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Witchcraft beliefs and the erosion of social capital: Evidence from Sub-Saharan Africa and beyond☆

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ABSTRACT

This paper examines the relationship between witchcraft beliefs, a deep-rooted cultural phenomenon, and various elements of social capital. Using novel survey data from nineteen countries in Sub-Saharan Africa we establish a robust negative association between the prevalence of witchcraft beliefs and multiple measures of trust which holds after accounting for country fixed effects and potential confounding factors at the individual, regional, and ethnic-group levels. This finding extends to other metrics of social capital, namely charitable giving and participation in religious group activities. Such coexistence of witchcraft beliefs and antisocial attitudes stands in stark contrast to a well-explored alternative cultural equilibrium characterized by religious prosociality. Evidence from societies beyond Africa shows that in preindustrial communities where witchcraft is believed to be an important cause of illness, mistrust and other antisocial traits are inculcated since childhood. Furthermore, second-generation immigrants in Europe originating from countries with widespread witchcraft beliefs are generally less trusting.

1. Introduction

Understanding the role of deep-rooted factors such as geography, institutions, and culture is currently at the forefront of research on comparative economic development (Spolaore and Wacziarg, 2013). Among these factors, culture, including values, attitudes, beliefs, and social norms, is perhaps the most controversial, hard-to-measure, and intriguing one. A theme that has received relatively little attention in the recent burgeoning empirical research on culture, largely due to the lack of data, is the place of long-standing traditional customs, practices, and beliefs in developing countries.

This paper is the first large-scale rigorous empirical study on witchcraft beliefs, a cultural phenomenon which is still a salient feature of daily life in many parts of the African continent and beyond. While beliefs in witchcraft, broadly defined as ability to use supernatural techniques to harm others or acquire wealth, have long been argued to impede socioeconomic development, systematic evidence to support such statements is missing.[1] This study contributes to filling this gap by using novel survey data from subnational regions of Sub-Saharan Africa to examine the relationship between witchcraft beliefs and trust, as well as other measures of social capital.

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[1] Several recent papers quantitatively examine some of the issues related to witchcraft. Miguel (2005) connects witch killings in Tanzania to income shocks caused by rainfall volatility. Similarly, Oster (2004) argues that witch trials in Europe in the 16th–18th centuries were a response to food shortages due to low temperatures. Johnson and Koyama (2014) measure the incidence of witch trials across French regions between 1550 and 1700 to infer the strength of legal institutions. Lemay-Boucher et al. (2013) explore the determinants of household expenditures on "magico-religious" protection in Benin. However, none of these studies examine the prevalence or the consequences of witchcraft *beliefs*.

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According to numerous ethnographic case studies, witchcraft beliefs can have a direct adverse effect on interpersonal relations and cooperation via two main channels: by fostering the fear of bewitchment and by spreading the fear of witchcraft accusations potentially entailing severe sanctions, from destruction of property to ostracism and even ritual killing.[2] The new evidence presented in this paper is largely consistent with this view suggesting that the erosion of social capital is one of the ways in which witchcraft beliefs may disrupt the fragile process of African economic development. On the other hand, the observed relationship may be an outcome of a broader process of cultural coevolution generating a mutually reinforcing set of antisocial beliefs and behaviors. Expanding the scope of the paper beyond Africa, the analysis of preindustrial small-scale societies shows that the presence of witchcraft beliefs is associated with inculcation of specific traits, including mistrust and aggressiveness, in children. In addition, lower trust among second-generation immigrants in Europe can be traced back to higher prevalence of witchcraft beliefs in their countries of ancestry.

The first layer of evidence is based on the 2008–2009 survey data collected by the Pew Forum on Religion and Public Life in nineteen countries of Sub-Saharan Africa. We use these data to extract two principal measures of interest, namely personal belief in witchcraft, as reflected by individual responses to the relevant survey questions, and regional prevalence of witchcraft beliefs at the level of subnational administrative units. Our baseline result is that self-reported trust in other people (generalized trust) is strongly negatively correlated with the regional prevalence of witchcraft beliefs. Similar result holds for trust in people with different religious values which is also negatively and significantly related to personal belief in witchcraft. This negative association between witchcraft beliefs and trust is robust to the inclusion of a wide range of individual socio-demographic characteristics and regional-level controls for geography, economic development, conflict, ethnolinguistic diversity, prevalence of traditional religion, education, and proxies for the quality of local institutions, in addition to country fixed effects. The estimates are quantitatively meaningful suggesting that, other things equal, a one-standard-deviation increase in the regional prevalence of witchcraft beliefs corresponds to an average decline in trust by roughly 0.1 standard deviations.

In order to further explore the robustness of our findings we use self-reported ethnic affiliations to link the original survey to ethnographic datasets. This allows to account for ethnic-group-level characteristics that have been shown to directly affect trust, such as historical intensity of slave trades, as well as those that might be related to the presence of witchcraft beliefs, such as measures of precolonial development, institutions, and the type of subsistence production mode. Reassuringly, the inclusion of these variables does not alter the main results. More generally, the addition of a broad array of potentially confounding factors at various levels of aggregation appears to strengthen rather than attenuate our baseline estimates.

The analysis is next extended to other traditional beliefs covered by the survey and other kinds of trust. We show that only those beliefs whose regional prevalence is highly correlated with that of witchcraft beliefs are significantly related to trust, at least when witchcraft beliefs are excluded from the equation. Thus, it is a special class of witchcraft and conceptually related beliefs, rather than any superstition, that is strongly associated with mistrust. To check whether our findings hold up for other kinds of trust, we connect the measures of regional prevalence of witchcraft beliefs and related superstitions to the three latest waves of the Afrobarometer surveys (2005–2013) containing a variety of trust questions. In that sample, witchcraft beliefs are uniquely negatively associated with interpersonal trust, namely trust in relatives, neighbors, and other acquaintances. The relationship also holds for trust in local institutions, such as police, courts, and local council, but is statistically insignificant for trust in "larger government" as represented by the army, president, parliament, and the electoral commission. This exercise provides external validation of our original findings and demonstrates the broader nature of the negative association between witchcraft beliefs and community trust.

Although our empirical investigation mostly focuses on trust, we also find a strong link between witchcraft beliefs and other elements of social capital. Specifically, in the main survey sample, people who claim to believe in witchcraft and those who reside in regions with higher prevalence of witchcraft beliefs are significantly less likely to engage in charitable giving and participate in religious group activities. This connection between witchcraft beliefs and antisocial attitudes and behaviors contrasts and complements the literature stressing the positive long-term role of religions with moralizing high gods in fostering within-group cooperation and solidarity (Norenzayan and Shariff, 2008). We argue that these different bundles of beliefs and norms may represent competing alternative equilibria emerging in the process of cultural coevolution and discuss potential factors contributing to the survival of witchcraft beliefs.

Finally, we exploit additional data from societies and countries beyond Africa to examine the connection of witchcraft beliefs to the inculcation and persistence of antisocial culture. We first show, based on the Standard Cross-Cultural Sample, that in those preindustrial societies where witchcraft is considered to be an important cause of illness, parents cultivate toughness, but not sociability, in their children by emphasizing traits such as aggressiveness and competitiveness rather than trust and honesty. In order to address persistence, we use recent surveys conducted by the Pew Forum on Religion and Public Life (2011–2012) in 24 predominantly Muslim countries to construct a broader country-level dataset on the prevalence of witchcraft beliefs. This extended dataset is then merged to the pooled data from five rounds of the European Social Survey (2004–2012) to examine the trust attitudes of second-generation immigrants in Europe with ancestry in countries for which data on witchcraft beliefs are available. We show that Europeans whose parents were born in countries with more widespread witchcraft beliefs are generally less trusting. Overall, this evidence is consistent with the idea that witchcraft beliefs may directly contribute to generating and promoting persistent norms of mistrust.

This paper contributes to the vibrant literature on the economics of culture.[3] First, it adds a novel component to the empirical literature on the determinants and correlates of cooperation and trust pioneered by Alesina and La Ferrara (2000; 2002) and recently reviewed in Algan and Cahuc (2014). Over the past fifteen years the list of factors argued to explain the variation in trust across individuals, regions, and countries has grown long. These include personal background characteristics (income, education, religion, religiosity), community composition (ethnic, racial, and income heterogeneity), incidence and exposure to civil conflict, nationwide policies, regulations, and institutions, ethnic history, regional climate, and

[2] The severity of such sanctions is attested by sporadic figures on witch killings. Miguel (2005) reports that 3072 accused witches were killed in Sukumaland, Tanzania, between 1970 and 1988. Over 600 alleged witches were lynched in South Africa's Limpopo province in 1996–2001 (Kgatla, 2007).

[3] See Nunn (2014), Alesina and Giuliano (2015), and Gershman (2016) for recent overviews.

early-childhood rainfall shocks.[4] Yet we argue that, at least in the context of Sub-Saharan Africa, one cannot ignore the deep-seated traditional culture and witchcraft beliefs in particular in the analysis of social capital. As the main empirical exercise of the paper demonstrates, even after accounting for a long list of factors offered in the literature, the prevalence of witchcraft beliefs remains an important predictor of mistrust in a broad sample of African regions. More generally, our argument fits with the thesis advanced by Fukuyama (1995) that "social capital, the crucible of trust and critical to the health of an economy, rests on cultural roots."

This study is also directly related to the strand of literature that examines the social costs of culture, specifically the extent to which certain traditional norms and practices may represent obstacles to economic development.[5] Notable contributions that provide qualitative summary analyses of the inhibiting role of witchcraft beliefs include Kohnert (1996) and Platteau (2009; 2014). Both authors argue that the fears generated by witchcraft beliefs suppress individual wealth accumulation, mobility, and incentives for economic self-advancement more generally. They further note that, far from being a relic of the past, witchcraft beliefs interfere with current development aid projects in Africa and are commonly used as a tool for political and ideological intimidation. This paper extends the list of potential negative side-effects of witchcraft beliefs by exploring their connection to social capital.

Importantly, while pointing out the possible social cost of witchcraft beliefs in the form of diminished trust and cooperation, we do not argue that they play absolutely no beneficial role. In fact, a long tradition in anthropology going back to the seminal work of Evans-Pritchard (1937) has been to explain the pervasiveness of witchcraft beliefs on efficiency or adaptability grounds.[6] Similarly, the research agenda on the "law and economics of superstition" attempts to rationalize seemingly bizarre practices and beliefs using standard cost–benefit analysis.[7] The present study does not contradict this "functionalist" approach to culture, but merely focuses on the costs side of the equation.

Finally, this investigation also contributes to the growing interdisciplinary literature on cultural coevolution and religious prosociality. While the dominant theme in this research agenda has been the positive role of religious beliefs in supporting large-scale cooperation and prosocial behavior (Atran and Henrich, 2010), our analysis instead focuses on a very different type of cultural equilibrium characterized by the coexistence of witchcraft beliefs and antisocial norms and attitudes. While the possibility of such equilibria has long been admitted in the literature (Chudek and Henrich, 2011), systematic empirical evidence documenting their presence is virtually nonexistent.

The rest of the paper is organized as follows. The next section reviews ethnographic case studies and highlights the two main channels through which witchcraft beliefs may erode trust and cooperation. Section 3 presents the main empirical results for Sub-Saharan Africa. Section 4 extends the analysis to other traditional beliefs and different kinds of trust. Section 5 examines the broader relationship between witchcraft beliefs and social capital and situates the paper in the literature on cultural coevolution. Section 6 moves beyond Africa to present evidence on cultivation and persistence of mistrust in connection to witchcraft beliefs. Section 7 concludes. Appendices contain the description of all variables used in the empirical analysis and additional figures.

2. Do witchcraft beliefs erode social capital?

Making generalizations about witchcraft beliefs in Sub-Saharan Africa is not an easy task. Far from being monolithic, witchcraft beliefs are quite heterogeneous and their precise expression varies across locations and cultures. For instance, while in some societies the ability to engage in witchcraft is believed to be innate and heritable, in others anyone is presumed to be able to acquire this skill.[8] Another dimension of heterogeneity has to do with the gender and age of witches. Although in many African cultures both men and women of any age can practice witchcraft, in certain societies such powers are exclusively available (or more likely to be attributed) to either men or women. Sometimes elderly women and even children run the highest risk of being accused of witchcraft and are expelled from homes or killed as a consequence (Miguel, 2005). While all societies believe in the harmful effects of witchcraft, some cultures also believe in "good" witchcraft. In the latter case special words may be reserved for different types of witchcraft, as in Green Valley, South Africa (Niehaus, 2001). On a related note, a rather common belief is that witchcraft powers can be used not just to harm others, but also to promote the witch's own well-being, often at the expense of other community members. Further aspects of witchcraft beliefs that vary across cultures include, among other things, the nature of a typical relationship between the accuser and the accused, mythology related to witches' rituals, and types of sanctions applied to the alleged witches.

Despite this heterogeneity, there are a few core features characterizing witchcraft beliefs that are common for most societies. First, witchcraft is normally used to explain the origins of misfortunes, especially unexpected ones, such as illness or death, crop failure, and business problems. Second, malevolent acts of witches are believed to be driven by hostile feelings like envy, jealousy, resentment, hatred, greed, or desire for revenge. In the context of the main narrative on the relationship between social capital and witchcraft beliefs, these essential common features of the latter are likely to be more important than the possible variations in details, and similar patterns come up repeatedly in fieldwork throughout the continent, as shown below.

There are several potential channels through which witchcraft beliefs may have a direct adverse effect on interpersonal trust, cooperation, and social relations more generally. An overview of ethnographic case studies suggests that there are two main reasons for being suspicious, distrustful, and non-cooperative in a society with widespread witchcraft beliefs: the fear of bewitchment and the

[4] For the role of personal background see, for example, Alesina and La Ferrara (2002); religion and religiosity are the focus of Guiso et al. (2003) and Berggren and Bjørnskov (2011), respectively; the role of diversity and inequality has been explored in the work of Alesina and La Ferrara (2000; 2002) and Bjørnskov (2007), among others; the effects of civil conflict are examined in Rohner et al. (2013), Cassar et al. (2013), and Besley and Reynal-Querol (2014); Aghion et al. (2010) study the relationship between trust and regulation; Nunn and Wantchekon (2011) look for the origins of mistrust in Sub-Saharan Africa in the history of slave trades; Durante (2010) shows that climatic volatility is associated with higher trust in a sample of European regions; BenYishay (2013) finds that abnormally low rainfall in the first five years of life reduces trust in adulthood.

[5] For instance, Platteau (2014) focuses on the adverse effects of redistributive norms in traditional communities of Sub-Saharan Africa. Similarly, Hoff and Sen (2006) argue that kin-based sharing norms may prevent economic modernization.

[6] We review some of this literature in Section 5. A notable exception is Edgerton (1992) who focuses on the negative consequences of certain elements of traditional culture, including witchcraft beliefs, for people's well-being.

[7] See, for example, Leeson (2014) or Gershman (2015) and references therein.

[8] In the ethnographic literature going back to Evans-Pritchard (1937), the former case is often referred to as witchcraft proper (based on innate ability) and the latter is called sorcery (based on acquired skill). In the first case, societies may also hold different beliefs about how the magical powers are transmitted intergenerationally. For example, the Azande of Southern Sudan believe that male and female witches transmit their powers only to sons and daughters, respectively. In contrast, the Tallensi of Ghana believe that female witches transmit their powers to all of their offspring, while magical abilities of a male witch die with him (Middleton and Winter, 1963).

fear of witchcraft accusations.[9] Importantly, while the former presumes personal belief in witchcraft, the latter only requires the belief to be maintained by other community members. This distinction will motivate our baseline specification in the empirical analysis of Section 3.

Plenty of anecdotal evidence on the corrosive effects of witchcraft beliefs on social relations comes from Tanzania, where, according to Green (2005), such beliefs are a "taken-for-granted aspect of daily life for most people in most communities."[10] Based on her fieldwork in the districts of Ulanga and Kilombero, the author concludes that the ubiquity of witchcraft beliefs and accusations "contributes to a culture of suspicion and mistrust of kin and neighbours, in which those seeking to establish businesses or succeed in their agricultural activities feel perpetually under threat from those whom they know to be jealous and whom they believe wish them to fail." Similarly, in the Tanzanian town of Singida widespread witchcraft beliefs breed "uncertainty, suspicion, and mistrust," while people are afraid that "their fellow business owners may practice witchcraft" to get rid of competitors (Tillmar, 2006).[11] In the Musoma Rural district, parents "discourage their children from eating in neighbours' houses and interacting with strangers" because of the fears of witchcraft attacks and accusations, that is, the norm of mistrust is inculcated from early on (Nyaga, 2007). The latter is especially important as it shows how witchcraft beliefs may contribute to intentional cultivation of mistrust in children on the part of their parents, an issue examined in more detail in Section 6.1.

Nombo (2008) makes another powerful case based on her fieldwork in the Mkamba village, Tanzania, where people are reluctant to cooperate and help each other due to witchcraft-related fears. For instance, they refuse to provide food assistance to their neighbors because they are afraid of witchcraft accusations in case someone gets sick after eating the contributed food.[12] Most villagers admitted in a survey that one of the main reasons for the decline in trust is the danger of witchcraft accusations. Nombo concludes that such anxiety seems to "damage intra-community relations by eroding trust, which is the glue that holds communities together." The lack of solidarity is exacerbated by the association of HIV/AIDS with witchcraft.

