Social Capital – A Key Determinant of Economic Development in Sub-Saharan Africa?

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Abstract

Social capital is believed to spur regional economic development. Since the groundbreaking works of Putnam, scholars hypothesized that it determines how well institutions function at the regional level and thus influences a region's economic performance. In Europe, a positive association between social capital and regional per-capita income levels could be established. However, is such a relation also found in a set of developing countries? This study investigates the relationship between social capital and subnational economic development in a sample of Sub-Saharan African countries. Using Afrobarometer data on trust, it estimates the relationship by Ordinary Least Squares (OLS) and Instrument Variables (IV). The OLS results suggest that trust is not significantly related to regional economic development in Sub-Saharan Africa. Exploiting regional differences in ethnolinguistic diversity and distances to slave demand centers, the study tries to isolate a potential effect of social capital via IV estimation. Although the results seem to corroborate the OLS findings, caveats remain since distances to slave ports were unrelated and deep cleavages of ethnic diversity only weakly related to trust. (JEL: R11, O11, O55, Z13)

Keywords: Social Capital, Trust, Ethnolinguistic diversity, African Development, Subnational analysis, Sub-Saharan Africa.

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1. Introduction

The ten poorest countries in the world are all found in Africa[1]. In Sub-Saharan Africa the average GDP per capita converted by purchasing power parity (PPP) amounts to Int$ 3,926 only. About 40% of the population there still live from less than $1.90 a day (all according to World Bank, 2019). Why is poverty in Africa still so pervasive? When analyzing the determinants of economic growth, literature has for a long time focused on natural capital (Malthus, 1798), physical capital (Solow, 1957) or human capital (Lucas, 1988). More recently, scholars have investigated other factors. Acemoğlu, Johnson, and Robinson (2002) emphasize the role of institutions and assert that their growth-inhibiting character in Africa dates to the European colonization. Nunn (2008) showed how the slave trade negatively influenced long-term development and in a follow-up study (Nunn & Wantchekon, 2011) discussed how the slave trade engendered a culture of mistrust. This thesis aims to investigate whether (as Nunn suspects) this lack of social capital can be directly attributed to Africa's low development level.

The relationship is analyzed at the regional level in Sub-Saharan Africa. The sample comprises 30 countries and 335 regions. The main social capital proxy used in this thesis is generalized trust, data on which is available in the Afrobarometer and the World Value Surveys (WVS). Regional income data stems from the UNDP, which provides estimates of subnational Gross National Income (GNI) of all countries in the world. As most data on social capital stems from the fifth wave of the Afrobarometer conducted between 2011 and 2013, the regional GNI in 2013 is used as a proxy for economic development. Analyzing the relationship between social capital and income raises two major concerns. First, omitted variables can potentially determine both current levels of social capital and development simultaneously and second, reverse causality is possible. The relationship between social capital and current development might work in both ways, that is social capital is relevant in explaining present income levels but is simultaneously influenced by that very same factor (Algan & Cahuc, 2014). To address these identification issues a two-pronged approach shall be followed. On the one hand, the relationship between trust and income is estimated at the regional level so that fixed effects can be included which pick up country-wide time-invariant characteristics. To avoid that the results are driven by some unobserved factor at the regional level, a whole host of control variables that account for general geographic conditions, climatic factors, natural resources, regional education levels, and urbanization are included. On the other hand, instrument variables shall rule our reverse causality. The two instruments conceived in this thesis both use historic events to measure the exogenous variations in social capital. The first utilizes the haphazard colonial border demarcation which led to ethnic homelands being severed and ethnic groups being lumped together randomly making African countries and regions the most ethnically diverse in the world. Gershman and Rivera (2018) measure this diversity using various fractionalization and polarization indices which take varying inter-group differences into account by examining how

[1] These are: Burundi, Central African Republic, Malawi, DR Congo, Niger, Mozambique, Liberia, South Sudan, Eritrea, Chad, and Togo.

close the languages spoken by different ethnic groups are. Following Desmet, Ortuño-Ortín, and Weber (2009), it is believed that ethnic heterogeneity indices which measure deep ethno-linguistic cleavages have a substantial negative effect on generalized trust without impairing economic development directly. The second instrument follows Nunn (2008) and Nunn and Wantchekon (2011) and uses the slave trade as exogenous source of variation in social capital. As in Nunn (2008), the distance of each region's capital to its nearest slave demand center in the Transatlantic, Red Sea, Indian Ocean and Trans-Saharan slave trade is computed. It is believed that regions closer to these demand centers were more strongly affected by the slave trade and are hence particularly low trusting until today.

To my knowledge, this thesis is the first attempt to examine the relationship between social capital and economic development at the regional level in Sub-Saharan Africa. Moreover, neither ethnic diversity nor distance to slave ports were used before to instrument generalized trust. However, one must conclude that both instruments exhibit salient shortcomings in that they are only weakly related to generalized trust. The indices of ethnic diversity are moreover correlated with some of the covariates in particular with education. Therefore, all results are likely to be biased and must be interpreted with much caution. Both OLS and IV estimations fail to establish a significant relation between generalized trust and regional economic performance. This result is substantiated in various robustness checks. Using other trust dimensions, viz. trust in relatives, neighbors, and other people you know, an alternative proxy of regional development (night-time luminosity), a high-trust dummy or group membership as alternative measures of social capital fail to establish a significant relationship between social capital and regional economic development. Therefore, bearing in mind the caveat that the estimates are likely to be biased, social capital seems not to be a significant determinant of regional income in Sub-Saharan Africa.

The remainder of this thesis is outlined as follows: Section 2 presents the concept of social capital, how it can be measured, and its relation to economic development by reviewing notable contributions to the literature. Section 3 describes the data and delivers descriptive statistics to the social capital and development proxies as well as to the control variables. Section 4 delineates the estimation strategy and explains the rationale behind both instruments. Section 5 present the results of the OLS and IV estimations. Section 6 carries out the mentioned robustness checks. Section 7 concludes.

2. Literature Review

2.1. Definition of social capital

The concept of social capital was first described by the sociologist Bourdieu (1985). For him social capital is a resource that stems from group membership as well as social networks and is based on mutual recognition. It can be utilized by single actors to improve their position in the pursuit of their goals, as social capital can multiply the effect of other forms of capital (Bourdieu distinguishes between economic, cultural and social capital). Thus, members from groups that share the same characteristics and

only differ with respect to the social capital they have created, can wind up in very different positions in society (Siisiäinen, 2000). Coleman's (1990) notion of social capital is similar as he defines social capital by its function. The term comprises social structures of whatever form which all have in common that they facilitate certain actions of individuals within that network. Coleman (1988), for example, shows how social capital within families can bolster the children's acquisition of human capital. In doing so, social capital can take different forms: Parents helping their children study or parents being merely physically close to their children. Just like Bourdieu, Coleman emphasizes the benefits of social capital that accrue to a single actor.

