18, Table 51 shows the regression results underlying the construction of Figure IX.

35. A potential concern is that these patterns are merely driven by different colonization experiences. Online Appendix D.18, Figure 10 replicates Figure IX, yet controls for colonizer fixed effects. The results are very similar.

guilt, and disgust—jointly form internally consistent moral systems that appear to enforce cooperation.

Second, the results provide a rationale for the existence of cultural variation: because some traits regulate different cooperation regimes, they ought to differ, both across societies (like disgust) and over time (as seems to be the case with moralizing religions).

Third, the article also illuminates the co-occurrence of various cultural traits. Across the social sciences, researchers with an interest in cultural variation have noted that cultural traits are frequently correlated, yet—as pointed out by Alesina and Giuliano (2015)—insights into why that is the case are rare. The present article sheds light on this issue by showing that different cultural traits serve a similar role in enforcing cooperation within a given moral system, so that their co-occurrence is simply a by-product of the fact that they discipline prosocial behavior in similar ways.

Finally, the article has provided suggestive evidence that the structure of these moral systems may be important not only for understanding cooperation per se but also for development outcomes. In the model in Section III, income differences between loose and tight kinship societies emerge precisely when (and because) societies begin to invest in different moral systems. Thus, the model suggests that income differences between loose and tight kinship societies cannot be understood without paying attention to the moral systems that mediate this relationship. Future research might be able to tease apart more clearly whether a social system that appears to be efficient in the past—tight kinship and resulting moral systems for the purposes of agricultural production—confers disadvantages under a modern economic regime that relies on increased interactions with strangers and hence benefits from a different type of morality.

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SUPPLEMENTARY MATERIAL

An Online Appendix for this article can be found at *The Quarterly Journal of Economics* online. Data and code replicating tables and figures in this article can be found in Enke (2018) in the Harvard Dataverse, doi:10.7910/DVN/JX1OIU.

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