South Africa is another country in which extensive fieldwork on witchcraft beliefs and accusations has been conducted. Golooba–Mutebi (2005) shows vividly how the latter are a constant source of tensions in a small village of South African lowveld. As observed by the author, the main consequence of witchcraft beliefs for social relations has been the depletion of trust. As in Nombo (2008), in one-on-one interviews villagers explained that concerns about witchcraft were one of the main reasons for the evident lack of trust between people. Some of them admitted to have rejected other people's help in the form of food due to the fear of being poisoned by a witch. Beyond that, violent sanctions applied to alleged witches are truly terrifying since anyone might find himself in the position of being accused. Such lack of trust prevents cooperation and collective action: attempts to establish mutual assistance groups "have collapsed amidst suspicions and accusations of witchcraft." In addition, Golooba-Mutebi (2004) writes about the general decline in various forms of socializing, such as collective drinking and partying. In order to protect themselves from possible accusations or witchcraft attacks people generally try to minimize any interaction with other community members.

Ashforth (2002) argues, again in South African context, that "in communities where a witchcraft paradigm informs understandings about other people's motives and capacities, life must be lived in terms of a presumption of malice." The "presumption of malice" feeds collective paranoia and makes it difficult to build networks of trust which has "practical implications for civil society and the building of social capital." This view is echoed by Kgatla (2007) who states that "the fear of being pointed out as a witch and the consequences that may follow from such an accusation keep people in a constant state of agony." What makes it even worse is that such accusations may emanate from relatives, neighbors, and close friends. The connection between witchcraft beliefs and the lack of trust in close relatives is also explored in the work of Peter Geschiere on the Maka of Cameroon. He views witchcraft beliefs as the "dark side of kinship" that reflects the "realization that the people with whom one has to live and work – whom one has to trust – can become particularly dangerous" (Geschiere, 2013). This "witchcraft inside the house" destroyed many families because of recurring accusations and sometimes direct violence.[13] Interestingly, while early literature stressed that accusations happened most often among members of the same tight social network, more recent studies notice a shift in this traditional pattern towards greater levels of anonymity, especially in an urban setting (Lindhardt, 2009; Leistner, 2014). This new line of literature suggests that over time, as African societies modernize economically and people engage in more regular interactions with strangers away from home, witchcraft beliefs and accusations are likely to disrupt social relations beyond the networks of relatives and neighbors.

The adverse effects of witchcraft beliefs on social capital are observed in communities all over Sub-Saharan Africa. Thomas (2007) reports that in the Caprivi region of Namibia inter-household trust and cooperation are undermined by frequent witchcraft accusations. Such allegations lead to the breakdown of reciprocal support networks, with dire implications for livelihood security. They also "may result in the accused, and sometimes their household, being shunned by other relatives and community members as long-term trust is damaged." Along the same lines, in her analysis of postwar rural Northern Mozambique Schindler (2010) stresses that, although community members fear bewitchment, an even greater fear is to be accused of practicing witchcraft which "results in the social isolation of households within the community." Interestingly, in their study of collectively liable groups of seed borrowers in Southern Zambia, van Bastelaer and Leathers (2006) notice that fears of witchcraft can weaken mutual monitoring of loan use. On the one hand, villagers may try to hide their relatively high yields to avoid bewitchment by envious neighbors and accusations of using witchcraft to promote own productivity. On the other hand, villagers who are too curious about their neighbors' plots may be accused of witchcraft in the event of crop failure. In sum, such environment helps to explain "most respondents' preference for farming alone over farming with

[9] We focus on case studies from Sub-Saharan Africa to be consistent with the empirical analysis of the following section. However, similar anecdotal evidence on fear and anxiety related to witchcraft beliefs also comes from other parts of the world. See, for example, Gregor (1990) for the case of the Xingu people in Brazil and Kluckhohn (1970) for the case of the Navaho. Furthermore, we narrow down the very large set of ethnographic studies on witchcraft to those that explicitly touch upon the relationship of interest. Section 6 examines the connection between witchcraft beliefs and mistrust beyond Africa.

[10] Incidentally, Tanzania shows the highest prevalence of witchcraft beliefs (96%) in our main survey data described in the following section.

[11] This interesting comparative case study points out that the corrosive impact of witchcraft beliefs on trust in Singida is similar to the effects of the fear of inciting envy on cooperation and trust in a small Swedish town of Karlshöjden.

[12] A typical sanction following such an accusation in the village is to take the accused to a "shaving salon" to conduct a humiliating and costly witchcraft-cleansing ceremony.

[13] This is in contrast to the common view of reciprocity and trust as declining in "concentric circles," from the inner circle of family, kin, and friends to the outer circle of strangers (Sahlins, 1972). In Section 4.2 we show that indeed the prevalence of witchcraft beliefs is negatively associated with a variety of trust measures including trust in relatives and neighbors.

another person (even if that arrangement led to potentially higher individual return)."

Overall, anecdotal evidence suggests that witchcraft-related fears are capable of eroding social capital which may in turn hinder economic development. The rest of the paper goes beyond case studies to conduct a systematic empirical analysis of the relationship between witchcraft beliefs and social capital in Sub-Saharan Africa and beyond.

3. Evidence from Sub-Saharan Africa

3.1. Data

The key individual-level data on both witchcraft beliefs and trust come from a series of surveys conducted by the Pew Forum on Religion and Public Life between December 2008 and April 2009. These nationally representative surveys of adult population involved more than 25000 face-to-face interviews in 19 countries of Sub-Saharan Africa.[14] The surveys included a range of questions on religious beliefs, practices, and attitudes, in addition to standard questions on socio-demographic characteristics, political views, and social issues, along the lines of the widely known Afrobarometer surveys.

The baseline econometric model uses data at three levels of aggregation: individual, region, and ethnic group. Most of the recorded regional affiliations correspond to first-level subnational administrative units.[15] Overall, there are 188 regions in the sample, with both the average and the median of roughly 10 regions per country. Ethnic affiliation is self-reported by survey participants.

The main outcome variable is taken directly from the survey and captures the responses to the standard generalized trust question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" The possible answers are, as usual, either that "most people can be trusted" or that one "can't be too careful." In the full sample of 25091 respondents, 3032 individuals either refused to reply or suggested an alternative answer. Roughly 70% of the remaining respondents picked the "can't be too careful" option.[16] In addition, we report the results for an auxiliary (and the only other) trust measure available in the survey which captures trust in people who have different religious values. For brevity, we refer to it as "trust in people of other religion" throughout the paper.[17] In Section 4.2 we explore additional measures of trust including trust in relatives, neighbors, local institutions, and larger government using the data from Afrobarometer surveys. Section 5 considers further metrics of social capital, namely charitable giving and participation in religious group activities.

The measures of witchcraft beliefs also come from the main survey. There are two (yes or no) questions that broadly fit the concept of witchcraft as defined in the introduction. The first one asks directly whether a respondent believes in "witchcraft," without specifying what the latter means. The second relevant question asks whether a respondent believes in the "evil eye," or that "certain people can cast curses or spells that cause bad things to happen to someone." Such formulation is in fact a misnomer which makes the evil eye virtually indistinguishable from witchcraft or sorcery.[18]

Given the heterogeneity of witchcraft beliefs briefly described in the previous section, the first question is rather vague and likely reflects the numerous variations of the superstition that exist across the continent including, among other things, the belief in "good" witchcraft. On the other hand, the evil eye question captures precisely the "dark side" of witchcraft that is particularly relevant in the context of ethnographic evidence emphasizing the corrosive effects of witchcraft-related fears on social capital. To fully use the available information and minimize potential measurement error, the baseline binary measure of personal belief in witchcraft is set equal to 1, if the respondent replies "yes" to at least one of the two relevant survey questions. The regional prevalence of witchcraft beliefs is then set equal to the fraction of survey participants in a given region who personally believe in witchcraft.[19] In the full sample, roughly 57% of respondents claimed to believe in witchcraft according to our baseline measure.

Fig. 1 shows the distribution of generalized trust and prevalence of witchcraft beliefs across 188 regions of the 19 countries covered by the survey. It is clear from the maps that, first, there is substantial variation in the spatial distribution of both trust and witchcraft beliefs.[20] Second, there is a negative correlation between the two. Scatterplots in Fig. 2 illustrate the association in the raw data (left panel) and what remains of it after country fixed effects are partialled out (right panel). In both cases, we observe a negative and highly statistically significant relationship. Regional variation in the prevalence of witchcraft beliefs accounts for 20% of the variation in trust in the raw data and 7%, if we focus just on within-country variation.

[14] Detailed background information may be found at http://www.pewforum.org/datasets. The following countries are covered by the survey: Botswana, Cameroon, Chad, Democratic Republic of the Congo (DRC), Djibouti, Ethiopia, Ghana, Guinea-Bissau, Kenya, Liberia, Mali, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda, and Zambia. Due to inaccessibility or instability in certain regions of Chad and the DRC, those surveys are only representative of roughly 70 and 80% of adult population, respectively.

[15] Only in the case of Nigeria regions correspond to larger administrative areas, namely six geopolitical zones and separately the Lagos State. The dataset does not contain information on subnational units smaller than those used in the analysis.

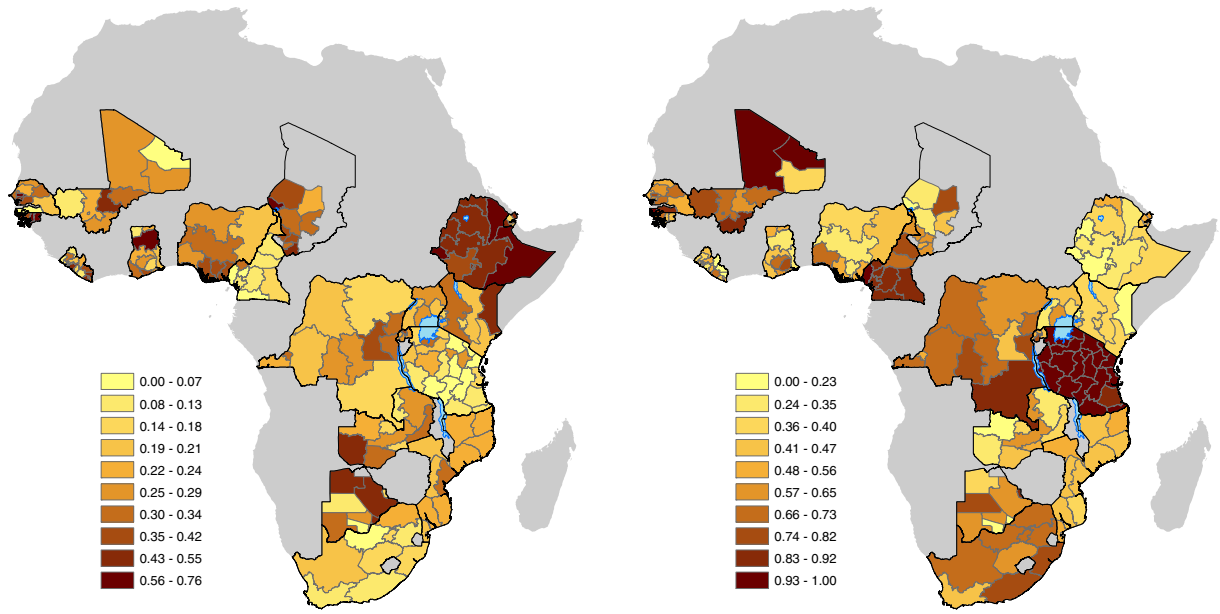
[16] The generalized trust question is the main outcome measure in the vast literature on the determinants of trust. Johnson and Mislin (2012) show that responses to this question in the World Values Surveys are positively correlated with experimental measures of trust across countries.

[17] The exact question reads: "And which comes closer to describing your view? I generally trust people who have different religious values than me, or I generally do not trust people who have different religious values than me." Note that most respondents identify themselves as either Christians or Muslims. Only 1.78% of the sample claim to follow traditional/animist religion and 2.21% are "unaffiliated."

[18] The conventional view of the evil eye belief is different from how it is defined in the survey. Specifically, it is a superstition according to which envious glances can cause damage to the coveted property or its owners via the supernatural destructive force of envy. This does not require intentional actions, such as casting curses or spells, or any knowledge of magical techniques. See Gershman (2015) for details.

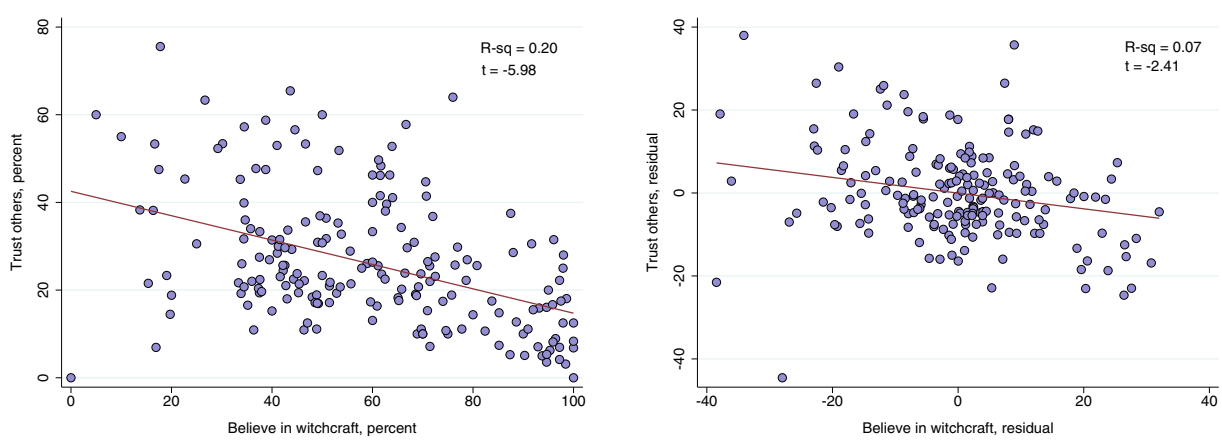
[19] As reported further below, we also conducted robustness checks for two separate measures based on either the witchcraft or the evil eye question. The qualitative results of the empirical analysis remain similar to those derived based on the composite measure, see footnote 38 for more details. The Spearman correlation coefficient for responses to the evil eye and witchcraft questions is 0.55. The correlation between the prevalence of these two beliefs across 188 regions in the sample is 0.88. In the survey both trust questions show up substantially earlier than the module on traditional beliefs.

[20] Tanzania represents a striking dark spot on the map of witchcraft beliefs. It is tempting to speculate that this uniformity across regions may be partly due to Julius Nyerere's Ujamaa nation-building policies whose important tenet was cultural and economic homogenization. Interestingly, Westerlund (1982) argues that the villagization campaign of 1974–1976, one of Nyerere's most controversial projects, was met with resistance because many people were afraid of witchcraft arising from the changes in living conditions and traditional settlement patterns. Miguel (2005) cites studies that attribute the revival of witch killings in Tanzania in the 1960s to the radical reforms of Nyerere's government which provoked conflicts arising from land shortages and misfortunes due to forced collectivization. As a practical matter, our empirical analysis always includes country fixed effects and the exclusion of Tanzania from the sample does not qualitatively affect the results reported below.



(a) Generalized trust (b) Witchcraft beliefs

Fig. 1. Trust and witchcraft beliefs across regions of Sub-Saharan Africa.
Notes. Panels (a) and (b) show the regional prevalence of generalized trust and witchcraft beliefs, respectively, based on aggregated survey responses. The breakdown into ten categories corresponds to deciles of the relevant distribution. Black and gray lines reflect national and regional boundaries, respectively.



(a) Raw data (b) Conditional on country fixed effects

Fig. 2. Correlation between trust and prevalence of witchcraft beliefs.
Notes. Panel (a) is based on the raw survey data. In panel (b), the vertical and horizontal axes correspond to residuals from regressions of regional measures of generalized trust and witchcraft beliefs, respectively, on country fixed effects. The fitted lines, values of *R*-squared, and (robust) *t*-statistics come from regressions weighted by the number of observations per region.

3.2. Empirical strategy

Our estimating equation is motivated by the anecdotal evidence and discussion in Section 2 which implies that both personal beliefs in witchcraft and their prevalence in the community may erode trust by generating, respectively, the fear of bewitchment and the fear of being accused of witchcraft (and facing sanctions). Hence, both variables enter the baseline specification which is an individual-level probit model:

$$\mathbf{P}\{\text{trust}_{i,r,e,c} = 1|\mathbf{X}\} = \Phi(\alpha_c + \beta\ \text{witch}_{i,r,e,c} + \mathbf{X}'_{\mathbf{i,r,e,c}}\text{B} + \gamma\ \text{witch}_{r,c} + \mathbf{X}'_{\mathbf{r,c}}\Gamma + \mathbf{X}'_{\mathbf{e}}\Theta),$$

where i indexes individuals, r regions, e ethnic groups, c countries, and $\mathbf{X}$ is the set of all control variables.[21] The variable $\text{trust}_{i,r,e,c}$ stands for one of the two measures of trust used in the analysis, as explained earlier. The two main right-hand-side variables are $\text{witch}_{i,r,e,c}$ capturing personal belief in witchcraft and $\text{witch}_{r,c}$ measuring the prevalence of witchcraft beliefs in each respondent's

[21] The model is estimated via maximum likelihood (ML). We also report ordinary least squares (OLS) estimates for some of the analogous linear probability specifications.