However, as the concept of social capital entered economics, it became a trait of societies itself whose benefits are enjoyed by all its members. Putnam (1993a) refers to social capital as moral obligations and norms, social values (especially trust) and social networks which lie at the bottom of a region's economic success and political integration. Thus, Putnam made it possible to compare the stock of social capital across regions, nations, and countries. For example, Putnam claims that southern Italy is less prosperous than the north because of a lack of social capital which impairs the efficient functioning of regional institutions. Fukuyama's (1995) argument is similar in that he shares Putnam's view that social capital influences economic performance. However, he proposes a different mechanism and speaks of trust rather than social capital. For Fukuyama trust is the social creed that individuals must subordinate their self-interests to those of a larger group. If trust is present in a society, individuals can establish large privately owned corporations which then propel economic development (Gray, 1997).

However, treating social capital as a collective resource in one instant and as an individual asset in another, can be problematic. Portes (2000) points out how ambiguities about the term itself arise. Scenarios become possible in which individual social capital undermines collective social capital – a lobby group, for example, that circumvents a new legislation thanks to the "right connections" but thus harms social cohesion. Moreover, Portes criticizes the circular reasoning inherent in collective social capital. On the one hand, social capital promotes the well-functioning of democracies, and, on the other hand, it is engendered by the very same outcomes. Guiso's, Sapienza's, and Zingale's (2011) critique points in a similar direction. Social capital can be perceived as something inherently positive (as Putnam does) or as something ambiguous and sometimes negative (as Bourdieu does). Fukuyama (2001) addresses this critique and tries to harmonize the concepts of individual and collective social capital. His definition restricts social capital to informal norms that facilitate cooperation across individuals thus delineating it from trust, networks, civil societies, and other by-products. These norms can create both positive and negative externalities. Puritans' conviction to treat everyone morally – be it a family member or a stranger – is a positive, the Ku Klux Klan's hatred towards outsiders a negative externality. In the former case, social capital can straddle groups and whole societies, while in the latter case, cooperative norms do not spread to other groups and might even be confined to subgroups of the larger community. The sum of social groups connected through norms of cooperation and their positive and negative externalities determine the stock of social capital within a society which can designate its economic and political

success. Guiso, Sapienza, and Zingales (2011) introduce the concept of civic capital to clarify the equivocal meaning of social capital. Their definition resembles that of Fukuyama in that civic capital encompasses all "those persistent and shared beliefs and values that help a group overcome the free rider problem in the pursuit of socially valuable activities". Like Fukuyama's later definition social (or civic) capital is about norms, values, and beliefs and not about networks and relationships per se. However, unlike Fukuyama's conception of social capital, this definition has a clearly positive connotation. Civic capital only includes beliefs and values that help groups to pursue *socially valuable activities* and thus excludes the deviant norms of the Ku Klux Klan.

2.2. Models of cultural transmission

In a critique to Fukuyama (1995), Solow (1995) notes that the concept of social capital does not just lack a lucid definition but also classic characteristics of other forms of capital, viz. investment and depreciation processes which alter its stock. Additionally, social capital must be somehow measurable. Scholars have responded to that critique by conceiving models of how social capital and other cultural traits in general come about. A first notable attempt is that of Bisin and Verdier (2001) who designed a model of intergenerational cultural transmission in which parents carve their children's preferences by evaluating rationally - that is based on their own set of values - what cultural traits to pass on. The equilibrium of this model is both backward- and forward-looking. It is backward-looking because parents assess which cultural traits to pass on according to their own set of values while it is forward-looking because parents take the future of their children's ever-changing social environment into account. Thus, cultural characteristics like the norms and values incorporated in the concept of social capital tend to abate only slowly. However, as Tabellini (2008) notes, the forward-looking component also creates a "strategic complementarity" between values and behavior, that is they reinforce themselves. In his extensions of the model, if values of generalized morality which accentuates "good" behavior towards everyone abound (in contrast to limited morality in which these values only apply to a person's close friends and family), then cooperation across individuals spreads which then again helps the propagation of generalized morality itself. Well-functioning inclusive institutions underpin cooperation and can hence procreate good values, whereas the lack of those promotes bad values and behaviors like cheating on others. Thus, a society can wind up in two distinct equilibria: One of limited morality and low cooperation and one of generalized morality and widespread cooperation.

Tabellini's model illustrates how values are transmitted over time. However, social capital encompasses both values and beliefs. Guiso, Sapienza, and Zingales (2008) devised an overlapping generation model that outlines the transmission of beliefs – in particular trust in the stock market. Children's beliefs are first molded by their parent's beliefs and then updated by their own real-world experiences. If parents transmit a deep general trust towards other individuals to their offspring and this belief is reciprocated, then these children can make a large profit from trade. However, if not, they incur heavy losses. To protect their children, parents tend to be too careful when passing on their beliefs and underestimate the

value of own experiences. As in Tabellini's model, two final equilibria are possible: If benefits from trading are sufficiently high and the probability of being cheated on consequently below a certain threshold, then a high-trust equilibrium can be sustained. However, if not, individuals withdraw completely from the market and forfeit the opportunity to update their beliefs so that an equilibrium of mistrust evolves. All these models tend to suggest that social capital unlike physical capital increases with use because of the complementarity of values, beliefs, and behavior. Parents invest in social capital by transmitting their values and beliefs to their children and by rebuking deviant behavior. So does the education system and inclusive institutions that corroborate cooperation and thus benign values and beliefs (Guiso et al., 2011). But social capital can also depreciate through changes in the economic and social environment or through historic events or episodes (Guiso et al., 2011). The financial, debt and refugee crises of the European Union, for instance, is believed to have caused a trust crisis and the rise of populism in Europe (Algan et al., 2017). The slave trade – even though abolished over a hundred years ago – generated an even more salient culture of mistrust in Africa (Nunn & Wantchekon, 2009).

2.3. Measurement of social capital

As Solow (1995) notes, if social capital is indeed capital, then it must be somehow measurable. However, social capital is an ambivalent and multidimensional phenomenon, making it hard to quantify. In an attempt to categorize social capital, Kaasa and Parts (2008) differentiate between structural and cognitive social capital where the former comprises civic participation, formal networks (voluntary organizations), and informal networks (friend and family circles), while the latter encompasses general and institutional trust, and norms like trustworthiness. Grootaert et al. (2004) divide social capital into six dimensions: "groups and networks" and "trust and solidarity" correspond to structural and cognitive social capital respectively, "collective action and cooperation" as well as "information and communication" are ways in which social capital operates, whereas "social cohesion and inclusion" as well as "empowerment and political action" are outcomes of social capital. Guiso, Sapienza and Zingales (2011) only distinguish between indirect and direct measures of social capita. The former tries to discern values and beliefs, that is the foundation of social capital, whereas the latter tries to capture its outcomes, which are defined more broadly than in Grootaert et al. (2004) including all structural components of social capital and thus also group membership, networks, and collective action.