Table 1
Trust and witchcraft beliefs: baseline estimates.

A. Generalized trust	(1)	(2)	(3)	(4)	(5)	(6)
Witchcraft (region)	−0.188**		−0.191**	−0.177**		−0.177**
	(0.081)		(0.081)	(0.072)		(0.073)
Witchcraft (person)		-0.009	0.003		-0.011	0.000
		(0.011)	(0.010)		(0.011)	(0.010)
Observations	21376	21376	21376	19817	19817	19817
B. Trust in people of other religion						
Witchcraft (region)	−0.187**		−0.158*	−0.240***		−0.205**
	(0.088)		(0.089)	(0.087)		(0.089)
Witchcraft (person)		−0.039***	−0.030**		−0.048***	−0.036***
		(0.014)	(0.013)		(0.014)	(0.013)
Observations	22726	22726	22726	21059	21059	21059
Individual controls	Basic	Basic	Basic	All	All	All
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Regional clusters	188	188	188	188	188	188

Notes. a) Probit specifications in all columns, marginal effects displayed. b) Standard errors shown in parentheses are clustered at the regional level. c) ***, **, and * denote statistical significance at the 1, 5, and 10% level, respectively. d) Basic individual controls include age, age squared, and gender. In addition to the latter, the set of all individual controls includes urban location dummy, religious denomination (twenty-three categories), education (three categories), household size (eight categories), marital status (six categories), computer ownership, and an indicator for self-reported shortage of money for purchasing food, clothes, or health care.

region of residence. The coefficients of primary interest are β and γ both of which are expected to be negative.

Since witchcraft beliefs are unlikely to be randomly distributed across regions in our sample, in what follows the estimates should be interpreted with caution. Specifically, they do not pin down the causal effects of witchcraft beliefs on trust, but rather reflect the association between the two after the influence of observed confounding factors has been accounted for. In the absence of exogenous variation in witchcraft beliefs, our goal in the analysis of this section is to merely explore the pattern observed in the data and check its robustness by ruling out some of the channels potentially mediating the relationship of interest.

Given the extensive literature on the correlates of trust, we include a battery of relevant control variables at different levels of aggregation. Baseline individual-level controls in $\mathbf{X}'_{\mathbf{i,r,e,c}}$ include standard socio-demographic characteristics. Regional controls $\mathbf{X}'_{\mathbf{r,c}}$ include variables that were shown to be important correlates of trust in previous studies and observable characteristics that could confound the relationship between witchcraft beliefs and trust. This group contains measures of local geography, regional socioeconomic development, civil conflict, ethnolinguistic fractionalization, and proxies for the quality of local institutions. In Section 3.4 we also add ethnic-group-level characteristics $\mathbf{X}'_{\mathbf{e}}$. Specifically, we control for the intensity of historical slave trades (Nunn and Wantchekon, 2011) and various measures of precolonial development from the Ethnographic Atlas (Murdock, 1967). For that purpose respondents are matched to respective datasets based on ethnic identifiers reported in the original survey. All variables are described in greater detail as they are introduced in the analysis of the following sections. Exact definitions are provided in Appendix A.

Finally, country fixed effects α_c capture nation-specific factors that may affect trust and cooperation, such as institutions (Tabellini, 2008), government policies and regulations (Aghion et al., 2010), and teaching practices (Algan et al., 2013). Of course, nationwide policies may also affect the prevalence of witchcraft beliefs. As such, we exploit within-country variation in order to estimate the coefficients of interest.

3.3. Baseline results

Table 1 reports the first set of regression results. The outcome variable is generalized trust in the top panel and trust in people of other religion in the bottom panel. The reported estimates are marginal effects from probit regressions with standard errors clustered at the regional level. Specifications in columns 1–3 include only the most basic individual controls (age, age squared, and gender) while in columns 4–6 the following additional variables are included: urban location dummy, religious denomination (twenty-three categories), education (three categories), household size (eight categories), marital status (six categories), and proxies for material well-being, namely computer ownership and self-reported shortage of money for purchasing food, clothes, or health care.[22] Note that the second group of individual controls includes endogenous variables that are likely to be co-determined with witchcraft beliefs or even directly affected by them, which would be problematic from the perspective of causal interpretation. As mentioned earlier, our empirical analysis cannot pin down such causal effects of witchcraft beliefs on trust. However, by including the relevant control variables we are able to check whether the observed pattern is driven by any of those particular factors plausibly correlated with both trust and witchcraft beliefs.

The first rows of estimates in both panels of Table 1 show that the regional prevalence of witchcraft beliefs is highly statistically significant, with a negative sign in all specifications. That is, residents of regions where witchcraft beliefs are more widespread tend to have less trust in others in general and people with different religious values in particular. The magnitude of the coefficient estimates is sensible: other things equal, a one-standard-deviation increase in the regional prevalence of witchcraft beliefs is associated with

[22] The dataset does contain a four-category variable for income (from low to high) but the codebook explicitly states that it cannot be used in cross-country comparisons. Hence, we opt for the comparable proxies for income listed above. When income is included in the analysis, it comes out insignificant in all specifications and its presence has a negligible effect on the estimates of interest. Furthermore, income data are missing for more than 2500 cases in each of the two baseline samples from Table 1. The codebook has a similar caveat for the three-category education variable (completed primary or less, some secondary or completed secondary, and post-secondary and above). Nevertheless, we include it in the analysis since it is one of the few variables significantly (negatively) correlated with personal belief in witchcraft. Although the standards for primary and secondary education indeed differ across countries, these differences are unlikely to render the available education measures completely incomparable.

an average decline of roughly 0.085 standard deviations for both outcome variables when all individual controls are included.[23]

Interestingly, the point estimates for personal belief are only statistically significant and, as expected, negative in the bottom panel of Table 1. That is, personal self-reported belief in witchcraft does not seem to be strongly associated with generalized trust, in contrast to trust in people of other religion. In the latter case, the coefficient estimates imply a non-trivial average decline in trust of more than three percentage points for witchcraft believers relative to non-believers conditional on all included socio-demographic characteristics and country fixed effects. One possible explanation for this finding is that trust in "people who have different religious values" serves as a proxy for trust in people who are unlike the respondent in certain ways. If a witchcraft believer thinks that people with whom he or she has conflicting preferences or values are more likely to engage in witchcraft, elevated mistrust of such people is justified. In other words, the indication of differences in religious values in the respective question may trigger the image of people with whom respondents disagree on some issues and who are thus more likely to wish them harm.

It is tempting to interpret the differences in significance of personal and regional beliefs in columns 3 and 6 in the top panel of Table 1 in terms of the earlier discussion of the channels linking witchcraft beliefs and mistrust. Specifically, it is the fear of witchcraft accusations, rather than the fear of encountering a witch, that may be a primary binding constraint affecting cooperation and trust. As mentioned above, it is not necessary for one to believe in witchcraft in order to be afraid of the consequences of being accused and persecuted as a witch by the rest of the community. On the other hand, this discrepancy may have to do with misreporting. Our regional belief measure might be better at capturing the likelihood of each respondent being a witchcraft believer than their actual answers. In that case, the significant coefficient on regional beliefs reflects the lack of trust associated with both the fear of bewitchment and the fear of accusations. It is also possible that the measurement error in self-reported belief in witchcraft is actually correlated with trust. If, for instance, less trusting witchcraft believers are more likely to hide their true beliefs from enumerators, the corresponding coefficient estimates are likely to be biased downward. Finally, as discussed in detail in Section 5, the regional correlation between witchcraft beliefs and trust may be an outcome of a joint process of cultural coevolution driven by various exogenous shocks.

Among all other individual controls, significant correlates of generalized trust include urban location, proxies for income (with a positive sign), age, and marital status. We also ran a probit regression of personal belief in witchcraft on a set of socio-demographic characteristics included in trust regressions and country fixed effects. Education, religion, and one of our income proxies turn out to be the strongest correlates of the belief. Specifically, less educated people, adherents of traditional (animist) religion and those who experienced money shortages are more likely to believe in witchcraft.[24] Fig. B.1 in Appendix B shows some of these patterns graphically for the raw data. These figures are also interesting since they do not provide strong support for a simple version of "modernization theory." Specifically, the proportion of witchcraft believers is very high among people with secondary and post-secondary education, those living in cities and having sufficient money for basic expenses. Note also that self-identified Christians and Muslims (96% of the sample) are equally likely to believe in witchcraft, with prevalence rates just under 60%.

So far, the only variable measured at the regional level has been the presence of witchcraft beliefs. To account for potential confounding factors we next add explanatory variables argued to constitute important determinants of trust and those that might be correlated with the regional prevalence of witchcraft beliefs. We start with geographic controls. Some of these may affect the variables of interest directly, while others are deep proxies for various correlates of trust such as socioeconomic development, ethnic diversity, and historical slave trades. Since geography has the benefit of being predetermined with respect to both trust and witchcraft beliefs, we control for these "deep" factors prior to including perhaps more immediately relevant endogenous variables.

3.3.1. Geographic controls

The first subgroup of geographic controls ("baseline") are the deep correlates of economic development.[25] These include absolute latitude of the region's centroid, indicators for access to rivers and major lakes, area of the region, suitability of land for agriculture, and malaria stability index. Ashraf and Galor (2011) show that land suitability for agriculture drives historical economic development as measured by population density. Gallup and Sachs (2001) argue that geographic and climatic conditions that contribute to stable presence and transmission of malaria are detrimental for economic development. Furthermore, the burden of disease might also be correlated with the prevalence of witchcraft beliefs since witchcraft is often invoked to provide an explanation for prolonged illness.[26]

The second subgroup of geographic controls ("climate") contains two measures of climatic volatility. Durante (2010) shows that temporal and spatial variability in temperature and precipitation are positively associated with contemporary measures of trust in a sample of European regions. His argument is that the norms of trust and cooperation emerged as a result of experiences of collective action and mutual insurance in agriculture that were instrumental in coping with climatic risk on part of subsistence farmers. To account for this mechanism in the context of Sub-Saharan Africa we construct measures of spatial variability in temperature and precipitation for each region in the sample.[27]

The third subgroup ("diversity") are geographic variables that have been argued to be deep determinants of ethnolinguistic diversity, a robust correlate of trust in cross-country regressions (Bjørnskov, 2007). These determinants include variability in land suitability for agriculture and absolute latitude, the latter already included in the group of "baseline" geographic controls (Michalopoulos, 2012). In addition, Ashraf and Galor (2013) show that genetic diversity which is proxied by the geographic distance from Addis Ababa is another predictor of ethnolinguistic diversity at the country level. In the next subsection we explicitly control for regional ethnolinguistic fractionalization.

[23] In a seemingly unrelated bivariate probit specification, the coefficients on regional prevalence of witchcraft beliefs in the two equations are not statistically different from each other. The standardized coefficient estimates come from the analogous linear specifications for ease of interpretation. The OLS estimates from linear probability models are very similar to those reported in Table 1.

[24] Not surprisingly, consistent with the results presented in Table 1, generalized trust is *not* a significant predictor of personal belief in witchcraft.

[25] See Spolaore and Wacziarg (2013) for the importance of geographic factors in explaining comparative development across countries and Gennaioli et al. (2013) and Mitton (2016) for subnational-level analyses.

[26] Numerous studies have shown that in Africa diseases like malaria and HIV/AIDS are often attributed to supernatural powers including witchcraft. See, for example,Muela et al. (1998) and Thomas (2007).

[27] We have also examined other climatic variables including long-run average annual temperature and precipitation, as well as various measures of agricultural drought and rainfall anomalies, prompted by the findings of Miguel (2005). None of these variables are significant predictors of witchcraft beliefs at the individual or regional levels or affect the results reported below when included as additional controls. The online supplementary appendix examines the relationship between witchcraft beliefs and weather shocks in greater detail.

Table 2
Trust and witchcraft beliefs: geographic controls.

A. Generalized trust	(1)	(2)	(3)	(4)	(5)	(6)
Witchcraft (region)	−0.187***	−0.177**	−0.173**	−0.176**	−0.192***	−0.203***
	(0.069)	(0.072)	(0.073)	(0.074)	(0.069)	(0.077)
Witchcraft (person)	-0.000	0.000	0.000	-0.000	-0.000	0.003
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Observations	19817	19817	19817	19817	19817	21376
B. Trust in people of other religion						
Witchcraft (region)	−0.208**	−0.205**	−0.209**	−0.240***	−0.256***	−0.214**
	(0.084)	(0.089)	(0.089)	(0.088)	(0.085)	(0.085)
Witchcraft (person)	−0.036***	−0.036***	−0.036***	−0.037***	−0.036***	−0.030**
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Observations	21059	21059	21059	21059	21059	22726
Geographic controls	Baseline	Climate	Diversity	Slavery	All	All
Individual controls	All	All	All	All	All	Basic
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Regional clusters	188	188	188	188	188	188

Notes. a) Probit specifications in all columns, marginal effects displayed. b) Standard errors shown in parentheses are clustered at the regional level. c) *** and ** denote statistical significance at the 1 and 5% level, respectively. d) The following geographic controls are included in the respective categories: absolute latitude, indicators for access to rivers and major lakes, area of the region, mean suitability of land for agriculture, and average malaria stability index (baseline); spatial variability in temperature and precipitation (climate); variability in land suitability for agriculture and distance from Addis Ababa (diversity); distance to the coastline and mean terrain ruggedness (slavery). e) Basic and all individual controls include variables listed in the notes to Table 1.

Finally, the fourth subgroup of geographic controls ("slavery") includes terrain ruggedness and distance to the coastline which are proxies for historical slave trades.[28] Nunn and Wantchekon (2011) argue that variation in mistrust across African ethnic groups is partly a legacy of slave trades the regional intensity of which was directly related to distance from the coast. Furthermore, Nunn and Puga (2012) show that Africa is the only continent in which terrain ruggedness is positively associated with economic development. Their interpretation is that rugged terrain made it easier for Africans to evade being captured as slaves.

Table 2 reports the estimates of interest when geographic controls are included in the equation. Their addition either group-by-group or altogether does not seem to substantially affect the estimates of interest. They remain highly statistically significant and the magnitudes do not change much. If anything, the inclusion of all geographic controls leads to slightly larger point estimates compared to Table 1.

3.3.2. Other regional controls

To further check the robustness of the baseline findings we include an array of regional characteristics that represent "proximate" confounding factors. Most of these controls were constructed using external sources, but some are based on aggregated responses from the main survey. We include these endogenous variables in order to see whether any of them disrupts the negative relationship between witchcraft beliefs and trust which would be indicative of the channels connecting the two measures of interest.

We start by introducing more explicit measures of regional economic development. Not surprisingly, high-quality official statistics comparable across African regions, such as gross regional product, are hard to find. Henderson et al. (2012) show that satellite data on night lights may serve as a reasonably good proxy for economic performance.[29] Following this insight, we calculate nighttime lights per capita for each region in the sample. Specifically, we calculate aggregate luminosity for the two survey years, 2008 and 2009, take the average and then divide it by the corresponding region's total population size.[30] Theoretically, the direct relationship between witchcraft beliefs and development is ambiguous and two-sided. On the one hand, as mentioned in the introduction, witchcraft beliefs hamper the incentives to accumulate wealth representing a potential brake on development. On the other hand, economic growth may affect the prevalence of witchcraft beliefs. Interestingly, development and modernization need not necessarily lead to a decline in witchcraft beliefs and accusations. In fact, the effect might be exactly the opposite as development brings about new production techniques, investment opportunities, and consumer goods, a phenomenon dubbed "the modernity of witchcraft" (Geschiere, 1997).[31] As shown in Table 3, the lights per capita measure is not statistically significant in any of the trust regressions.

Recent studies have argued that social capital may be depleted by the experience of civil conflict and exposure to violence, although the

[28] Clearly, these two geographic variables are also important from a broader development perspective. We relegate them to the "slavery" subgroup because of their special prominence in research on African development, trust, and historic slave trades. We explicitly control for ethnic-group-level intensity of slave trades in Section 3.4.

[29] See an extended discussion of the lights measure in Michalopoulos and Papaioannou (2013; 2014) who employ it to proxy for economic development at the level of ethnic homelands and individual pixels (grid cells) of the African map. Rohner et al. (2013) use average nighttime luminosity to proxy for economic development in counties of Uganda.

[30] High-resolution gridded data on population come from LandScan Africa for the year 2013. Bidner and Francois (2011) argue that population size is an important determinant of trust on its own right. Results are qualitatively the same if we control separately for average luminosity and population size or density, or if we take log transformations of these measures.

[31] Macfarlane (1970) makes a related case in the context of witchcraft beliefs in Tudor and Stuart England. He argues that witchcraft prosecutions accompanied the social change from an integrated village society to a more individualistic one.

overall evidence remains somewhat mixed.[32] Furthermore, an early strand of literature in anthropology argued that witchcraft accusations represent what Marwick (1970) calls a "social strain-gauge" which reflects the type of social tensions present in a community. Thus, it is important to account for conflict as potential correlate of both trust and the strength of witchcraft beliefs. Following Rohner et al. (2013) we construct a measure of regional exposure to conflict using geo-referenced data from ACLED (Armed Conflict Location and Event Dataset). Specifically, we calculate their benchmark indicator which is the total count of all armed conflict events that occurred within each region. [33] As shown in columns 2 and 5 of Table 3, our measure of conflict comes out insignificant and leaves the estimates of interest virtually unchanged.