The first to face the problem of measurement was Putnam (1993, 1995) who referred to voter turnout in referenda, newspaper readership, and membership in voluntary associations (like soccer clubs or literacy circles) to show how social capital is scarce in South Italy and how it is in the retreat in the United States. However, as voluntary organizations and other groups vary substantially in size, political clout, internal cohesion, and the externalities they bring about, merely counting their number can be misleading (Fukuyama, 2001; Engbers et al., 2017). Therefore, scholars (Knack, 2003; Beugelsdijk & van Schaik, 2005; Rodríguez-Pose & von Berlepsch, 2013) have tried to distinguish between groups that cause positive and negative external effects: "Putnam groups" are those envisaged of the said

scholar and embrace civic organization that pursue a common good thus promoting social capital and growth. "Olson groups", instead, are rent-seeking associations (e.g., lobbying groups) operating for their own benefit and thus potentially growth harming (Olson, 1982). Nevertheless, subsuming groups into broad categories is subjective itself and hence might aggravate the problem more than attenuating it. Therefore, scholars have retreated to other outcome-based social capital variables like parking violations by UN diplomats in New York City (Fisman & Miguel, 2006), organ (Guiso et al., 2016) and blood donations (Guiso et al., 2004; Buonanno et al., 2009; Crescenzi, et al., 2013).

On the other hand, researchers have tried to create direct measures of social capital which capture values and norms. In essence, there are two ways to measure these: Surveys and experiments. The former has the advantage of being readily available for various countries (e.g., the World Value Survey, European Social Survey, General Social Survey, Euro-, Afro- Latinobarometer) but exhibits the caveat that they might fail to capture true values and beliefs since participants could be hesitant to reveal those. Experimental measures, instead, can be easier to interpret and can be made incentive-compatible by using real money but on the flipside, they are expensive, and the samples are often small and non-representative leading to issues of external validity (Guiso et al., 2011; Alesina & Giuliano, 2015). The most popular direct measure of social capital is generalized trust which captures how much an individual generally trusts his or her compatriots (in contrast to personalized trust which examines trust towards a well-defined individual, e.g., a family member or a superior). Trust itself is sometimes considered a separate component of social capital (e.g., as a dimension in Kaasa & Parts, 2008; Grootaert et al., 2004), as a belief itself (e.g., Guiso et al., 2011), or as a direct consequence of social capital (e.g., Woolcock, 2001; Putnam, 2001).

Altogether, most scholars agree that trust can be deemed a good proxy for social capital. Usually generalized trust is measured via the question "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" with "Most people can be trusted" and "Need to be very careful" as answer options. Whether this question aptly captures trust levels of a society has been subject of debates among scholars. Fukuyama (2001) criticizes that one cannot deduce how much and who exactly respondents trust and how likely they are to cooperate. Glaeser et al. (2000) find that the question rather captures trustworthiness than trust as only the former is correlated with the results of their experiment. However, Fehr et al. (2003) find the exact opposite result using the same experimental setting but a larger and more heterogenous sample[2]. Sapienza, Toldra, and Zingales (2007) refine the experiment[3] and resolve the contradicting results by separating between a belief-based and a preference-based component of trust. They discover that trusting behavior in the experiment is

[2] Both Glaeser et al. (2000) and Fehr et al. (2003) have conducted a survey about generalized trust and trustworthiness and a trust game devised by Berg, Dickhaut, & McCabe (1995). In this experiment a first mover is endowed with a specific amount of money and gets to decide how much money to send to a second mover. The amount sent is then doubled and the second mover can in turn decide how much to return. The amount sent by the first mover indicates his/her level of trust, while the amount returned by the second mover indicates his/her level of trustworthiness.

[3] In their refined version of the experiment all subjects got to play both sides of the game. All subjects first had to indicate how much to send, then how much they expect to receive, and then how much they will return themselves. To motivate subjects to answer accurately, they were rewarded for correct expectations.

influenced by both[4], but answers to generalized trust questions are only correlated with the belief-based component. To measure the preference-component, the authors suggest questions on past trusting behavior. Naef and Shupp (2009) corroborate these findings by discovering that trusting behavior in the experiment is most strongly correlated with survey-based trust measures when individuals are asked how much they trust strangers. Therefore, trust can be considered an apt measure of social capital also because it is positively correlated with a whole host of institutional development measures. Moreover, there is no stigma attached to either answer opportunity of the generalized trust question, so that one can expect people to answer truthfully. This is not necessarily true for other survey questions about beliefs and values like peoples' opinion whether or not disobeying the law or cheating on taxes is justifiable (Guiso et al., 2011).

2.4. Social capital and institutions

Social capital is believed to influence economic development by determining how well nation-wide institutions function at the regional level. The idea of institutions that subvert social cohesion goes back to Alexis de Tocqueville (1840, p. 93) who noted that

> "Despotism (...) sees in the separation among men the guarantee of its continuance, and it usually makes every effort to keep them separate. (...) A despot easily forgives his subjects for not loving him, provided they do not love one another."

The French philosopher and political scientist maintained that by creating mistrust among the people, despots can rule over them more easily. Therefore, Tocqueville can be seen as an early scholar of a literature which claims that institutions and social capital are mutually reinforcing. Putnam (1993) contends that social capital influences the way in which institutions operate. Regional institutions in northern Italy function better than their southern counterparts because social capital is stronger in the North. Helliwell and Putnam (1995) present first empirical evidence for this hypothesis. They use a government reform of 1977 which granted more power to regional governments as a natural experiment and observe that interregional income convergence processes reversed, indicating that institutions in regions with low social capital function less well. Putnam (1993), furthermore, believes that institutions in turn favor the creation of social capital. He attributes the abundance of social capital in northern Italy to its inclusive institutions in the Middle Ages. Guiso, Sapienza, and Zingales (2016) substantiate this hypothesis empirically by exploiting regional variations within the North. They show that cities which did not experience a period of self-governance exhibit significantly lower levels of social capital today. Moreover, they show that social capital levels rise with the persistence of beneficial institutions. Tabellini (2008)

[4] Expectations about the trustworthiness of others (how much receivers would return) are highly correlated both with how much they trust others and their own trustworthiness (as receivers). In homogenous populations players' expectations are molded by their own behavior, that is they trust others if they are trustworthy themselves. This explains why Glaeser et al. whose sample is very homogenous consisting of Harvard undergraduate students only, find a high correlation between the generalized trust question and trustworthiness but not between the survey question and senders' behavior. In very heterogenous population, on the other hand, players' expectations do not hinge upon their own preferences regarding trustworthiness but only on their beliefs. Thus, Fehr et al. who use random German households find that survey questions are correlated with senders' behavior but not with trustworthiness.

finds similar evidence. Investigating second generation US citizens, he finds that individuals whose parents are from a country which was a century ago ruled democratically, are more likely to value trust and respect for others. European regions with more inclusive institutions exhibit higher levels of generalized morality. Moreover, he discovers that regions which highly value trust and respect tend to perform better regarding governance indicators and are generally more developed.

Nannicini, Stella, Tabellini, and Troiano (2013) create a model of political agency to describe how social capital determines the functioning of institutions. Individuals (civic voters) who share cultural traits of solidarity and cooperation hold politicians accountable to higher standards, penalizing them if they fail to comply with these standards. They will do so even if they are the beneficiaries of clandestine policies because their utility depends on the aggregate welfare level. However, their model includes a second, uncivic type of voters which is only concerned with individual or group-specific welfare. This second group allows incumbent politicians to pursue a "divide and rule" strategy (just like the despot in Tocqueville's quote). The uncivic voters tolerate the politician's lapses as long as he enriches them. The rents a politician can extract decreases with the share of civic voters. Thus, social capital constrains the power of politicians and the well-functioning of institutions. The authors find empirical evidence for their model, in that politicians from Italian regions with low levels of social capital are more likely to be absent in parliament and to be prosecuted. Moreover, regions with high social capital tend to penalize misbehaving politicians more.

2.5. Empirical studies on social capital and economic development

Scholars have tried to discern the effect of social capital on economic development also empirically. The first econometric investigation was that of Knack and Keefer (1997). Using the World Value Survey's data on how much people generally trust their compatriots as well as how much they object asocial behavior, they find a positive relationship between social capital and economic growth in a cross-section of 29 countries. Zak and Knack (2001) second these results extending the sample to 41 economies. Moreover, they empirically test the propositions of their model that trust is lower if institutions are weak, society is heterogenous, and the economy is unfair. They find that higher trust levels are indeed correlated with better institutions and lower inequality regarding income or land. However, ethnic fractionalization – the proxy of a society's homogeneity – is only significantly related to trust in a quadratic function indicating that Horowitz (1985) was right in that inter-group differences are maximized when there is a limited number of relatively large groups which pose a serious threat to dominate all others. Temple and Johnson (1998) confirm the positive correlation between social capital and economic growth by proxying the former via indices of social development constructed in the 1960s. Temple (1998) furthermore finds that this positive association is also present in Africa. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997) find evidence for the hypothesis that social capital (or trust) boosts economic growth by facilitating cooperation and thus enhancing the performance of large organizations (e.g., Putnam, Fukuyama, Nannicini et al., Tabellini, etc.) by discovering that trust is correlated with

government effectiveness, participation in civic organizations, and the relative size of firms. Whitely (2000) even ascertains that social capital's impact on economic growth is at least as strong as that of human capital. However, all these cross-country comparisons exhibit shortcomings viz. coefficient instability due to multicollinearity, omitted variable bias, and limited degrees of freedom (Michalopoulos & Papaioannou, 2017). Thus, these results only represent mere correlations and not causal effects. In an attempt to tackle some of these issues, scholars of social capital moved to cross-regional studies which account for nation-wide factors like institutions. Building upon Putnam's hypothesis that social capital determines how well institutions perform at the regional level, Beugelsdijk and van Schaik (2005) analyze its association with regional economic growth in European regions and find a positive correlation between growth and both generalized trust and associational activity. Tabellini (2010) refines the former scholars' investigation tackling its endogeneity problem by instrumenting culture through historical political institutions and education levels. He ascertains a positive and significant effect of the social capital measures on subnational development levels. Neira, Vázquez, and Portela (2009) verify the positive relation between social capital and economic growth in Europe using a panel data model rather than a regional approach. In contrast, Gennaioli, La Porta, Lopez-de-Silanes, and Shleifer (2013) investigating a whole host of different determinants of regional development find that their culture measures – trust and ethnic heterogeneity – exhibit no significant relationship to GDP/capita.

This thesis builds on this literature by investigating the relationship between social capital and regional economic development in Sub-Saharan Africa. Unlike the works of Beugelsdijk and van Schaik, Tabellini, and Neira et al., it focuses on developing countries. The only study which has included a wide array of developing countries is Gennaioli et al. (2013). Although it covers most countries in the world, Africa is somewhat underrepresented. This problem is particularly striking when the authors include their trust variable. The World Values Surveys (wave 1 to 5) polled people in 69 countries, only ten of which were Sub-Saharan African. This thesis uses data from the Afrobarometer and the World Value Survey and covers 30 Sub-Saharan African economies. Most researchers believe that the poor growth performance of developing countries can be associated with a lack of social capital. Francois and Zabojnik (2004) propose that low levels of trust and trustworthiness can trap developing countries in poverty even if new technologies and techniques become available. Zak and Knack (2001) state that trust is low if institutions are weak, societies heterogenous, and economies unfair – all of which is true in most African economies – and that this dearth of social capital prevents people from saving thus hindering economic growth. As less developed countries are often simultaneously fraught with low levels of trust and poor institutions, many scholars adopt a pessimistic view regarding potential development leaps. Nannicini, Stella, Tabellini, and Troiano (2013) allege that a low level of social capital can incentivize politicians to follow a divide and rule approach in which they underpin their power by enriching their supporters. Thus, political leaders can establish authoritarian rule upheld through cronyism and nepotism and preclude economic development. Africa – the ethnically most fractionalized continent – seems to be particularly prone to this pernicious relationship between crony capitalism and despotism.

Burgess et al. (2015), for example, convincingly show how in Kenya ethnic favoritism sprawls under autocratic regimes whereas it was constrained during democratic periods. On the other hand, some scholars believe that social capital can overcome weak institutions. Ahlerup, Olson, and Yanagizawa (2007) suggest that abundant social capital supersedes feeble legislation and ineffective law enforcement by creating a set of informal rules. Thus, countries can develop even without strong institutions. Bisin and Verdier (2017) likewise show how a favorable set of cultural norms can not only assert itself against other traits inimical to economic growth but also spur the development of benevolent institutions.

3. Data

The sample consists of 30 Sub-Saharan African countries and 335 regions. Wherever possible, the highest administrative division was used which corresponds to regions or provinces. As the administrative units of the Afrobarometer and the United Nations Development Programme (UNDP) did not always correspond, some subregions had to be merged into larger aggregates[5].

Using Guiso's, Sapienza's, and Zingales' (2011) definition of "civic capital", this thesis follows their recommendation to measure it via the generalized trust question, that is "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" The proportion of people in a given subnational administrative unit answering "Most people can be trusted" serves as the main proxy of social capital of that region. Additionally, other trust dimensions shall be considered (following Nunn & Wantchekon, 2011): How much people trust their relatives, neighbors, and other people they know. Unlike the generalized trust question, these latter questions allow interviewees to choose from four different options when asked how much they trust the respective group or institution: i) "not at all", ii) "just a little", iii) "somewhat", and iv) "a lot". For the sake of comparability, responses i) and ii) as well as iii) and iv) are lumped together. The generalized trust question does not correlate much with responses from other trust questions[6]. Membership in religious communities or voluntary groups is moreover used as alternative proxy of social capital. The most recent data can be found in the 2011/13 wave of the Afrobarometer. The survey covers 34 African countries and indicates the region each interviewee is from. As this thesis concentrates on Sub-Sahara Africa only and the proposed instruments are not applicable for Northern African and the African island countries[7], they must be excluded reducing the sample to 28 nations[8]. Data on two further states[9] could be gleaned from the

[5] The countries in which lower subdivisions had to be merged into larger ones are Uganda, Sierra Leone, and Malawi. Subdivisions of the Afrobarometer had to be merged in Botswana, Côte d'Ivoire, Benin, Burundi, and Zanzibar in Tanzania. Sometimes cities had to be merged with their surrounding area. This was the case for Lomé and the surrounding Maritime region in Togo, Ouagadougou and the Centre region in Burkina Faso, and Niamey and Tillabéri in Niger.

[6] A table summarizing all correlation can be found in the appendix (table 8.1).