We also control for subnational ethnolinguistic fractionalization (ELF) which has been argued to be an important correlate of trust. To construct ELF indices at the subnational level we use, when possible, large-scale regionally representative household surveys, namely DHS (Demographic and Health Surveys) and MICS (Multiple Indicator Cluster Surveys).[34] Consistent with earlier research, ELF enters negatively and is highly significant in the generalized trust regression, as shown in column 3 of Table 3.[35]

In Table 4 we continue to add potentially important controls one-by-one. Regional variables in this table are all calculated based on the original survey. As mentioned earlier, the two important correlates of personal belief in witchcraft within a large set of socio-demographic controls are the level of education and self-identification with traditional (animist) religion. To control for these factors at the regional level, we measure the proportion of respondents with education above primary and the share of those following traditional religion. Curiously, education turns up negative and highly significant in the generalized trust regression. Somewhat surprisingly, the fraction of people following traditional religion enters significantly and positively in the generalized trust regression but negatively for trust in people of other religion.[36]

Finally, widespread witchcraft beliefs might reflect the malfunctioning of local institutions which may at the same time cause mistrust. They may also be capturing finer types of local conflicts related to misdemeanors, religious or ethnic tensions. To proxy for these channels we exploit survey questions that infer local sentiments about conflict between religious groups, crime, and corruption among political leaders. Specifically, these questions ask whether those three issues represent "a very big problem, a moderately big problem, a small problem or not a problem at all." Based on the answers we calculate average regional scores and include them as additional control variables. As columns 3–5 and 8–10 of Table 4 show, these measures do not seem to be significantly correlated with trust or challenge our estimates of interest.

Table 5 shows the estimation results when all regional controls are included in the analysis. The coefficients of interest are not substantially different from the case in which only geographic controls are included.[37] In other words, the main findings remain robust to a wide range of regional controls.[38]

3.4. Ethnic-level controls

According to Nunn and Wantchekon (2011), historical exposure of African ethnic groups to slave trades had a long-run adverse effect on trust. More generally, precolonial experiences of ethnic groups, their traditional institutions and subsistence mode of production likely had and still have an influence on their contemporary social relations. Similarly, the formation of traditional culture including witchcraft beliefs may have been affected by certain ethnic-level characteristics. In order to account for such potentially important factors, we link our survey data to relevant ethnic-level datasets.

The source of data on most ethnic-level characteristics is the Ethnographic Atlas (Murdock, 1967) that has been widely used in recent research on long-run development. Data on slave exports by ethnic group come from Nunn and Wantchekon (2011). We matched self-reported ethnicities of respondents in the original survey to these two sources. Since survey data on ethnicity are missing for Rwanda and South Africa, these two countries (14 regions in total) drop out from the sample whenever ethnic-level characteristics are included. For the remaining 17 countries there were a total of 660 unique valid ethnicities, of which 551 were matched to Nunn and Wantchekon (2011).[39] Most of these matches were perfect, that is, based on exact correspondence between the names of ethnicities (or their alternates) in the two sources, while some were based on the belonging of ethnic groups to the same "cluster" as defined by Murdock (1959). We followed the same strategy when matching ethnicities from the main survey to the Ethnographic Atlas. The baseline sample used in the analysis below includes only those two high-quality types of matches.[40] Due to imperfect matching and limited availability of the ethnographic data the sample size is substantially reduced.

The following variables from the Ethnographic Atlas are included in the analysis: settlement pattern (eight categories), jurisdictional

[32] See Rohner et al. (2013) and Cassar et al. (2013) for the cases of Uganda and Tajikistan, respectively. Besley and Reynal-Querol (2014) show that historical conflict is associated with lower contemporary levels of trust across Africa. On the other hand, Bellows and Miguel (2009) study the 1991–2000 civil war in Sierra Leone and find that more intense experience of violence is associated with *greater* trust of people outside local community, higher local public goods contributions, and better attendance of community meetings, among other things.

[33] The baseline time period is from 1997, when ACLED records begin, until 2009, the end year of the survey. If we focus only on conflict events in 2008–2009, corresponding to the survey period, the results remain virtually the same. Using total fatalities instead of the number of events or focusing separately on violence against civilians or riots and protests does not qualitatively alter the results. Since ACLED only captures severe conflict events involving arms, as an alternative we used a similar measure based on SCAD (Social Conflict in Africa Database) which documents smaller-scale socio-political disturbances and communal conflict in Africa. Again, the results remain qualitatively the same.

[34] When DHS and MICS data were not available, we used self-reported ethnic affiliations in the main survey to calculate regional ELF. Relevant data on subnational distribution of ethnic groups in Rwanda are unavailable since such information has not been collected in this country after the 1994 events.

[35] Esteban et al. (2012) demonstrate that ethnolinguistic polarization is a robust predictor of conflict in a panel of countries. When we include this subnational-level index in the regressions, it is statistically insignificant and does not qualitatively affect any of the reported results.

[36] Recall, however, that the fraction of respondents who follow traditional religion is just a tiny 1.78% in the full sample.

[37] Note also that the OLS estimates in columns 3 and 6 are very close to the marginal effects for probit specifications of columns 2 and 5.

[38] The main results reported in this section remain qualitatively the same when we use two alternative metrics of witchcraft beliefs based on either the witchcraft or the evil eye question, although our baseline composite measure looks somewhat stronger than its two components on their own. This is consistent with the notion that the baseline measure corrects the attenuation bias caused by measurement error contained in the alternative metrics. Curiously, the evil-eye-based measure performs slightly better than its witchcraft counterpart in generalized trust regressions. A likely explanation is that "witchcraft" may be interpreted in a variety of ways to include, for instance, "good" witchcraft which is not expected to be strongly associated with mistrust.

[39] Invalid responses include citizenship, race, geographical region of origin, and refusal to respond.

[40] Lower-quality matches were based on geographic location and search across less reliable sources. Using the data on all ethnic groups regardless of the match quality yields very similar results.

Table 3
Trust and witchcraft beliefs: regional controls, part I.

	Generalized trust			Trust in people of other religion		
	(1)	(2)	(3)	(4)	(5)	(6)
Witchcraft (region)	−0.190***	−0.193***	−0.184***	−0.253***	−0.256***	−0.286***
	(0.068)	(0.069)	(0.071)	(0.085)	(0.085)	(0.087)
Witchcraft (person)	−0.000	−0.000	0.001	−0.036***	−0.036***	−0.033**
	(0.010)	(0.010)	(0.011)	(0.013)	(0.013)	(0.014)
Lights per capita	−0.866			−1.568		
	(1.061)			(1.483)		
ACLED events		0.002			−0.001	
		(0.003)			(0.004)	
ELF			−0.097***			−0.010
			(0.032)			(0.038)
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Regional clusters	188	188	183	188	188	183
Observations	19817	19817	19004	21059	21059	20252

Notes. a) Probit specifications in all columns, marginal effects displayed. b) Standard errors shown in parentheses are clustered at the regional level. c) *** and ** denote statistical significance at the 1 and 5% level, respectively. d) Individual and geographic controls include all variables listed in the notes to Tables 1 and 2, respectively. e) ACLED events are measured in hundreds. f) Columns 3 and 6 omit Rwanda due to unavailability of the ELF indices for this country.

Table 4
Trust and witchcraft beliefs: regional controls, part II

	Generalized trust					Trust in people of other religion				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Witchcraft (region)	−0.208***	−0.201***	−0.192***	−0.190***	−0.192***	−0.256***	−0.249***	−0.252***	−0.257***	−0.258***
	(0.068)	(0.068)	(0.068)	(0.068)	(0.069)	(0.085)	(0.085)	(0.084)	(0.085)	(0.085)
Witchcraft (person)	0.000	0.001	−0.000	−0.000	−0.000	−0.036***	−0.037***	−0.036***	−0.036***	−0.036***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Education	−0.204***					0.009				
	(0.061)					(0.075)				
Traditional religion		0.687**					−0.627***			
		(0.298)					(0.235)			
Religious conflict			0.002					0.039		
			(0.032)					(0.031)		
Crime				−0.044					0.031	
				(0.037)					(0.045)	
Corruption					0.002					0.010
					(0.044)					(0.045)
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional clusters	188	188	188	188	188	188	188	188	188	188
Observations	19817	19817	19817	19817	19817	21059	21059	21059	21059	21059

Notes. a) Probit specifications in all columns, marginal effects displayed. b) Standard errors shown in parentheses are clustered at the regional level. c) *** and ** denote statistical significance at the 1 and 5% level, respectively. d) Individual and geographic controls include all variables listed in the notes to Tables 1 and 2, respectively. e) The range for regional perceptions of religious conflict, crime, and corruption is from 1 (not a problem at all) to 4 (very big problem).

hierarchy beyond local community (a measure of precolonial political centralization), and the type of subsistence economy measured as reliance on hunting, fishing, animal husbandry, and agriculture. These indicators have been viewed as proxies for early economic development (Murdock and Provost, 1973) and some of them were used as ethnic-level controls in the trust regressions of Nunn and Wantchekon (2011) and Rohner et al. (2013). Precolonial measure of political centralization has also been recently shown to be correlated with contemporary economic development as proxied by night-time luminosity (Michalopoulos and Papaioannou, 2013). To capture the intensity of slave trades we take the preferred measure from Nunn and Wantchekon (2011), that is, the natural log of one plus slave exports normalized by land area of the ethnic homeland. All regressions also include individual and regional controls used in earlier specifications and country fixed effects. Since the right-hand side of the regression equation now features variables measured at both regional and ethnic group levels, standard errors are clustered at these two levels following the procedure in Cameron et al. (2011) for OLS regressions.[41]

Table 6 reports the results. First, despite the reduction in the sample size and inclusion of a variety of ethnic-level control variables,

[41] We also ran probit specifications with double-clustered standard errors, and the results were qualitatively the same as those presented in Table 6.

Table 5
Trust and witchcraft beliefs: full set of regional controls.

	Generalized trust			Trust in people of other religion		
	ML (1)	ML (2)	OLS (3)	ML (4)	ML (5)	OLS (6)
Witchcraft (region)	−0.192***	−0.200***	−0.201***	−0.256***	−0.263***	−0.254***
	(0.069)	(0.071)	(0.072)	(0.085)	(0.087)	(0.084)
Witchcraft (person)	−0.000	0.001	0.001	−0.036***	−0.034**	−0.033**
	(0.010)	(0.011)	(0.011)	(0.013)	(0.014)	(0.013)
Regional controls	No	Yes	Yes	No	Yes	Yes
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Regional clusters	188	183	183	188	183	183
Observations	19817	19004	19004	21059	20252	20252

Notes. a) Marginal effects displayed for probit (ML) specifications; linear models in columns 3 and 6 estimated via OLS. b) Standard errors shown in parentheses are clustered at the regional level. c) *** and ** denote statistical significance at the 1 and 5% level, respectively. d) Regional controls include all eight variables from Tables 3 and 4. e) Individual and geographic controls include all variables listed in the notes to Tables 1 and 2, respectively. f) All specifications except for those in columns 1 and 4 omit Rwanda due to unavailability of the ELF indices for this country.

Table 6
Trust and witchcraft beliefs: ethnic-level controls.

	Generalized trust					Trust in people of other religion				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Witchcraft (region)	−0.196***	−0.208***	−0.212***	−0.194***	−0.211***	−0.274***	−0.280***	−0.279***	−0.269***	−0.275***
	(0.074)	(0.073)	(0.074)	(0.075)	(0.076)	(0.081)	(0.080)	(0.082)	(0.081)	(0.082)
Witchcraft (person)	−0.009	−0.010	−0.007	−0.010	−0.007	−0.027*	−0.027*	−0.026*	−0.028*	−0.026*
	(0.014)	(0.015)	(0.016)	(0.015)	(0.016)	(0.014)	(0.015)	(0.015)	(0.014)	(0.015)
Slave exports	−0.012	−0.007	−0.007	−0.009	−0.006	−0.016	−0.010	−0.011	−0.013	−0.008
	(0.009)	(0.009)	(0.010)	(0.010)	(0.011)	(0.012)	(0.012)	(0.013)	(0.011)	(0.013)
Settlement pattern		−0.003			−0.001		−0.004			−0.003
		(0.005)			(0.006)		(0.005)			(0.006)
Jurisdictional hierarchy			0.008		0.009			0.009		0.009
			(0.009)		(0.009)			(0.010)		(0.010)
Hunting				0.013	0.013				−0.012	−0.016
				(0.014)	(0.016)				(0.017)	(0.018)
Fishing				0.016	0.018				−0.003	−0.006
				(0.012)	(0.013)				(0.013)	(0.015)
Animal husbandry				0.021**	0.022*				0.007	0.002
				(0.011)	(0.012)				(0.012)	(0.013)
Agriculture				0.013	0.015				0.001	−0.000
				(0.012)	(0.013)				(0.011)	(0.012)
Regional clusters	174	169	169	173	169	174	169	169	173	169
Ethnic clusters	305	281	276	295	275	306	282	276	296	275
Observations	15273	14220	13973	15189	13965	16196	15025	14767	16087	14759

Notes. a) Linear models estimated via OLS. b) Standard errors shown in parentheses are clustered at the regional and ethnic-group levels. c) ***, **, and * denote statistical significance at the 1, 5, and 10% level, respectively. d) All specifications include a full set of individual, geographic, and regional variables, as well as country fixed effects. e) Settlement pattern ranges from 1 to 8; jurisdictional hierarchy beyond local community ranges from 1 to 4; measures of reliance on hunting, fishing, animal husbandry, and agriculture range from 0 to 9.

the coefficients of interest remain remarkably stable compared to earlier estimates. Second, the included characteristics are themselves largely insignificant. Interestingly, the slave exports variable always enters negatively, consistent with the findings in Nunn and Wantchekon (2011).[42]

3.5. Assessing the bias from unobservables

As the analysis of this section demonstrates, the original results from Table 1 remain robust to the inclusion of a wide set of controls at various levels of aggregation. If anything, the magnitude of the coefficient estimates on regional prevalence of witchcraft beliefs becomes larger and their statistical significance rises. Overall, the estimates imply that a one-standard-deviation increase in the regional prevalence of witchcraft beliefs is associated with an average decrease of 0.083–0.101 and 0.085–0.118 standard deviations for generalized trust and trust in people of other religion, respectively, depending on specification. Personal belief in witchcraft retains significance when trust in people of other religion is a dependent variable and its magnitude hovers around a three-percentage-point average decline in trust for witchcraft believers.

Although our baseline results are highly robust to the inclusion of a very diverse set of controls, it is still possible that certain unobservable characteristics are partly driving the estimated negative

[42] Note that their sample of countries is quite different from the one in the present study with an overlap of just ten countries.

Table 7
Witchcraft and other supernatural beliefs across regions: pairwise correlations.

		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(0)	Witchcraft	1.00									
(1)	Heaven	−0.18	1.00								
(2)	Hell	0.21	0.61	1.00							
(3)	Reincarnation	0.10	−0.02	−0.11	1.00						
(4)	Angels	0.34	0.33	0.30	0.15	1.00					
(5)	Miracles	0.44	0.22	0.23	0.09	0.86	1.00				
(6)	Evil spirits	0.89	−0.06	0.32	0.08	0.53	0.60	1.00			
(7)	Sacrifices	0.67	−0.12	0.06	0.15	0.05	0.14	0.54	1.00		
(8)	Shamans	0.66	−0.06	0.10	0.09	0.04	0.14	0.54	0.86	1.00	
(9)	Juju	0.57	0.06	0.26	0.07	−0.00	0.05	0.45	0.78	0.79	1.00

relationship. One way to assess the severity of potential bias from unobservables is to follow the procedure suggested by Altonji et al. (2005) and modified by Bellows and Miguel (2009).[43] Specifically, we rerun three sets of regressions for each of our two trust equations, now based on common samples of individuals. The first two "restricted" regressions contain only the variables of interest, country fixed effects, and three individual controls: age, age squared, and gender. The second pair of regressions include all individual, geographic, and regional controls. The third pair contain all control variables, including those at the ethnic-group level. Comparing the magnitudes of the coefficient estimates in the "restricted" and "full" regressions we find that the inclusion of controls strengthens rather than attenuates our baseline results. Hence, if the set of included observables is "representative" of all relevant control variables in the sense of Altonji et al. (2005), it is implausible that omitted variables bias can explain away our findings.

4. Other beliefs and other kinds of trust

4.1. Trust and other supernatural beliefs

Although witchcraft beliefs are perhaps the most extensively studied part of traditional African culture, numerous other superstitions are present on the continent. The question is then whether witchcraft beliefs, which assign supernatural destructive powers to people, involve accusations and sanctions, are indeed special in terms of their negative relationship with trust.

To examine this issue we exploit additional questions available in the beliefs module of the survey. The two main questions (on witchcraft and the evil eye) used in the analysis so far are part of the longer list under the following common preamble "Which, if any, of the following do you believe in?" The other nine items on that list are: 1) heaven, where people who have led good lives are eternally rewarded; 2) hell, where people who have led bad lives and die without being sorry are eternally punished; 3) reincarnation – that people will be reborn in this world again and again; 4) angels; 5) miracles; 6) evil spirits; 7) that sacrifices to spirits of ancestors can protect you from bad things happening; 8) that certain spiritual people can protect you from bad things happening; 9) that juju, shrines, or other sacred objects can protect you from bad things happening.

Table 7 shows pairwise correlations between the prevalence of these different beliefs across 188 regions in the sample. Note that there is a high correlation between witchcraft beliefs, beliefs in evil spirits and in supernatural ways to prevent misfortune. This is not surprising since these beliefs are interrelated and often coexist. The notion of "certain spiritual people" (shamans) having protective powers most certainly includes witch doctors specializing in ailments believed to be caused by witchcraft. Supernatural powers attributed to ancestral spirits are also believed to be accessible to witches (Brain, 1982). Juju is a popular term for various forms of traditional medicine and black magic, while "juju-man" refers to a sorcerer or a witch doctor (Smith, 2001). Somewhat more surprisingly, the correlation between witchcraft beliefs and beliefs in angels and miracles is also high and positive.

We first estimate baseline regressions substituting each of the nine beliefs for witchcraft and then run "horse races" between witchcraft and other superstitions. Each of the blocks in Table 8 separated by solid horizontal lines represents a series of such "horse races." As columns 1 and 4 of Table 8 demonstrate, only a few measures of regional beliefs are statistically significant when included by themselves. Those that come out significant with a negative sign are all highly correlated with witchcraft beliefs, with the exception of belief in heaven. Beliefs in hell, reincarnation, angels, and shamans do not seem to be systematically related to trust. Most personal beliefs, too, come out insignificant. In generalized trust regressions, the only two robust statistically significant correlates are personal beliefs in miracles (with a negative sign) and in the protective powers of sacrifices to the spirits of ancestors (with a positive sign), while in the case of trust in people of other religion the only two stable significant correlates are personal beliefs in heaven and hell (both with a negative sign). As for the "horse races," witchcraft beliefs remain statistically significant after the inclusion of other beliefs in the analysis. Furthermore, superstitions whose prevalence is highly correlated with that of witchcraft beliefs are either "knocked out" or "share" their coefficient estimates with those for regional witchcraft beliefs.[44] Thus, witchcraft and related beliefs appear to represent a special layer of traditional culture negatively associated with trust.[45]

[43] This method was recently used by Nunn and Wantchekon (2011) and Rohner et al. (2013) for the same purpose in their trust regressions.

[44] The decline in significance of individual coefficients in some cases is symptomatic of multicollinearity caused by coexistence of supernatural beliefs within regions.

[45] The survey also contains four additional questions on religion-specific beliefs. In particular, Muslim respondents were asked whether they believe in the following: "the return of the Mahdi, the guided one who will initiate the final period before the Day of Resurrection and Judgment"; "that the caliphate will be re-established" in their lifetime; "in one God, Allah, and his prophet Muhammed." Christian respondents were asked if they believe that Jesus will return to Earth during their lifetime. Similar to the results in Table 8, witchcraft beliefs dominate the horse races against these religious beliefs and remain a strong predictor of trust despite the selected samples of Muslims or Christians only.

Table 8
Trust and other supernatural beliefs.

	Generalized trust			Trust in people of other religion		
	(1)	(2)	(3)	(4)	(5)	(6)
Heaven (region)	−0.235*	−0.222	−0.217	0.179	0.213	0.037
Heaven (person)	0.001	0.002	0.010	−0.035**	−0.033**	−0.045*
Witchcraft (region)		−0.195***	−0.218***		−0.253***	−0.278***
Witchcraft (person)		−0.000	−0.006		−0.036***	−0.028*
Observations	19487	19487	13764	20718	20718	14551
Hell (region)	0.048	0.122	0.233*	0.147	0.250**	0.201
Hell (person)	−0.009	−0.008	−0.008	−0.029**	−0.024*	−0.033*
Witchcraft (region)		−0.215***	−0.255***		−0.282***	−0.301***
Witchcraft (person)		−0.002	−0.007		−0.034***	−0.025
Observations	19331	19331	13686	20554	20554	14469
Reincarnation (region)	0.019	0.055	0.096	0.026	0.070	0.038
Reincarnation (person)	0.016	0.015	0.027*	0.016	0.018	0.017
Witchcraft (region)		−0.199***	−0.225***		−0.233***	−0.256***
Witchcraft (person)		−0.003	−0.010		−0.036***	−0.028*
Observations	18381	18381	13026	19522	19522	13764
Angels (region)	−0.013	0.102	0.213**	−0.091	0.056	0.113
Angels (person)	−0.022	−0.021	−0.031	−0.002	0.004	−0.015
Witchcraft (region)		−0.229***	−0.290***		−0.267***	−0.317***
Witchcraft (person)		0.002	−0.003		−0.036***	−0.025*
Observations	19397	19397	13667	20616	20616	14451
Miracles (region)	−0.121	−0.041	−0.006	−0.180*	−0.067	−0.032
Miracles (person)	−0.026**	−0.027**	−0.030**	−0.006	0.002	0.007
Witchcraft (region)		−0.169**	−0.198*		−0.217**	−0.260***
Witchcraft (person)		0.002	−0.004		−0.036***	−0.029**
Observations	19411	19411	13673	20623	20623	14446
Evil spirits (region)	−0.096	0.163	0.192	−0.216***	−0.064	−0.095
Evil spirits (person)	0.008	0.014	0.026	−0.021*	−0.004	−0.010
Witchcraft (region)		−0.343***	−0.384**		−0.191	−0.190
Witchcraft (person)		−0.010	−0.024		−0.032**	−0.020
Observations	19383	19383	13643	20603	20603	14423
Sacrifices (region)	−0.237***	−0.152*	−0.257***	−0.203**	−0.050	−0.119
Sacrifices (person)	0.020*	0.022*	0.027*	−0.001	0.010	0.018
Witchcraft (region)		−0.134*	−0.116		−0.222**	−0.223**
Witchcraft (person)		−0.006	−0.015		−0.038***	−0.032**
Observations	19220	19220	13571	20416	20416	14339
Shamans (region)	−0.121*	−0.042	−0.072	−0.076	0.042	−0.042
Shamans (person)	0.017	0.018	0.027*	0.002	0.011	0.012
Witchcraft (region)		−0.188***	−0.206**		−0.258***	−0.265***
Witchcraft (person)		−0.005	−0.014		−0.036**	−0.028*
Observations	19208	19208	13587	20403	20403	14349
Juju (region)	−0.205**	−0.104	−0.255***	−0.183**	−0.021	−0.122
Juju (person)	0.011	0.012	0.012	0.007	0.017	0.013
Witchcraft (region)		−0.168**	−0.146*		−0.243***	−0.241***
Witchcraft (person)		−0.003	−0.011		−0.037***	−0.028*
Observations	18775	18775	13418	19950	19950	14171
Regional controls	No	No	Yes	No	No	Yes
Ethnic controls	No	No	Yes	No	No	Yes

Notes. a) Linear models estimated via OLS. b) Standard errors (suppressed from the table) are clustered at the regional level for estimates in columns 1, 2, 4, 5 and at both regional and ethnic-group levels in columns 3 and 6. c) ***, **, and * denote statistical significance at the 1, 5, and 10% level, respectively. d) Each of the blocks separated by solid horizontal lines represents a different "horse race." e) All specifications include the full sets of individual and geographic controls listed in the notes to Tables 1 and 2, respectively, as well as country fixed effects. Models in columns 3 and 6 include all regional and ethnic-group-level controls from Tables 5 and 6, respectively.

4.2. Witchcraft beliefs and other kinds of trust

The two dependent variables examined above capture generalized trust and trust in people with different religious values. To gain additional evidence on the relationship between witchcraft beliefs and trust we connect our regional measures of beliefs to the Afrobarometer surveys which contain a larger variety of trust questions. Specifically, we pool the three latest rounds of the Afrobarometer:

Table 9
Witchcraft beliefs and other kinds of trust.

	Relatives		Neighbors		Others you know		Police		Courts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Witchcraft (region)	−0.267**	−0.211*	−0.400**	−0.346*	−0.371**	−0.386**	−0.219*	−0.230*	−0.183*	−0.201*
	(0.113)	(0.123)	(0.154)	(0.186)	(0.170)	(0.196)	(0.115)	(0.123)	(0.109)	(0.109)
Sacrifices (region)	−0.015	−0.083	−0.233	−0.285	−0.111	−0.125	0.141	−0.112	0.066	−0.077
Shamans (region)	0.140	0.065	−0.134	−0.034	0.130	0.187	0.288**	−0.005	0.203	0.020
Juju (region)	0.066	−0.050	−0.019	−0.245	0.210	0.115	0.093	0.061	0.107	0.086
Regional clusters	136	136	136	133	136	136	136	136	136	136
Ethnic clusters	None	193	None	185	None	186	None	193	None	193
Observations	57074	41386	39664	28738	40440	29393	55963	40623	54646	39748
	Local council		Army		President		Parliament		Electoral commission	
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Witchcraft (region)	−0.198*	−0.152	−0.143	−0.063	−0.021	−0.095	−0.136	−0.052	−0.031	0.007
	(0.105)	(0.105)	(0.142)	(0.157)	(0.167)	(0.134)	(0.129)	(0.095)	(0.144)	(0.149)
Sacrifices (region)	0.022	−0.164	0.162	−0.018	0.345*	-0.048	0.189	0.001	0.273*	0.081
Shamans (region)	0.109	−0.057	0.258	0.057	0.370*	0.000	0.330**	0.129	0.336**	−0.067
Juju (region)	0.081	0.065	0.162	0.231	0.400**	0.264	0.245*	0.232	0.296*	0.233
Regional clusters	136	136	136	133	136	136	136	136	136	136
Ethnic clusters	None	193	None	184	None	193	None	193	None	192
Observations	54513	39728	38276	27830	55297	40350	54364	39587	52807	38431

Notes. a) Linear models estimated via OLS. b) Standard errors (only shown for equations with witchcraft beliefs) are clustered at the regional level in specifications with odd numbers and at both regional and ethnic-group levels in specifications with even numbers. c) ** and * denote statistical significance at the 5 and 10% level, respectively. d) All specifications include country and round fixed effects, as well as the following individual controls: age, age squared, gender, urban location dummy, employment status (four categories), religion (sixteen categories), education (ten categories), and living conditions (five categories). e) Specifications in even columns, unlike those in odd columns, include geographic, regional, and ethnic-level controls from Tables 2, 5, and 6, respectively. f) Each row of estimates corresponds to a different set of regression results, where the row's title indicates the right-hand-side "beliefs variable" used in the analysis.

the third (2005–2006), the fourth (2008–2009), and the fifth (2011–2013).[46] The overlap between the pooled Afrobarometer data and the baseline Pew Forum survey is 13 countries and 136 regions.

We focus on the trust questions that were present in at least two out of three rounds of the Afrobarometer. These include three questions on interpersonal trust, namely trust in relatives, neighbors, and other people respondents know. In addition, we examine the questions on trust in the following institutions: police, courts of law, elected local government council, army, president, parliament, and the electoral commission. Each trust measure is coded on the ordinal 0–3 scale (not at all, just a little, somewhat, and a lot) unlike the binary measures used in the earlier analysis. Given the differences between the main survey and the Afrobarometer, we try to mimic baseline specifications from Section 3 as close as possible. The following individual controls are extracted from the pooled Afrobarometer surveys: age, age squared, gender, urban location dummy, employment status (four categories), religion (sixteen categories), education (ten categories), and living conditions (five categories). Geographic and other regional covariates are exactly the same as in Section 3. In order to replicate the results with ethnic-level controls we also match self-reported ethnicities of respondents to relevant groups in the historical datasets.[47] In addition, all regressions include round and country fixed effects.

Table 9 shows the estimates for main specifications featuring regional prevalence of witchcraft beliefs on the right-hand side.[48] It also shows estimation results for specifications with three other superstitions strongly correlated with witchcraft beliefs at the regional level. Each row of estimates in Table 9 corresponds to a different set of regression results, where the row's title indicates the right-hand-side "beliefs variable" used in the analysis. First, note that witchcraft beliefs are negatively associated with all three measures of interpersonal trust in columns 1–6. The strong relationship for trust in neighbors and other acquaintances is especially interesting since, according to some case studies, most witchcraft accusations happen between non-kin, specifically neighbors (Niehaus, 2001). The significant negative association between witchcraft beliefs and trust in relatives is consistent with the idea of witchcraft as the "dark side

[46] Two earlier rounds were excluded for the following reasons: 1) they do not have information on the ethnicity of respondents making it impossible to include ethnic-level characteristics; 2) they do not have the most interesting measures of community trust and instead focus on trust in institutions/organizations; 3) the first round does not have information on standard individual-level controls, namely religion, employment status, and living standards. Also, the last three rounds stand reasonably close to the dates of the Pew Forum survey (2008–2009) for the potentially time-sensitive regional controls variables to be relevant.

[47] Specifically, we used the publicly available data from Nunn and Wantchekon (2011) and Deconinck and Verpoorten (2013) to do the matching for rounds 3 and 4, respectively, and manually did the matching for round 5 using previous references as baseline.

[48] Note that we cannot include personal beliefs in these individual-level regressions since such data are not available in the Afrobarometer surveys.

of kinship" discussed in Section 2. Witchcraft beliefs are also negatively related to trust in local institutions, such as police, courts, and local government council.[49] The relationship is much weaker and insignificant for trust in "larger government" as represented by the army, president, parliament, and the electoral commission. Thus, estimates in Table 9 provide external validation of the findings in Section 3 and demonstrate a broad nature of the negative association between witchcraft beliefs and community trust. Furthermore, looking at specifications with other superstitions, we can see that witchcraft beliefs are uniquely significant and robust in their negative association with measures of interpersonal trust and trust in local institutions.

5. Witchcraft beliefs and antisocial culture

The preceding investigation established a robust negative relationship between the prevalence of witchcraft beliefs and trust across subnational regions in Sub-Saharan Africa, an association that does not appear to be driven by any of the numerous factors included in the analysis. As discussed earlier, this finding is consistent with the view of mistrust as a direct response to witchcraft-related fears that promote caution in dealing with other people. However, in the absence of exogenous variation in witchcraft beliefs causal interpretation of the obtained estimates is problematic. Specifically, there may still be some unobserved or hard-to-measure variables that drive the relationship of interest. On the other hand, this negative association may be an outcome of a broader process of cultural coevolution, a type of equilibrium characterized by mutually reinforcing antisocial beliefs, attitudes, and behaviors.

A rich literature at the intersection of anthropology, economics, evolutionary biology, and other disciplines explores cultural dynamics broadly speaking and the origins of cooperative behavior in groups in particular.[50] One of the fundamental theoretical results in this literature is that evolutionary models with norm-sustaining mechanisms like reputation, costly punishment, and signaling may yield multiple stable equilibria characterized by very different social norms. While some of these equilibria may be characterized by cooperative prosocial behavior, others may feature inferior and even group-damaging norms (Chudek and Henrich, 2011). The multiplicity of equilibria creates a potential for competition between culturally distinct groups as a result of which the more successful sets of norms and behaviors survive and the inferior ones become extinct, in a process known as cultural group selection (Henrich, 2004).

This approach has been applied in particular to understand the role of religion in promoting large-scale cooperation and prosocial norms (Norenzayan and Shariff, 2008). The argument is that cultural evolution has favored certain packages of beliefs and rituals that encourage and sustain group-beneficial cooperation and solidarity. Specifically, religions that feature moralizing high gods concerned with prosocial behavior offered a competitive advantage in the process of intergroup competition and spread at the expense of other types of beliefs and practices that did not provide the benefits of large-scale cooperation (Atran and Henrich, 2010). In this context, de facto popularity of witchcraft beliefs in Sub-Saharan Africa is puzzling if they indeed hamper cooperation and trust that are essential for group survival and competition. Interestingly, in a recent paper Slingerland et al. (2013) use witchcraft beliefs precisely to illustrate the notion that "not all religious beliefs lead to prosocial behavior." Citing recent anecdotal evidence from Liberia, the authors note that "witchcraft and sorcery-based killings have effectively paralyzed civil society…creating an environment of such pervasive interpersonal suspicion and competition that not even the most basic forms of social cooperation can get off the ground." This view of witchcraft beliefs is very much in line with the discussion in Section 2 and evidence presented above.

While the empirical analysis so far has focused on trust, the main survey data from the Pew Forum on Religion and Public Life allow to examine two other measures of social capital commonly used as indicators of prosocial behavior. The first one is charitable giving which has been shown to be positively associated with religiosity, consistent with the idea of religious prosociality (Norenzayan and Shariff, 2008). As noted earlier, a vast majority of witchcraft believers in Sub-Saharan Africa identify themselves as either Christians or Muslims. Depending on the declared religion, survey respondents were asked whether they give tithe/zakat (that is, a set percentage of their income) to charity or church/mosque. Based on responses to these questions, we construct indicators of participation in charitable giving for Christians, Muslims, and for the combined sample.[51] The second useful indicator available in the survey captures the degree to which respondents "participate in prayer groups, Scripture study groups or religious education programs" measured on the ordinal 1–5 scale.[52] Participation in community group activities, membership in associations and formal or informal voluntary organizations have been traditionally seen as useful metrics of social capital (Durlauf and Fafchamps, 2005).