[7] Neither does Gershman's and Rivera's data set cover these nations nor is it sensible to compute the distance to the location of slave demand as these countries were rather destinations for slaves. The Northern African countries excluded are Algeria, Egypt, Morocco, and Tunisia. The island countries excluded are Cape Verde and Mauritius. Following Nunn and Wantchekon (2011) Madagascar is included.

[8] These countries are Benin, Botswana, Burkina Faso, Burundi, Côte d'Ivoire, Cameroon, Eswatini, Ghana, Guinea, Kenya, Lesotho, Liberia, Mali, Madagascar, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, South Africa, Sudan, Togo, Tanzania, Uganda, Zambia, and Zimbabwe.

[9] Ethiopia and Rwanda.

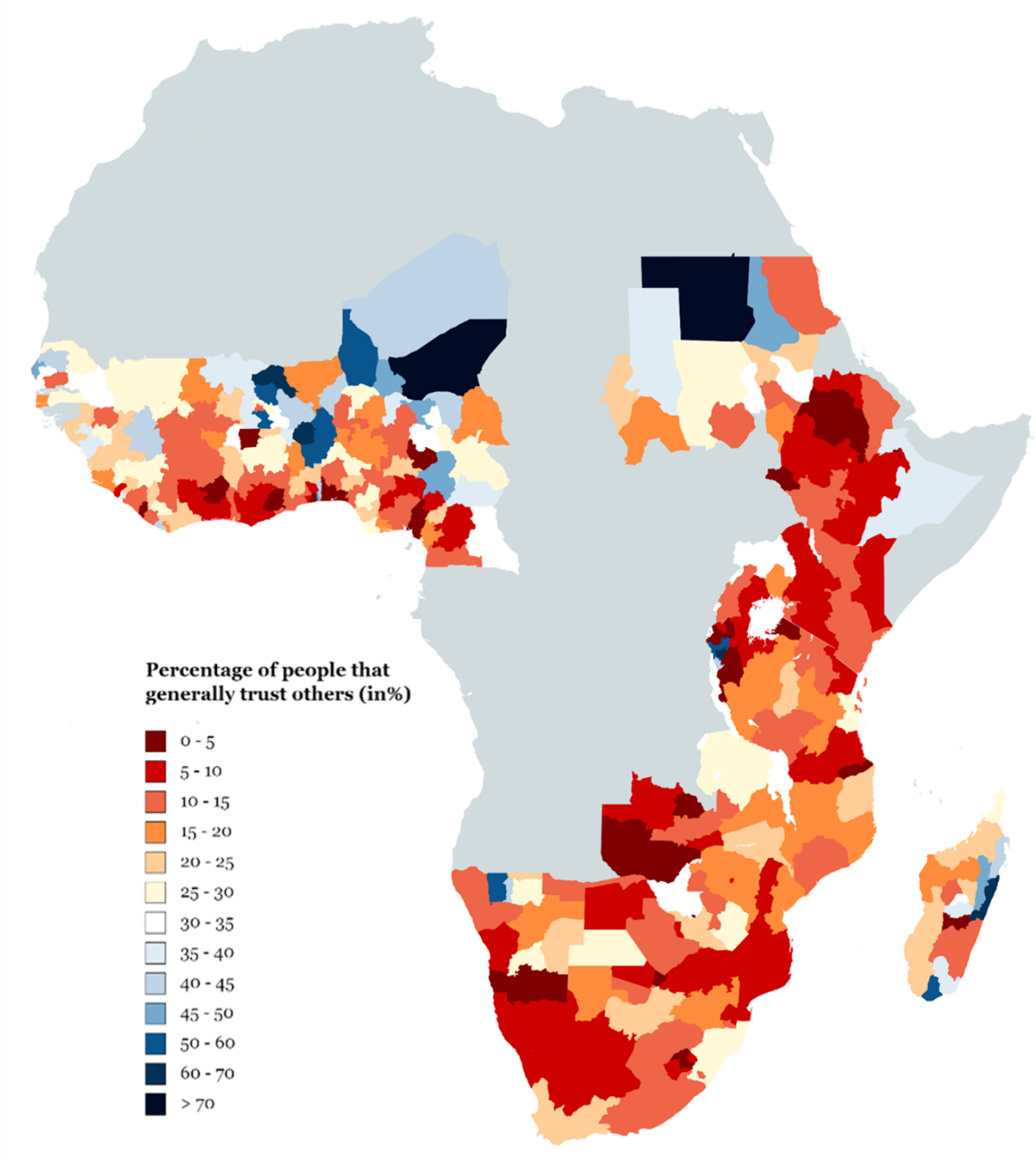
World Value Survey extending the total sample to the 30 countries of table 3.1 and their respective 337 subdivisions.

Table 3.1: Composition of the sample by country.

Country	Region Type	Obs.
Benin	Departments	12
Botswana	Districts	9
Burkina Faso	Regions	13
Burundi	Provinces aggregated to statistical regions	5
Côte d'Ivoire	Regions (pre-2011)	19
Cameroon	Regions	10
Eswatini	Regions	4
Ethiopia	Regional states and chartered cities	11
Ghana	Regions (pre-2018)	10
Guinea	Regions	8
Kenya	Provinces (pre-2010)	8
Lesotho	Districts	10
Liberia	Counties	15
Madagascar	Regions (post-2009)	22
Malawi	Regions	3
Mali	Regions (pre-2012)	9
Mozambique	Provinces	11
Namibia	Regions (pre-2014)	13
Niger	Regions	8
Nigeria	States	37
Rwanda	Provinces (pre-2006)	12
Senegal	Regions (pre-2008)	11
Sierra Leone	Provinces (pre-2017)	4
South Africa	Provinces	9
Sudan	States/Wilayat (pre-2012)	15
Tanzania	Regions (pre-2012)	21
Togo	Regions	5
Uganda	Regions	4
Zambia	Provinces (pre-2011)	9
Zimbabwe	Provinces	10
Total		**337**

The table reports the composition of the sample by country. The number of subnational units and their type are reported for each country.

Figure 3.1: Regional distribution of generalized trust in Sub-Saharan Africa.



The figure depicts the regional distribution of the generalized trust question conducted by the Afrobarometer. Red colors correspond to relatively low levels of trust, blue colors to higher levels of trust. Source: Own creation.

The sample covers most of West, East, and South Africa. Unfortunately, Central Africa was neither surveyed by the Afrobarometer nor the World Value Survey. The highest trusting region is Northern State in Sudan where 93% indicated that they generally trust people, the least trusting regions are Gambela and Harari Peoples' region in Ethiopia, Rivercess county in Liberia, and the Amoron'i Mania region of Madagascar where no interviewee responded to generally trusts people. The summary statistics of all trust questions can be found in table 3.2. Figure 3.1 displays the regional distribution of generalized trust in the sample. In comparison, the highest trusting countries in Europe according to the WVS are

Denmark, Norway, and Finland where around 70% of the people indicate that they generally trust most people. Germany, Spain and the United Kingdom exhibit mediocre values of around 40%, while most Eastern European and Balkan countries are low trusting with values of 10% to 25%. The lowest trusting European country is Albania where only 2.8% of the people believe that they can trust most people[10].