We employ the same baseline specifications as in the trust regressions above, enhanced by a measure of individual religiosity, or self-reported importance of religion in life, as a standard determinant of charitable giving and participation in religious group activities.[53] Table 10 shows the estimation results. Overall, both personal witchcraft beliefs and their regional prevalence are strongly negatively associated with charitable giving (panel A) and participation in religious group activities (panel B). This is consistent with anecdotal evidence in Section 2 and demonstrates that witchcraft beliefs are a powerful predictor of not just lower trust, but the erosion of social capital more broadly.[54] Note also the stark contrast between the estimates for witchcraft beliefs and religiosity: the latter is highly significant and positively associated with both measures of prosocial behavior. Such contrast may reflect the coexistence and competition between two cultural equilibria, one with witchcraft beliefs and antisocial attitudes and the other with prosocial religiosity.

Recall that the literature on cultural coevolution emphasizes the long-run dominance of cooperative equilibria with prosocial

[49] This is in line with anecdotal evidence on the relationship between witchcraft beliefs and politics. Ashforth (2002) points out how in South Africa the inability of government to deal with consequences of witchcraft beliefs and accusations has led local communities to believe that government officials were protectors of witches. More generally, he notes that "the tendency to see evil forces manipulating visible appearances and conspiring to pervert the institutions of public power is both extraordinarily difficult to disprove and extremely destructive of trust in the legitimacy of those institutions."

[50] See, for example, Henrich (2004), Bowles and Gintis (2011), Chudek and Henrich (2011), and Young (2015).

[51] In the latter case the indicator variable is set equal to one, if a person gives either tithe (for Christians) or zakat (for Muslims), and zero, otherwise.

[52] More specifically, the frequency of participation is coded as follows: never (1), seldom (2), several times a year (3), once or twice a month (4), at least once a week (5). This variable is available for the full sample of respondents.

[53] We omit ethnic-level controls to maximize sample size. Including religiosity as additional control variable in the trust regressions leaves all of the reported results virtually unaffected.

[54] Quantitatively, the estimates in Table 10 are comparable to those reported for trust regressions. For specifications in column 10, a one-standard-deviation increase in the regional prevalence of witchcraft beliefs is associated with an average decline in charitable giving and religious group participation by 0.088 and 0.064 standard deviations, respectively.

Table 10
Witchcraft beliefs, charitable giving, and participation in religious group activities.

	Christians			Muslims			Combined sample			
A. Charitable giving	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Witchcraft (person)	−0.037***		−0.028**	−0.055***		−0.048***	−0.043***		−0.035***	−0.036***
	(0.013)		(0.013)	(0.018)		(0.018)	(0.011)		(0.011)	(0.011)
Witchcraft (region)		−0.212***	−0.180**		−0.200*	−0.161		−0.195***	−0.159**	−0.212***
		(0.080)	(0.080)		(0.110)	(0.108)		(0.072)	(0.072)	(0.071)
Religiosity	0.136***	0.137***	0.137***	0.111***	0.119***	0.110***	0.131***	0.134***	0.132***	0.134***
	(0.014)	(0.014)	(0.014)	(0.022)	(0.021)	(0.022)	(0.013)	(0.013)	(0.013)	(0.013)
Observations	14021	14206	14021	7013	7257	7013	21034	21463	21034	20211
B. Participation in religious group activities										
Witchcraft (person)	−0.133***		−0.112***	−0.080		−0.050	−0.131***		−0.108***	−0.096**
	(0.043)		(0.043)	(0.066)		(0.067)	(0.039)		(0.039)	(0.040)
Witchcraft (region)		−0.486**	−0.385**		−0.635***	−0.612**		−0.508***	−0.427**	−0.424**
		(0.190)	(0.192)		(0.238)	(0.254)		(0.169)	(0.173)	(0.175)
Religiosity	0.470***	0.480***	0.470***	0.364***	0.342***	0.362***	0.450***	0.455***	0.452***	0.447***
	(0.042)	(0.042)	(0.042)	(0.103)	(0.105)	(0.102)	(0.036)	(0.037)	(0.036)	(0.036)
Observations	14218	14418	14218	7028	7269	7028	22039	22489	22039	21191
Regional clusters	179	179	179	172	172	172	188	188	188	183
Regional controls	No	No	No	No	No	No	No	No	No	Yes
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes. a) Marginal effects displayed for probit specifications in panel A; linear models estimated via OLS in panel B. b) Standard errors shown in parentheses are clustered at the regional level. c) ***, **, and * denote statistical significance at the 1, 5, and 10% level, respectively. d) Regional controls include all variables introduced in Tables 3 and 4. e) Individual and geographic controls include all variables listed in the notes to Tables 1 and 2, respectively. f) Combined sample includes Christians and Muslims in panel A and all survey respondents regardless of their religion in panel B. g) Charitable giving is a binary variable, while religious participation is coded on the 1–5 ordinal scale.

religions. Cultural group selection implies that, facing competition from a package of beliefs fostering cooperation and group solidarity, an equilibrium with witchcraft beliefs and antisocial culture is bound to extinction.[55] On the other hand, witchcraft beliefs are not only widespread but also, as the literature on the modernity of witchcraft argues, experience a revival, perhaps in a modified form, in response to the challenges of economic development and globalization (Geschiere, 1997). It is thus tempting to surmise that, along with costs in the form of depleted mutual cooperation and trust, witchcraft beliefs deliver potentially important social benefits that contribute to their survival. Existing body of work offers a few insights into the possible useful functions of witchcraft beliefs. For instance, a number of anthropological case studies point out that witchcraft beliefs tend to have leveling effects and promote equality in small-scale societies by enforcing redistributive norms, as recently reviewed in Platteau (2014). The nature of witchcraft accusations is such that they can be used against both the poor and the rich: the former may be accused of witchcraft driven by envy of the wealthier community members, while the latter may be accused of promoting their own good fortune at the expense of others by resorting to witchcraft. The fears of such accusations preserve social hierarchy by preventing mobility and deviation from the established order. In a related argument, Posner (1980) suggests that witchcraft accusations against the well-off society members force them to share their surplus and thus serve as a primitive mechanism of mutual insurance in societies that lack conventional ways of supplying it.

More generally, witchcraft-related fears induce people to conform to the status quo making witchcraft beliefs a special "technique of social control" that may contribute to social cohesion (Kluckhohn, 1970).[56] In other words, witchcraft beliefs help to support a special kind of social order based on fear and forced conformity rather than cooperation, trust, and mutual solidarity. The side-effects, or social costs, of this way to maintain stability include mistrust and other elements of antisocial culture.[57] Furthermore, deterioration of social capital and witchcraft beliefs are mutually reinforcing. Witchcraft beliefs generate suspicion and mistrust which trigger accusations thereby validating and strengthening such beliefs in society. Similarly, witchcraft-related fears prevent people from participating in mutual help groups and building cooperative relationships with their neighbors. To the extent that such lack of solidarity and support

[55] In this context, the interaction between Christianity, the dominant world religion in Sub-Saharan Africa, and witchcraft beliefs is very interesting. For example, while mainline Christian churches tend to deny the existence of witchcraft and oppose local superstitious beliefs, new Charismatic and Pentecostal churches eagerly incorporate African traditional beliefs and practices in their rituals (Leistner, 2014). Both the outright rejection of witchcraft beliefs and attempts at syncretization on part of Christian congregations may be viewed as ways to encroach upon the traditional cultural equilibrium in a competition between different sets of beliefs and social norms.

[56] In his influential work on the Navaho, Kluckhohn also argues that in certain situations witchcraft beliefs may serve as a rather effective conflict-resolution device and a "socially tolerated expression of direct and displaced aggression," although its cost is the tension arising from witchcraft suspicions and accusations. Similarly, Bulbulia et al. (2013) underscore the fluid nature of witchcraft beliefs that "sometimes lead to normative vigilance and sometimes lead to cascades of killings and violent retribution, both building and destabilizing normative orders."

[57] Note, however, that the norms of mistrust per se may have been useful during an important period in African history, namely centuries of slave trades. As argued by Nunn and Wantchekon (2011), such culture was beneficial in the dangerous and insecure environment caused by slave raids. To the extent that witchcraft beliefs enforced mistrust, they, too, could have been a useful element of culture.

aggravates the living conditions of the already vulnerable community members, it also tends to increase the incidence of misfortunes precipitating mutual accusations which keep witchcraft beliefs alive.

6. Beyond Africa: cultivation and persistence of mistrust

As follows from the previous section, witchcraft beliefs are associated not just with mistrust, but with antisocial culture more generally. This section brings new empirical evidence on two related issues: socialization of children in societies with witchcraft beliefs and persistence of antisocial culture over time. We first use the Standard Cross-Cultural Sample (SCCS) to provide direct evidence on the relationship between witchcraft beliefs and parental inculcation of mistrust and other antisocial attitudes in their children. We next explore how trust attitudes of second-generation immigrants in Europe vary depending on the prevalence of witchcraft beliefs in their country of ancestry. Taken together, these two exercises contribute to our understanding of socialization, cultural transmission, and persistence in the context of the relationship between witchcraft beliefs and mistrust. Along the way we introduce new data which extend the scope of the paper beyond Sub-Saharan Africa and permit an additional external validity check for the earlier findings of the paper.

6.1. Witchcraft beliefs and socialization of children

The Standard Cross-Cultural Sample is a dataset on 186 preindustrial societies from around the world originally put together by Murdock and White (1969) and subsequently expanded to include a variety of indicators describing local economies, institutions, and culture. [58] The primary variables of interest for the purposes of this section are the inculcation of trust and other traits in children and the importance of witchcraft beliefs.

Barry et al. (1976) coded the intensity with which parents socialize their children to certain traits, each on the 0–10 ordinal scale. The scores were assigned by a team of researchers "on the basis of reports of the pressures exerted by the people who train the child," as well as the actual observed behavior of children in the community. The first three relevant traits fall in the "sociability" category: trust, honesty, and generosity. Trust refers to "confidence in social relationships, especially toward community members outside the family," and high level of trust means, for example, that children are welcome in any home in the village and possessions are left unguarded. Honesty implies "desire and strong approval for truthfulness under all circumstance," and stealing and other types of antisocial behavior by children indicate low honesty. Generosity includes the encouragement of prosocial actions such as sharing and giving treats, as well as "expressions of kindness and affection" towards others. As a point of reference, we take the "toughness" category which includes the following traits: aggressiveness, fortitude, and competitiveness. Aggressiveness captures "aggressive behavior toward people (including peers) or animals, which may be implicitly inculcated or condoned by adults." Fortitude "measures suppressions of visible reaction to pain, exertion, frightening situations, discomfort." Competitiveness refers to "achievement of superiority over other people, especially peers." In short, "sociability" generally corresponds to prosocial attitudes and behaviors, while "toughness" captures the opposite traits.

In addition, we explore three further traits: obedience, self-restraint, and industry.[59] Obedience is "primarily a measure of the degree to which children are expected to obey specific requests by parents and others in authority." Self-restraint refers to the "discouragement of children's open expression of emotions, including crying, anger, or effusiveness." Industry or diligence are "based on the demand that the child keep busy on activities which involve responsibility or obedience," and one of the relevant indicators here is that children have little spare time for pleasure or idleness. Finally, our measure of witchcraft beliefs available in the SCCS is a score, on the 1–4 ordinal scale, capturing whether witchcraft, defined as "aggressive action of a member of a special class of human beings believed to be endowed with a special power and propensity for evil," is recognized as an important cause of illness (Murdock et al., 1978).

The econometric framework mimics the model specifications employed earlier. In particular, along with the variables of interest we include two groups of regressors: geographic controls and proxies for economic development that could be confounding the relationship between superstitious beliefs and socialization of children to certain values and traits. The set of geographic variables includes absolute latitude, distance to the coast, suitability of soil for agriculture, and slope. Development controls are population density, urbanization, an egalitarian/stratified dummy, dominant production mode (foraging, pastoralism, horticulture, or agriculture), and jurisdictional hierarchy beyond local community, a measure of precolonial political centralization used in Section 3.4. All model specifications include continental fixed effects.

Estimates in panel A of Table 11 show that there is a strong negative association between the importance of witchcraft as a cause of illness and the inculcation of trust, even in the most demanding specifications. Negative correlations are weaker for honesty and even more so for generosity even though the point estimates are all negative. In contrast, "toughness" features in panel B are all strongly and positively related to witchcraft beliefs. These two contrasting findings provide further support for the idea of distinct cultural equilibria, prosocial and antisocial, as discussed in the previous section. Interestingly, as can be seen in panel C, inculcation of obedience, self-restraint and, to a lesser extent, industry is positively related to witchcraft beliefs. While self-restraint comes very close to the "toughness" category, the remaining two traits are more related to the notion of submission to either parents or other authority. This is in line with the suggestion, mentioned in Section 5, that witchcraft beliefs may perform a "social control" function and operate to maintain the existing hierarchy in society. Overall, the results show that in societies which tend to attribute misfortune in the form of illness to the acts of witches, parents actively socialize their children to not trust others and be tough instead of cultivating norms of positive reciprocity.

If mistrust and other antisocial traits are cultivated in societies with widespread witchcraft beliefs and are then transmitted through generations, they may persist even in an environment free of witchcraft believers. If, on the other hand, mistrust is narrowly associated with fears of witches and witchcraft accusations in the place of residence, it should be expected to disappear over time within a dynasty when individuals move and raise their offspring in a superstition-free environment. The next section attempts to disentangle these two possibilities.

[58] The SCCS societies in fact represent a subsample of the Ethnographic Atlas used in the analysis of Section 3.4. See the original paper by Murdock and White (1969) for details or Gershman (2015) for a brief introduction.

[59] Note that these as well as all of the "toughness" traits are coded on four separate scales, based on gender (boys and girls) and age (early and late childhood) splits. We aggregate those scales by taking average scores.

Table 11
Witchcraft beliefs and inculcation of traits in childhood.

	Trust			Honesty			Generosity		
A. Sociability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Witchcraft	−0.828***	−0.773***	−0.595**	−0.496*	−0.484	−0.292	−0.103	−0.182	−0.050
	(0.247)	(0.247)	(0.270)	(0.277)	(0.293)	(0.308)	(0.260)	(0.268)	(0.255)
Observations	97	97	97	75	75	75	73	73	73
R^2	0.107	0.144	0.179	0.058	0.075	0.238	0.027	0.115	0.158
B. Toughness	Aggressiveness			Fortitude			Competitiveness		
Witchcraft	0.395**	0.425**	0.480**	0.444***	0.456***	0.522***	0.562**	0.601**	0.621***
	(0.163)	(0.162)	(0.184)	(0.119)	(0.122)	(0.123)	(0.226)	(0.230)	(0.231)
Observations	107	107	107	116	116	116	96	96	96
R^2	0.138	0.167	0.190	0.129	0.151	0.206	0.090	0.186	0.215
C. Other traits	Obedience			Self-restraint			Industry		
Witchcraft	0.526**	0.546***	0.413*	0.433**	0.378**	0.369**	0.184	0.191*	0.086
	(0.214)	(0.205)	(0.230)	(0.188)	(0.172)	(0.181)	(0.111)	(0.114)	(0.113)
Observations	118	118	118	97	97	97	128	128	128
R^2	0.135	0.196	0.284	0.195	0.262	0.306	0.080	0.086	0.210
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Development controls	No	No	Yes	No	No	Yes	No	No	Yes

Notes. a) Dependent variables capture the intensity of inculcation of the corresponding traits in children; linear models estimated via OLS. b) Importance of witchcraft beliefs as a recognized cause of illness is measured on the 1–4 ordinal scale. c) Robust standard errors in parentheses. d) ***, **, and * denote statistical significance at the 1, 5, and 10% level, respectively. e) Geographic controls include absolute latitude, distance to the coast, suitability of soil for agriculture, and slope. f) Development controls include population density, urbanization, stratification dummy, production mode, and an index of political centralization.

6.2. Trust among second-generation immigrants in Europe

To examine the possible persistence of mistrust inculcated in societies with high prevalence of witchcraft beliefs we look at the trust attitudes of second-generation immigrants residing in Europe. This type of exercise, known as "epidemiological" approach to culture, compares individuals who were born and raised in the same country facing similar socioeconomic and institutional environment but who presumably have different cultural "baggage" transmitted from their immigrant parents (Fernández, 2011). Specifically, the question is whether the children of immigrants from countries with more widespread witchcraft beliefs are less trusting. A positive answer would provide evidence consistent with the notion that mistrust which originated in a witchcraft-believing society persists over time despite the change in surrounding environment.[60]

We first extend the sample of potential "countries of ancestry" by employing all available country-level data. In addition to 19 countries of Sub-Saharan Africa explored in Section 3, we use the data from 24 other countries from North Africa, Asia, Europe, and the Middle East collected by the Pew Forum on Religion and Public Life in 2011–2012 and released in 2014 as "The World's Muslims" dataset. The latter wave of surveys focused on predominantly Muslim countries and explored religious, social, and political views of their populations.[61] Fortunately, the surveys included a number of questions on traditional culture that allow to construct a consistent measure of the prevalence of witchcraft beliefs for the whole augmented sample of 43 countries, the same way as in Section 3.[62] In this sample, witchcraft beliefs are most widespread in Tanzania (96%) and least prevalent in Bangladesh (24%). As shown in Fig. 3, the negative correlation between witchcraft beliefs and trust is quite strong at the country level, with 12% of the variation in generalized trust explained by the witchcraft variable alone.[63]

To conduct the main exercise of this section we next identify second-generation immigrants from the full sample of "countries of ancestry" using pooled data from five rounds (2004–2012) of the European Social Survey (ESS).[64] Specifically, we identify three samples of second-generation immigrants depending on whether their mother's, father's, or parents' common country of birth is assumed to be the country of ancestry. We then estimate the following equation:

$$\text{trust}_{i,c,a,t} = \mathbf{X}'_{\mathbf{i,c,a,t}}\mathrm{B} + \gamma\ \text{witch}_a + \mathbf{X}'_{\mathbf{a}}\Gamma + \alpha_c + \delta_t + \varepsilon_{i,c,a,t},$$

where i indexes individuals, c countries of residence, a countries of ancestry, and t the wave/year of the ESS survey. The outcome

[60] Fernández (2011) discusses in detail the benefits of the epidemiological approach and its limitations including sample selection issue, bias against finding the effect of culture, problems related to omitted variables and the possibility that immigrants from different places of origin and their children may not face identical economic and institutional conditions even in the same host country.

[61] We exclude Russia and Thailand from the original dataset since Islam is not the majority religion in these countries and hence the data are not nationally representative. Additional countries are: Afghanistan, Albania, Algeria, Azerbaijan, Bangladesh, Bosnia and Herzegovina, Egypt, Indonesia, Iran, Iraq, Jordan, Kazakhstan, Kosovo, Kyrgyzstan, Lebanon, Malaysia, Morocco, Niger, Pakistan, Palestinian territories, Tajikistan, Tunisia, Turkey, and Uzbekistan.

[62] The trust question, however, was not asked in "The World's Muslims" surveys making it impossible to replicate the exercise of Section 3 for this broader set of countries.

[63] See Appendix A for details on the sources of country-level trust data. No data on generalized trust could be found for Niger.

[64] The very first round of ESS conducted in 2002 does not have information on parents' countries of birth which is necessary for the exercise. The ESS is a standard "laboratory" to explore cultural transmission and persistence and was recently used by Alesina et al. (2013) and Ljunge (2014), among others.

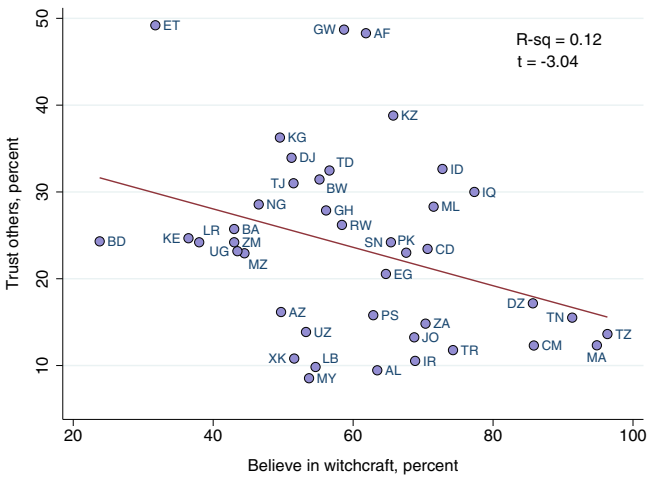


Fig. 3. Trust and witchcraft beliefs in a cross-section of countries.

variable is $\text{trust}_{i,c,a,t}$ capturing individual responses to the standard generalized trust question which in the ESS is measured on the ordinal 1–10 scale. The main variable of interest is witch_a, the prevalence of witchcraft beliefs in the country of ancestry.[65] Other country-of-ancestry features are captured by the term $\mathbf{X'_a}$, while $\mathbf{X'_{i,c,a,t}}$ contains individual socio-demographic characteristics: age, age squared, and gender ("basic" controls), as well as religion, education, marital status and employment. The terms α_c and δ_t are the full sets of country-of-residence and survey-year fixed effects, respectively, and $\varepsilon_{i,c,a,t}$ is the individual idiosyncratic component. We estimate the model using OLS and cluster the standard errors at the country-of-ancestry level.

Table 12 shows baseline estimation results when the prevalence of witchcraft beliefs is the only country-of-ancestry-level variable included in the regression equation. The coefficient of interest has a negative sign and is statistically significant across all specifications. Its magnitude is the highest for the sample in which parents share the same country of birth and is lowest for the sample based on father's country of birth.[66]

It is possible that there are some relevant omitted variables at the country-of-ancestry level which mediate the negative relationship between the prevalence of witchcraft beliefs and trust attitudes of second-generation immigrants. Here we focus on two potentially relevant omitted variables, the overall level of economic development and the quality of formal institutions. Hence, we include the logarithm of real GDP per capita and the rule-of-law index from the Worldwide Governance Indicators database as additional controls. We follow two estimation strategies, as shown in Table 13. Panel A lists the estimates from individual-level regressions, where additional country-of-ancestry characteristics are included along with witchcraft beliefs. Alternatively, we apply the following two-step procedure in the style of Alesina and Giuliano (2010) and Ljunge (2014). In the first step, we run individual-level trust regressions on country-of-ancestry dummies, along with individual controls, country-of-residence, and survey-year fixed effects, to get the estimates of the overall average contribution of having different countries of ancestry. In the second step, we regress those estimates of fixed effects in a country-level cross-section on the prevalence of witchcraft beliefs, log GDP per capita, and the rule-of-law index.[67] Such procedure allows to quantify, in the second step, the explanatory power of witchcraft beliefs relative to other included country-of-ancestry characteristics. The outcomes of this alternative estimation strategy are shown in panel B of Table 13.[68]

The two strategies yield qualitatively similar results. The prevalence of witchcraft beliefs in the country of ancestry remains a significant predictor of mistrust attitudes of the second-generation immigrants in Europe, and this association is the strongest if we consider the sample of individuals whose parents were born in the same country. Curiously, while GDP per capita is insignificant, the rule-of-law index enters positively and significantly in most specifications implying that children of immigrants from countries with better institutions are more trusting.[69] Furthermore, as panel B of Table 13 demonstrates, the variation in the prevalence of witchcraft beliefs in the country of ancestry (defined on the mother's side) explains an impressive 35% of the variation in the country-of-ancestry fixed effects from the first-step estimates. Income per capita adds no explanatory power, while the contribution of the rule-of-law index is notable, but relatively modest. Overall, for specification in column 3, the prevalence of witchcraft beliefs accounts for approximately 78.4% of the explained variation in the ancestral country fixed effects.

The findings of this section may be interpreted in various ways. On the one hand, they are consistent with the notion that mistrust attitudes cultivated in societies with widespread witchcraft beliefs are transmitted through generations and persist even in an environment where such beliefs are presumably much weaker.[70] On the other hand, one cannot rule out direct intergenerational transmission of witchcraft beliefs as a result of which the children of immigrants maintain such beliefs themselves (despite being born and raised in a different environment) and thus may be less trusting for that reason. In any case, evidence from second-generation immigrants is in line with persistence of cultural traits, whether the latter are inherited trust attitudes or witchcraft beliefs.

7. Concluding remarks

This paper establishes a robust negative relationship between the prevalence of witchcraft beliefs and various measures of

[65] Since only contemporary measure of witchcraft beliefs is available, it is essentially used as a proxy for the strength of beliefs around the time when parents of individuals in our sample were raised or earlier.

[66] The larger estimates in columns 5–6 of Table 12 are consistent with the idea of stronger inculcation of traits when parents share the same background. The weaker estimates in columns 3–4 are in line with the result in Ljunge (2014) who shows that transmission of trust attitudes is significantly stronger on the mother's side than on the father's.

[67] The GDP and rule-of-law data are for 2010 which is the average year for our witchcraft beliefs measures.

[68] We follow the bootstrap approach to construct standard errors for the estimates of interest in this case. More specifically, the reported standard errors are based on simple non-parametric bootstrap which resamples observations (with replacement) from the original ESS sample of second-generation immigrants 1000 times.

[69] Results for other indicators of good governance such as government effectiveness and control of corruption are very similar.

[70] Unfortunately, no comprehensive data on witchcraft beliefs in the European "host" countries are available. As a reference point for comparison, according to a 2009 survey by the Pew Forum on Religion and Public Life, 16% of Americans believe in the "evil eye, or that certain people can cast curses or spells that cause harm," a much smaller share relative to the average of 60% for countries of ancestry in our sample. It should be noted, however, that persistence of culture may be exacerbated at the local level if immigrants and their children tend to settle in communities dominated by fellow immigrants and their descendants.

Table 12
Witchcraft and trust among second-generation immigrants in Europe.

	Mother's country		Father's country		Parents' country	
	(1)	(2)	(3)	(4)	(5)	(6)
Witchcraft	−0.644**	−0.710**	−0.581*	−0.533*	−0.745***	−1.132***
	(0.250)	(0.341)	(0.299)	(0.312)	(0.270)	(0.312)
Individual controls	Basic	All	Basic	All	Basic	All
Country and year FE	Yes	Yes	Yes	Yes	Yes	Yes
Countries of residence	33	32	31	29	25	24
Countries of ancestry	40	39	37	36	35	34
Observations	2442	2316	2762	2609	1645	1570
Adjusted R^2	0.050	0.096	0.062	0.095	0.056	0.095

Notes. a) Dependent variable is generalized trust, on the 1–10 ordinal scale; linear models estimated via OLS. b) Standard errors shown in parentheses are clustered at the country-of-ancestry level. c) ***, **, and * denote statistical significance at the 1, 5, and 10% level, respectively. d) Basic individual controls include age, age squared, and gender. In addition to the latter, the set of all individual controls includes marital status (four categories), religious denomination (nine categories), education (five categories), and employment status (nine categories). e) Country of ancestry is defined as mother's country of birth in columns 1–2, father's country of birth in columns 3–4, and parents' shared country of birth in columns 5–6.

Table 13
Witchcraft and trust among second-generation immigrants in Europe: country-of-ancestry controls.

	Mother's country			Father's country			Parents' country		
A. Individuals	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Witchcraft	−0.645**	−0.919**	−0.844***	−0.594*	−0.883**	−0.866**	−1.151***	−1.409***	−1.383***
	(0.302)	(0.352)	(0.285)	(0.313)	(0.347)	(0.327)	(0.266)	(0.358)	(0.311)
Log GDP per capita	−0.042		−0.100	0.042		−0.027	0.014		−0.037
	(0.066)		(0.075)	(0.073)		(0.082)	(0.086)		(0.099)
Rule of law		0.133*	0.184**		0.213***	0.226***		0.170**	0.184*
		(0.073)	(0.089)		(0.074)	(0.076)		(0.082)	(0.100)
Observations	2316	2316	2316	2609	2609	2609	1570	1570	1570
Adjusted R^2	0.095	0.096	0.096	0.095	0.096	0.096	0.095	0.096	0.095
B. Countries									
Witchcraft	−1.284**	−1.257**	−1.356**	−1.149**	−1.248**	−1.336**	−1.888***	−1.911***	−2.011***
	(0.577)	(0.589)	(0.532)	(0.548)	(0.560)	(0.559)	(0.673)	(0.692)	(0.710)
Log GDP per capita		−0.029	−0.115		0.108	0.039		0.026	−0.066
		(0.102)	(0.118)		(0.085)	(0.091)		(0.116)	(0.126)
Rule of law			0.247*			0.187			0.249
			(0.141)			(0.117)			(0.152)
Observations	39	39	39	36	36	36	34	34	34
R^2	0.350	0.354	0.446	0.165	0.195	0.227	0.389	0.390	0.441
Countries of residence	32	32	32	29	29	29	24	24	24
Countries of ancestry	34	34	34	36	36	36	34	34	34

Notes. a) Dependent variable is: generalized trust, on the 1–10 ordinal scale, in panel A; estimates of country-of-ancestry fixed effects from individual-level trust regressions, in panel B; linear models estimated via OLS. b) Standard errors shown in parentheses are clustered at the country-of-ancestry level for panel A regressions and bootstrapped for panel B regressions. c) ***, **, and * denote statistical significance at the 1, 5, and 10% level, respectively. d) All specifications in panel A include country-of-residence and survey-year fixed effects and the full set of individual controls listed in the notes to Table 12. e) Country of ancestry is defined as mother's country of birth in columns 1–3, father's country of birth in columns 4–6, and parents' shared country of birth in columns 7–9. f) Country-level regressions on panel B are weighted by the number of second-generation immigrants belonging to each country of ancestry.

community trust in Sub-Saharan Africa, an association which holds after accounting for a battery of potentially confounding characteristics at the individual, regional, and ethnic levels, in addition to country fixed effects. It also appears to be much stronger for witchcraft beliefs relative to other elements of traditional culture. Furthermore, witchcraft beliefs are negatively related to other measures of social capital, namely charitable giving and participation in religious group activities. These findings are consistent with the idea that witchcraft beliefs affect cooperation and trust by generating the fears of witchcraft attacks and accusations. Alternatively, the main results may be viewed as pinpointing a particular type of cultural equilibrium in which witchcraft beliefs and antisocial attitudes and behaviors coexist and are mutually reinforcing.

Moving beyond Africa, the paper explores the connection between witchcraft beliefs, cultivation of mistrust, and its persistence. It shows using the data from the Standard Cross-Cultural Sample that in small-scale preindustrial societies where witchcraft beliefs are more important for explaining illness, mistrust and toughness rather than sociability are inculcated in children by their parents. Furthermore, second-generation immigrants in Europe whose parents were born in countries with more prevalent witchcraft beliefs, are less trusting, a finding highlighting the possibility of transmission and persistence of antisocial culture.

Overall, this research argues that there is a strong potentially self-reinforcing relationship between witchcraft beliefs and the erosion of social capital which may plausibly impede economic development in Sub-Saharan Africa and beyond. It is but a first step towards rigorous empirical investigation of traditional culture which contributes to our understanding of its social costs and benefits.

Appendix A. Description of variables

A.1. Main survey data

Raw data and documentation for "Tolerance and Tension: Islam and Christianity in Sub-Saharan Africa" are available at http://www.pewforum.org/datasets.

Personal belief in witchcraft. Dummy variable equal to 1, if the respondent claims to believe in witchcraft or the evil eye, i.e., that "certain people can cast curses or spells that cause bad things to happen to someone" (or both), and 0, otherwise.

Regional prevalence of witchcraft beliefs. Proportion of people in a region who claim to believe in witchcraft or the evil eye (or both). Calculated based on individual survey responses and regional identifiers.

Generalized trust. Dummy variable equal to 1, if the respondent replies that "most people can be trusted," and 0, otherwise.

Trust in people of other religion. Dummy variable equal to 1, if the respondent replies that she "generally trusts people who have different religious values," and 0, otherwise.

Religion. Religious denomination, twenty-three categories: African independent (initiated) church, Anglican or Episcopalian, Baptist, Catholic, Congregationalist, Dutch or Uniting Christian reformed church, Ethiopian Orthodox, Jehovah's Witness, Lutheran, Methodist, Pentecostal, Presbyterian, Seventh-day Adventist, just a Protestant, just a Christian, something else (Christian); Ahmadiyya, Shia, Sunni, just a Muslim, something else (Muslim); traditional religion; unaffiliated.

Education. Level of educational attainment, three categories: completed primary or less, some secondary or completed secondary, post-secondary and higher.

Shortage of money. Dummy variable equal to zero, if the respondent reports insufficient money to buy food, health care, or clothing. The original question is: "Have there been times during the last year when you did not have enough money: 1) to buy food your family needed? 2) to pay for medical and health care your family needed? 3) to buy clothing your family needed?"

Marital status. Six categories: married, living with a partner, divorced, separated, widowed, never been married.

Household size. Eight categories: three or fewer, four, five, six, seven, eight, nine, ten or more.

Other beliefs (Section 4.1). Measures of personal and regional beliefs are constructed in the same way as for witchcraft. Other beliefs include the following: heaven, where people who have led good lives are eternally rewarded; hell, where people who have led bad lives and die without being sorry are eternally punished; reincarnation – that people will be reborn in this world again and again; angels; miracles; evil spirits; that sacrifices to spirits of ancestors can protect you from bad things happening; that certain spiritual people can protect you from bad things happening; that juju, shrines, or other sacred objects can protect you from bad things happening.

Charitable giving (Section 5). Dummy variables based on responses to the following questions: 1) "Do you tithe, that is give a set percentage of your income to charity or the church?" (Christians only); 2) "Do you give zakat, that is give a set percentage of your wealth to charity or the mosque?" (Muslims only). For the combined sample, the dummy variable is set equal to one, if a person gives either tithe (for Christians) or zakat (for Muslims), and zero, otherwise.

Participation in religious group activities (Section 5). The original question is: "Please tell me how often you participate in prayer groups, Scripture study groups or religious education programs." Coded on the ordinal scale: at least once a week (1), once or twice a month (2), several times a year (3), seldom (4), never (5).

Religiosity (Section 5). The original question is: "How important is religion in your life – very important, somewhat important, not too important, or not at all important?" Coded on the ordinal scale: not at all important (1), not too important (2), somewhat important (3), very important (4).