Table 3.2: Summary Statistics of the social capital proxies.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Generalized Trust	335	.196	.155	0	.933
Trust in Relatives	323	.813	.184	.153	1
Trust in Neighbors	335	.618	.23	.025	1
Trust in other people you know	335	.422	.209	0	1
Religion Member	335	.422	.214	0	1
Religion Active Member	335	.32	.216	0	.9
Voluntary Member	311	2.184	.57	.19	3.29
Voluntary Active Member	311	.244	.151	0	.7

The table presents descriptive statistics of the social capital proxies used in this study.

Regional income data is gleaned from the subnational Human Development Index (HDI) dataset of the UNDP, which uses the Gross National Income (GNI) at purchasing power parity (PPP) to compute the income subindex of the HDI. As most data on social capital stems from the fifth wave of the Afrobarometer conducted between 2011 and 2013, the regional GNI in 2013 is used as a proxy for economic development. Since nighttime luminosity is becoming increasingly popular as subnational development proxy (e.g., Henderson et al., 2012; Michalopoulous & Papaioannou, 2017), its relationship with social capital shall be additionally examined. Light intensity data is available for 25 countries of those included in the Afrobarometer 2011/13, whereas the GNI data covers all 30 countries of the sample. Descriptive statistics can be found in table 3.3. Figure 3.2 illustrates the pattern of GNI/capita in the sample. The poorest region in terms of GNI per capita is Bulawayo in Zimbabwe followed by Northern Burundi[11] both of which exhibit a per-capita income of under 700 US-$ (at PPP). Thus, both regions belong to the poorest in the world undercutting the Democratic Republic of the Congo – the poorest country of the world in 2013[12]. The richest region in the sample is South-East Botswana where people earn on average 25,920 US-$ a year. In 2013, this corresponded to per-capita income levels of Greece (25,940 US-$) and as of 2019 to those of Chile (25,190 US-$) or Turkey (26,860 US-$).

Table 3.3: Summary Statistics of regional development proxies.

Variable	Obs.	Mean	Std. Dev.	Min	Max
GNI/capita (in thousand US-$)	337	3.398	3.688	.64	25.92
ln Light Intensity	273	-1.249	1.906	-4.605	3.97

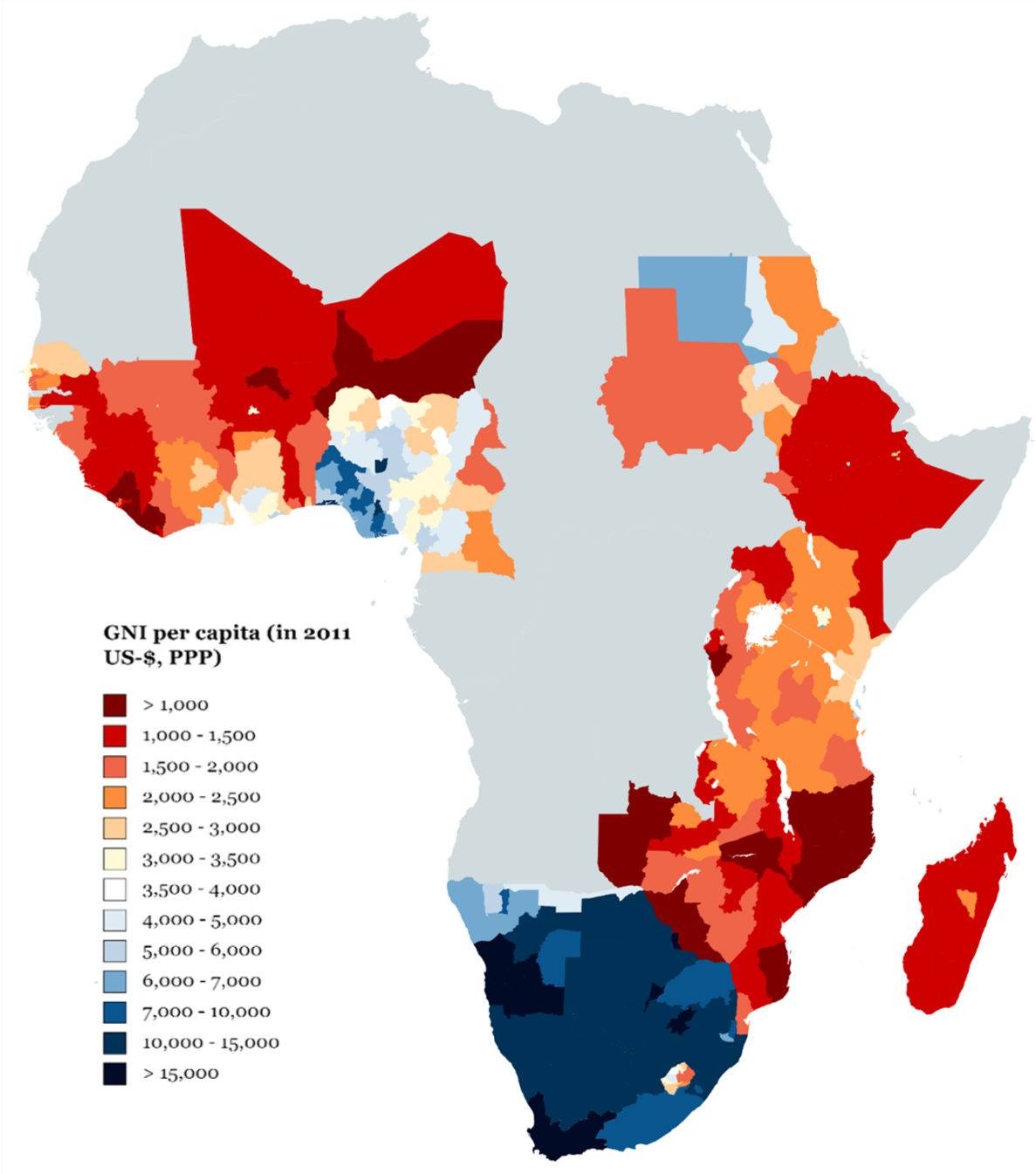
This table summarizes descriptive statistics on regional development proxies. For presentation purposes, logs were not yet applied to GNI/capita.

[10] All data on generalized trust in Europe was taken from the seventh wave of the World Value Survey.

[11] Northern Burundi comprises the provinces Kayanza, Kirundo, Muyinga, and Ngozi.

[12] The Democratic Republic of the Congo had a GNI/capita of 690 $ (at PPP) (World Bank Open Data). As of 2019, Burundi is the only country exhibiting a nation-wide GNI/capita of below 1000 $ (at PPP) (790 $).

Figure 3.1: Regional distribution of GNI/capita in Sub-Saharan Africa.



The figure illustrates the distribution of gross national per-capita income in Sub-Saharan Africa. Red colors correspond to relatively poor regions in terms of GNI/capita, blue colors to comparatively rich regions. Source: Own creation.

In order to avoid omitted variable bias, various control measures are included. Regional education data is provided by the UNDP. To construct the subnational HDI, they use expected and mean years of schooling. Moreover, the literacy rate is considered which is provided by the Robert Strauss Center for International Security and Law who compiled a dataset of various regional education measures mostly based on data from the Demographic and Health Surveys program (DHS) and the UNICEF Multiple Indicator Cluster Surveys (MICS). For Sudan and Botswana, literacy data stems from the national central statistics bureaus. Descriptive statistics are provided in table 3.4.

Table 3.4: Summary statistics of education controls

Variable	Obs.	Mean	Std. Dev.	Min	Max
Expected schooling	337	9.934	2.479	2.35	14.9
Mean schooling	337	4.716	2.571	.3	12.1
Literacy rate	337	.587	.266	.095	.989

The table shows descriptive statistics on education variables.

On average, students (of 2013) can expect to go nine years to school while the total population spent on average less than five years in school, thus only finishing primary education. In South-East Botswana people spent an average 12 years in school – the highest value in the sample, whereas in vast parts of Burkina Faso (with the Sahel region at the bottom of the list) people spent only a couple of months in school. In the sample, only a little more than half the people are literate. The lowest literacy rate is found in the Tillabéri region of Niger where only every tenth person can read. Unsurprisingly, in urban areas (Harare and Bulawayo in Zimbabwe, Nairobi in Kenya, Analamanga with the Malagasy capital Antananarivo) and in regions of South Africa and Namibia almost everybody can read.

To account for the geographic characteristics of a region a whole range of different factors is included. For expositional purposes they are divided into four groups, general geographic data, climate data, natural resource data, and human geography data (broadly following Mitton, 2016). General geographic variables comprise *latitude*, *longitude*, *elevation*, *capital*, *land area*, *landlock,* and *terrain ruggedness*. *Latitude* and *longitude* are measured in absolute values expressed in degrees and thus indicate the distance to the equator and the null meridian, respectively. The southern-most region (and thus also that furthest from the equator) is Western Cape in South Africa, while Dakar in Senegal is the region which lies the most western. Timbuktu in Mali is the northern-most region; Sava in Madagascar the one furthest in the East. *Elevation* measures the mean height of each region in meters. The lowest-lying region is Conakry in Guinea, which only encompasses the Guinean capital situated on the Kaloum Peninsula and the neighboring Tombo Island. The highest region in terms of average elevation is the Butha-Buthe district in Lesotho which has an average elevation of almost 3,000 meters. To set this in context, Tyrol in Austria has an average elevation of mere 712 meters, Grisons in Switzerland of 1,292 meters. Six further Basotho regions lie on average above 2,000 meters making Lesotho the highest country of the sample. *Land area* is the surface in square kilometers. The capital regions of Conakry, Guinea and Niamey, Niger are the smallest regions in terms of land area, the desert regions of Agadez in Niger and Timbuktu in Mali are the largest regions. Agadez is over 600,000 km² and thus almost double the size of Germany (ca. 357,000 km²). *Landlock* and *Capital* are dummy variables. *Landlock* becomes one if a region has no access to the sea and zero otherwise, *Capital* becomes one if a country's capital is within the respective region and zero elsewise. Data on *terrain ruggedness* at the subnational level is provided by Shaver, Carter, and Shawa (2016) who compute each region's mean terrain ruggedness. As these authors sometimes use outdated boundaries or second-level administrative borders, the data had to be computed by hand for some regions. A rugged terrain is difficult to cultivate making agriculture difficult. Moreover, it is believed to offer hideouts for criminal gangs or rebels. The least rugged region is the

Centre Region of Burkina Faso, the Basotho regions are the most rugged ones (with Butha-Buthe district again topping the list).

Climatic factors include the average yearly *temperature* and *precipitation*, the yearly *temperature range* and *precipitation range*, average yearly *sunshine hours*, *humidity*, *rain days*, and *wind speed*. The coldest regions in the sample are all found in Madagascar with Anosy being the coldest with an average temperature of 10.8°C which broadly corresponds to that of Frankfurt, Germany (10.6°C). The hottest region is Gao in Mali with an average temperature of 30,1°C. Littoral Region in Cameroon is the rainiest region of the sample both in terms of precipitation and in terms of annual rain days (Douala, the capital of Littoral Region has more than double as much rain days as the "Rain City" Seattle: 243 compared to 119 rain days per year). The most humid region is the South-West region in Cameroon which is also the cloudiest region (in terms of average daily sunshine hours). The driest region in terms of precipitation is River Nile, in terms of rain days and average humidity Northern State, both in the Sudanese Sahara. Both are also the sunniest regions of the sample. Besides the Saharan region, regions which lie in the Namib and/or Kalahari Desert (e.g., Erongo, Hardap, and Karas all in Namibia) belong to the driest and sunniest ones in the sample. The windiest region is Sava at the northern cape of Madagascar (windier than "Windy City" Chicago where wind blows at an average 18.4 km/h compared to 24.2 km/h in Antsiranana – the capital of Sava), while Nimba County, Liberia is the calmest region.

The natural resources considered are *oil and gas*, *diamonds* and other gemstones, *precious metals*, *base metals*, *iron*, and elements commonly used in *alloys*. *Oil and gas* is defined as the number of onshore oil and gas fields in each jurisdiction which is provided by the United States Geological Survey (USGS). Delta State in Nigeria has 110 and therefore the most oil or gas fields in the sample. Almost all fields are found in southern Nigeria (besides Delta State, Rivers and Bayelsa States have an abundance oil or gas sites). *Diamonds* includes the number of sites at which diamonds or other gemstones are reported in the Mineral Resources Data System (MRDS) of the USGS. Most diamonds are found in Free State followed by Northern Cape in South Africa. The MRDS gathers reports describing metallic and nonmetallic resources throughout the world and indicates their exact location. Data on 1,752 mineral sites located within regions of the sample are identified and the different mineral resources categorized into *base metals*, *precious metals*, *iron*, and *alloys*. *Base metals* includes copper, lead, nickel, aluminum, cobalt, germanium, cadmium, magnesium, mercury, potassium, titanium, tin, uranium, zirconium, and lithium. Most base metals are found in Limpopo, South Africa. Almost all South African regions have notable deposits of base metals as well as the Copperbelt and Central region in Zambia and the Mashonaland regions in Zimbabwe. *Precious metals* encompasses gold, silver, and the platinum group.[13] The most are found in Gauteng, South Africa followed by the South African provinces Free State, Limpopo, North-West and Mpumalanga. Outside South Africa, Mashonaland West and Midlands in Zimbabwe, Oromia in Ethiopia, and Western Province in Sierra Leone have notable deposits of precious metals.

[13] The platinum group includes platinum, ruthenium, rhodium, palladium, osmium, and iridium.

Alloys comprises carbon, manganese, chromium, molybdenum, vanadium, boron, cerium, and other rare earth elements[14], niobium, tungsten, tantalum, hafnium, and rhenium. Again, they are mostly found in South African provinces (Limpopo, North-West, Northern Cape) followed by provinces of Zimbabwe (Midlands, Mashonaland East). *Base metals*, *iron*, and *alloys* are all scaled by total land area of the region they are located in, whereas *precious metals*, *diamonds*, and *Oil & Gas* are not, following the assumption of Mitton (2016) that precious resources have a substantial effect on a region's development level regardless of its land area. The last control included is the *urbanization* rate of each region. Data was gleaned from Gershman and Rivera (2018) as well as statistical reports of countries which were not covered in the mentioned study[15]. Unsurprisingly, the city regions exhibit the highest urbanization rate[16]. The most rural areas are Amoron'i Mania in Madagascar, the three provinces of Burundi as well as the states Ebonyi, Taraba, and Zamfara in Nigeria. Summary statistics of all geographic controls are provided in table 3.5.