A.2. Geographic controls (section 3.3.1)

Absolute latitude. Absolute latitude of region's centroid. *Source:* own calculations.

Access to rivers. Dummy variable equal to 1, if the region has access to major rivers, and 0, otherwise. *Source:* http://www.naturalearthdata.com and own calculations.

Access to major lakes. Dummy variable equal to 1, if the region has access to one of the major African lakes, namely Chad, Tana, Turkana, Albert, Victoria, Tanganyika, and Nyasa, and 0, otherwise. *Source:* ESRI World Map and own calculations.

Area. Area of the region measured in square km. *Source:* own calculations based on Albers projection.

Mean suitability of land for agriculture. Index of suitability of land for rain-fed agriculture (maximizing technology mix). Coded on the scale from 1 (very high suitability) to 8 (not suitable) for cells at 5 arc-minute resolution. The variable used in the analysis is the average value of the suitability index across cells in each region. *Source:* FAO GAEZ dataset (plate 46) downloaded at http://webarchive.iiasa.ac.at/Research/LUC/GAEZ/index.htm and own calculations.

Spatial variability of land suitability for agriculture. Based on the same underlying data as the mean suitability index. Calculated as the standard deviation of cell values for each region.

Malaria stability index. Index measuring the stability of malaria transmission based on regionally dominant vector mosquitoes. Takes values from 0 to 39 and is available for cells at 0.5 degree resolution. The variable used in the analysis is the average value of the index across cells falling in each region. *Source:* Kiszewski et al. (2004), available as a raster file at http://www.earth.columbia.edu/people/gmccord/.

Spatial variability of temperature and precipitation. Raw data on annual mean temperature and precipitation (1950–2000) are available for cells at 30 arc-second resolution. Spatial variability is calculated as the standard deviation of cell values for each region. *Source:* Hijmans et al. (2005), raw data available at http://www.worldclim.org/current.

Distance from Addis Ababa. Great circle distance from Addis Ababa to the region's centroid. Computed using the haversine formula and measured in km. *Source:* own calculations.

Distance to the coastline. Great circle distance from the region's centroid to the closest location on the coastline. Computed using the haversine formula and measured in km. *Source:* own calculations using the coastline shapefile downloaded at http://www.naturalearthdata.com.

Ruggedness index. Index of terrain ruggedness as constructed by Nunn and Puga (2012) for cells at 30 arc-second resolution.

The variable used in the analysis is the average value of the index across cells in each region. *Source:* http://diegopuga.org/data/rugged/#grid.

A.3. Other regional controls constructed from external data sources (section 3.3.2)

Nighttime lights per capita. Data on luminosity come from the Defense Meteorological Satellite Program's Operational Linescan System (DMSP-OLS) that reports stable images of Earth at night captured between 20:00 and 21:30. The measure ranges from 0 to 63 and is available for cells at 30 arc-second resolution, see Henderson et al. (2012) for technical details. We aggregate luminosity data for 2008 and 2009 at the regional level and then take their average. The latter is then divided by the region's population size (see below) to obtain the final measure of lights per capita. *Source:* http://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html.

Population size. Data on population counts come from LandScan Africa (2013) for cells at 30 arc-second resolution. We calculate the sum of all grid values in each region to find regional population counts. *Source:* http://web.ornl.gov/sci/landscan.

ACLED events. Geographical coordinates for all fighting events during 1997–2009 are taken from the Armed Conflict Location and Event Database (ACLED, version 3). We calculate the total number of events for each region. *Source:* http://www.acleddata.com/data/.

Ethnolinguistic fractionalization. Standard ELF index based on regionally representative household surveys (DHS and MICS), and the original Pew Forum survey. Details available upon request.

A.4. Other regional controls constructed from main survey data (section 3.3.2)

Regional education. Proportion of respondents in a given region that have education above primary.

Traditional religion. Proportion of respondents in a given region that belong to traditional religion.

Religious conflict. Average regional survey response to the following question: "Do you think conflict between religious groups is a very big problem, a moderately big problem, a small problem or not a problem at all?" The answers were coded as 4, 3, 2, and 1, respectively.

Crime. Average regional survey response to the following question: "Do you think crime is a very big problem, a moderately big problem, a small problem or not a problem at all?" The answers were coded as 4, 3, 2, and 1, respectively.

Corruption. Average regional survey response to the following question: "Do you think corrupt political leaders is a very big problem, a moderately big problem, a small problem or not a problem at all?" The answers were coded as 4, 3, 2, and 1, respectively.

A.5. Ethnic-level controls (section 3.4)

Slave exports. Natural logarithm of one plus the number of exported slaves of a given ethnicity normalized by the area of land historically inhabited by the respective ethnic group. *Source:* Nunn and Wantchekon (2011), dataset available at http://scholar.harvard.edu/nunn/pages/data-0.

Settlement pattern. A measure of residence fixity, on the ordinal scale: nomadic or fully migratory (1); seminomadic (2); semisedentary (3); compact but impermanent settlements (4); neighborhoods of dispersed family homesteads (5); separated hamlets, forming a single community (6); compact and relatively permanent settlements (7); complex settlements (8). *Source:* Murdock (1967).

Jurisdictional hierarchy beyond local community. A measure of political centralization, on the ordinal scale: no levels, no political authority beyond community (1); one level, for example, petty chiefdoms (2), two levels, for example, larger chiefdoms (3); three levels, for example, states (4); four levels, for example, large states (5). *Source:* Murdock (1967).

Subsistence production mode. Dependence of subsistence (in percent) on hunting, fishing, animal husbandry, and agriculture measured on the ordinal scale: 0–5% (0); 5-15% (1); 15–25% (2); 25–35% (3); 35–45% (4); 45–55% (5); 55–65% (6); 65–75% (7); 75–85% (8); 85–100% (9). *Source:* Murdock (1967).

A.6. Afrobarometer data (section 4.2)

Raw survey data and codebooks are available at http://www.afrobarometer.org/data.

Trust questions. Measures of interpersonal trust are based on the following questions: "How much do you trust each of the following types of people: your relatives? your neighbors? other people you know?" Measures of trust in institutions are based on the following questions: "How much do you trust each of the following, or haven't you heard enough about them to say: police? courts of law? elected local government council? army? President? parliament? electoral commission?" The answers are coded on the ordinal scale from 0 (not at all) to 3 (a lot).

Employment status. The original question is: "Do you have a job that pays a cash income? Is it full-time or part-time? And are you presently looking for a job (even if you are presently working)?" Four categories: no (not looking); no (looking); yes, part-time; yes, full-time.

Religion. Sixteen categories: African independent church, agnostic, atheist, Catholic, Christian (general/other), Hindu, Jehova's Witness, Muslim (general/other), Muslim (Shia), Muslim (Sunni), none, other, Protestant (Evangelical/Pentecostal), Protestant (mainstream), Seventh-day Adventist, traditional religion.

Living conditions. The original question is: "In general, how would you describe your own present living conditions?" Five categories: very bad; fairly bad; neither good nor bad; fairly good; very good.

Education. Ten categories: no formal schooling; informal schooling only (including Koranic schooling); some primary schooling; primary school completed; some secondary school/high school; secondary school completed/high school completed; post-secondary qualifications, other than university, e.g., a diploma or degree from polytechnic or college; some university; university completed; postgraduate.

A.7. SCCS data (section 6.1)

Traits inculcated in childhood. Strength of traits inculcated by parents in their children. Trust refers to "confidence in social relationships, especially toward community members outside the family"; honesty refers to "desire and strong approval for truthfulness under all circumstance"; generosity refers to the encouragement of prosocial actions such as sharing and giving treats, as well as "expressions of kindness and affection" towards others.

Aggressiveness is the "aggressive behavior toward people (including peers) or animals, which may be implicitly inculcated or condoned by adults"; fortitude "measures suppressions of visible reaction to pain, exertion, frightening situations, discomfort"; competitiveness refers to "achievement of superiority over other people, especially peers." Obedience is "primarily a measure of the degree to which children are expected to obey specific requests by parents and others in authority"; self-restraint refers to the "discouragement of children's open expression of emotions, including crying, anger, or effusiveness"; industry or diligence are "based on the demand that the child keep busy on activities which involve responsibility or obedience." Each trait is coded on the 0–10 ordinal scale from "no inculcation or inculcation of opposite trait" (0) to "extremely strong inculcation" (10). The last six traits are coded on four separate scales, based on gender (boys and girls) and age (early and late childhood) splits. Those scales are aggregated by taking average scores. *Source*: Barry et al. (1976).

Witchcraft beliefs. Witchcraft is defined as the "aggressive action of a member of a special class of human beings believed to be endowed with a special power and propensity for evil." Its importance is coded, based on whether it is used to explain illness, on the following ordinal scale: absence of such as cause (1); minor or relatively unimportant cause (2); an important auxiliary cause (3); predominant cause recognized by the society (4). *Source*: Murdock et al. (1978).

Absolute latitude. Absolute latitude of the location of an SCCS society, as defined by the geographical coordinates in Murdock and White (1969).

Suitability of soil for agriculture. Adapted from FAO/UNESCO soil maps and augmented by information from ethnographers. Coded on an ordinal 0–8 scale from "very poor" to "very good." *Source*: Pryor (1986).

Slope. Adapted from FAO/UNESCO data and in some cases adjusted by information from ethnographers. Coded on an ordinal 1–5 scale from "level to gently undulating" (0 to 8% slope) to "steeply dissected by mountains." *Source*: Pryor (1986).

Distance to coastline. Great circle distance from an SCCS society, as defined by the geographical coordinates in Murdock and White (1969), to the closest location on the coastline. Computed using the haversine formula and measured in 1000 km. *Source*: Murdock and White (1969), author's calculations using the shapefile for the coastline downloaded at http://www.naturalearthdata.com.

Population density. Mean population density in the territory controlled or exploited by an SCCS society, on the following ordinal scale: less than 1 person per square mile (1); 1–5 persons per square mile (2); 5.1–25 persons per square mile (3); 26–100 persons per square mile (4); more than 100 persons per square mile. *Source*: Murdock and Provost (1973).

Urbanization. Average population of local communities, measured on the following ordinal scale: less than 100 persons (1); 100–199 persons (2); 200–399 persons (3); 400–999 persons (4); more than 1000 persons (5). *Source*: Murdock and Provost (1973).

Stratification dummy. The original class stratification measure comprises five categories: absence of significant wealth distinctions among freemen (1); wealth distinctions based on the possession and distribution of property, not crystallized into distinct social classes (2); elite stratification, in which an elite class has control over scarce resources, particularly land (3); dual stratification into a hereditary aristocracy and a lower class of ordinary commoners or freemen (4); complex stratification into social classes correlated in large measure with extensive differentiation of occupational statuses (5). Class stratification dummy is equal to 0 for the first category and 1, otherwise. *Source*: Murdock (1967).

Production mode. The original variable (subsistence economy: dominant mode) contains the following categories: advanced agriculture, horticulture, simple or shifting cultivation, domestic animals, exchange, fishing, gathering, and hunting. The second and third groups are combined in one, "horticulturalists," and the last 4 groups are joined into "foragers" to get the final four-way classification. *Source*: Murdock and White (1969).

Jurisdictional hierarchy beyond local community. Same definition as in the "ethnic-level controls" section above.

A.8. European Social Survey (section 6.2)

Raw survey data and documentation are available at http://www.europeansocialsurvey.org.

Trust. Standard generalized trust question: "Would you say that most people can be trusted, or that you can't be too careful in dealing with people?" Answers are coded on a 0–10 ordinal scale, from "you can't be too careful" (0) to "most people can be trusted" (10).

Marital status. Four categories: married, divorced or separated, widowed, never married.

Religious denomination. Nine categories: Eastern Orthodox, Protestant, Roman Catholic, other Christian, Eastern religions, Islamic, Jewish, other non-Christian, none.

Education. Five categories according to the 5-level International Standard Classification of Education (ISCED): less than lower secondary education (ISCED 0–1), lower secondary education completed (ISCED 2), upper secondary education completed (ISCED 3), post-secondary non-tertiary education completed (ISCED 4), tertiary education completed (ISCED 5–6).

Employment status. Nine categories: paid work, education, unemployed and looking for job, unemployed and not looking for job, permanently sick or disabled, retired, community or military service, housework or looking after children or others, other.

A.9. Country-level data (section 6.2)

Real GDP per capita. GDP per capita in 2010 in constant 2005 U.S. dollars. *Source:* World Development Indicators database.

Rule-of-law index. The index reflects "perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement." The value is taken for the year 2010. *Source:* Worldwide Governance Indicators database.

Country-level prevalence of witchcraft beliefs. The measure is constructed the same way as regional prevalence of witchcraft beliefs described earlier. *Source*: Pew Forum on Religion and Public Life surveys.

Country-level measures of generalized trust. To construct these measures used in Fig. 3, responses to the standard generalized trust question are averaged at the country level. For the 19 Sub-Saharan African countries examined in Section 3, the respective survey data were used. For 24 additional countries in Section 6.2, trust measures were constructed using the most recent available wave of the World Values Survey, with the exception of the following cases for which more up-to-date data were available from other sources: Albania, Bosnia and Herzegovina, Kosovo (European Values Study, 2008), Afghanistan, Bangladesh, Tajikistan (AsiaBarometer, 2005), and Indonesia (Asian Barometer, 2011).

Appendix B. Who believes in witchcraft?

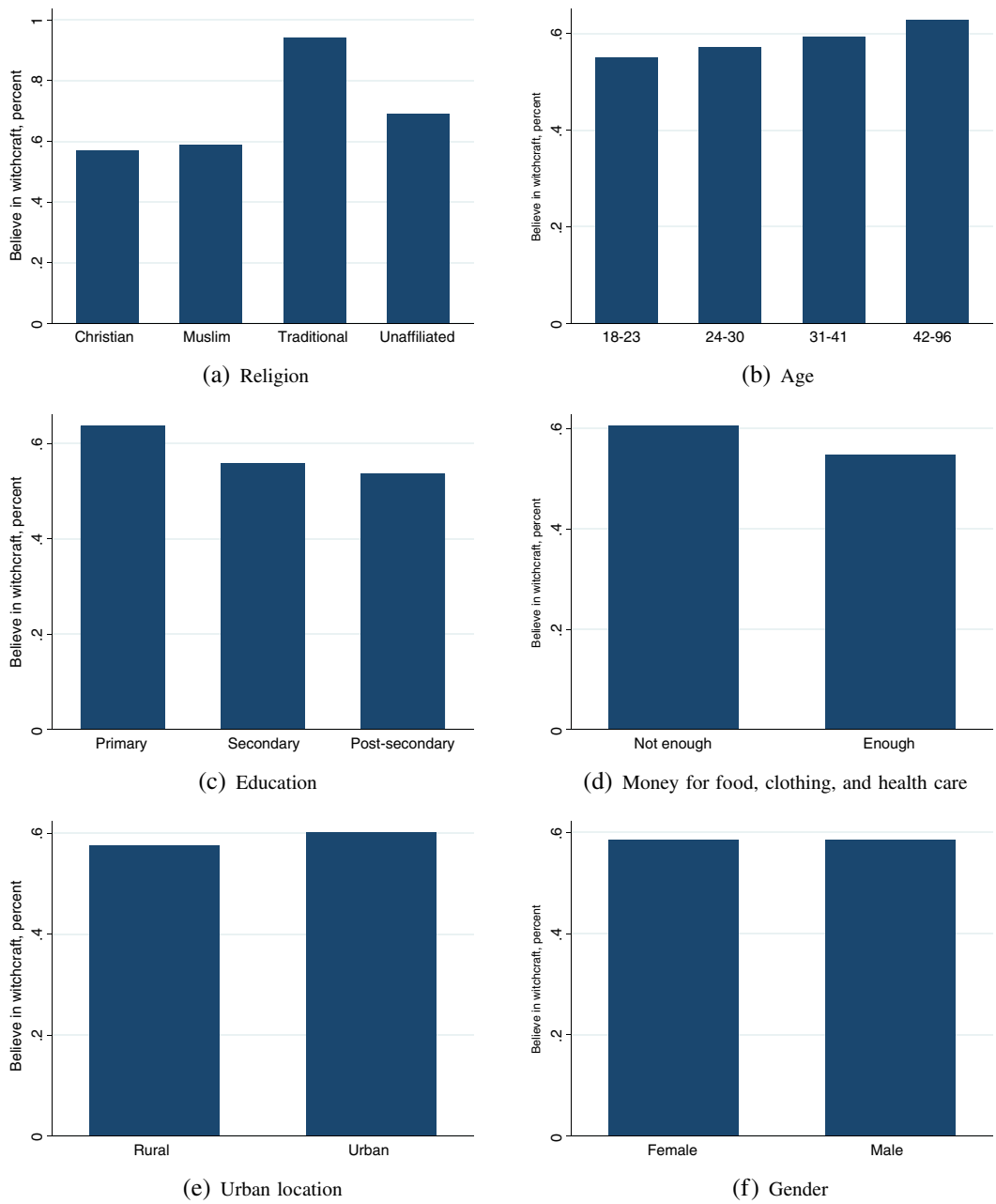


Fig. B1. Correlates of personal witchcraft beliefs.

Appendix C. Supplementary data

Supplementary data to this article can be found online at http://dx.10.1016/j.jdeveco.2015.11.005.

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