Table 3.5: Summary statistics of geographic controls.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Basic geographic variables					
Latitude	337	12.171	7.415	0	33.228
Longitude	337	20.402	14.395	.034	49.855
Landlock	337	.682	.466	0	1
Capital	337	.089	.285	0	1
Land Area	337	46196.043	68560.121	76.482	621417
Elevation	337	681.306	606.672	3	2849
Terrain Ruggedness	336	63.012	75.311	3.608	455.693
Climate variables					
Temperature	355	24.058	3.887	10.8	30.1
Precipitation	355	1162.034	904.397	8.2	3758.6
Temperature Range	337	6.204	3.36	.9	17.4
Precipitation Range	337	219.875	199.141	2	3223
Sunshine	337	8.378	1.734	4.483	10.908
Humidity	337	.657	.688	.083	12.583
Rain days	337	106.467	57.135	2.25	243
Windspeed	337	12.155	6.534	3.563	117.48
Natural resources variables					
Oil & Gas	337	1.122	8.781	0	110
Diamonds	337	.098	.612	0	9
Precious metals	337	4.389	30.863	0	425
Base metals	337	.103	.386	0	4.362
Iron	337	.022	.104	0	1.454
Alloys	337	.043	.167	0	2.181
Human geography variables					
Urbanization	337	.323	.248	0	1

The table reports summary statistics for all geographic controls. For expositional purposes, variables were subsumed into four categories: Basic geographic variables, Climate variables, Natural resources variables, Human geography variables.

[14] The rare earth elements (REE) are not distinguished in the MRDS. They comprise all lanthanides as well as scandium and yttrium.

[15] Viz.: Benin, Burundi, Côte d'Ivoire, Lesotho, Madagascar, Senegal, Tanzania, and Uganda.

[16] Bulawayo and Harare (Zimbabwe), Kigali (Rwanda), Niamey (Niger), Nairobi (Kenya), Bamako (Mali), Addis Ababa (Ethiopia), Conakry (Guinea), Lagos (Nigeria), and the Littoral region in Benin which corresponds to Benin's largest city Cotonou.

4. Estimation Strategy

The baseline specification is a simple linear model of the following form:

$$\boldsymbol{y}_{ci} = \alpha + \beta \boldsymbol{SC}_{ci} + \gamma \boldsymbol{X'}_{ci} + \boldsymbol{\delta}_c + \varepsilon_i \quad (4.1)$$

Where $\boldsymbol{y}_{ci}$ is one of the development outcomes in region i in country c, $\boldsymbol{SC}_{ci}$ is one of the social capital measures, $\boldsymbol{X'}_{ci}$ is a vector of control variables, $\boldsymbol{\delta}_c$ is the full set of country fixed effects, and ε_i the error term[17]. In the base regressions of section 5, generalized trust serves as the social capital proxy and the natural logarithm of GNI/capita as the dependent variable. When checking the robustness of the results in section 6, other social capital measures (trust in relatives/neighbors/other people you know, group membership, and high-trust dummies) are evaluated. Moreover, night-luminosity is used as alternative development indicator. Like GNI/capita, it is logarithmically transformed with the only difference that a small number is added beforehand. This procedure follows previous literature (Gershman & Rivera, 2018; Hodler & Raschky, 2014; Michalopoulos & Papaioannou, 2014) and prevents observations from taking on the value of zero as well as alleviating the effect of outliers. Estimating the relationship between social capital and income raises two major concerns. On one side, omitted variables can potentially determine both current levels of social capital and development and on the other side, reverse causality is possible. To tackle these problems a two-pronged approach will be used in which a large set of control variables shall obviate omitted variable bias and instrument variables shall guarantee the direction of causality.

4.1. Control Variables

To ensure that the results are not driven by country-wide unobservable characteristics, this thesis analyzes the relationship between social capital and economic development at the regional level. Thus, a set of country fixed effects, $\boldsymbol{\delta}_c$, can be included. However, this strategy cannot rule out the possibility that social capital might not actually measure the effect trust has on income but rather pick up other regional characteristics (Algan & Cahuc, 2014). Such factor could comprise local or regional institutions as well as geographic factors. Gennaioli, La Porta, Lopez-de-Silanes, & Shleifer (2013), for example, discover that education explains a substantial share of variations in regional development. Although geographic factors measured by temperature, distance to the sea, and natural resource endowments are significant, their explanatory power falls behind that of education. Culture and institutions exhibit no significant relation to regional income levels. Mitton (2016) investigates the relationship between regional development and a whole host of different geographic and institutional variables. He finds that institutions have no significant influence on income at the regional level, but several geographic factors do (terrain ruggedness, tropical climate, ocean access, temperature range, storm risk, & natural resources). Moreover, he confirms the results of the latter study and finds a strongly significant

[17] Throughout the thesis, clustered standard errors were used.

association between regional education and income. Dell, Jones, and Olken (2009) examine the relationship between sub-national income and geography at the municipality level in the Americas and observe that temperature is negatively associated with income at the regional and local level. Michalopoulos and Papaioannou (2014) study within-ethnicity differences in economic performance of ethnic groups whose homelands were severed by the colonial border demarcation. Thus, they control for geographic and cultural factors and isolate the effect of formal nation-wide institutions. However, national institutions were unrelated to within ethnicity differences in economic development.

As this literature shows, in order to avoid omitted variable bias, it is essential to control for education and geography. The according variables are described in section 3. Since institutions have never been found to influence regional development levels, they are not explicitly accounted for (Gennaioli et al., 2013; Michalopoulos & Papaioannou, 2014; Mitton, 2016). The vector $\boldsymbol{X'}_{ci}$ usually includes all control variables presented in the previous section to minimize potential omitted variable bias.

4.2. Instrument Variable Approach

The second prong of the identification strategy is the instrument variable approach. The relationship between social capital and current development might work in both ways, that is social capital is relevant in explaining present income levels but is simultaneously influenced by that very same factor (Algan & Cahuc, 2014). Numerous variables have been found to exhibit a significant relationship to growth, inter alia institutions (Hall & Jones, 1999; Acemoğlu, Johnson, & Robinson, 2002) geography (Sachs, 2003), historical events (Nunn, 2009), immigration (Tabellini, 2019; Sequeira, Nunn, & Qian, 2020), and biology via the genetic transmission of characteristics (Ashraf & Galor, 2013) or through psychological backlashes (Haushofer & Fehr, 2014). All these determinants of development, however, can potentially affect trust as well. For instance, Tabellini (2019) and Sequeira, Nunn, & Qian (2020) show that immigration brings about long-lasting economic benefits but deteriorates social cohesion at least in the short run. Haushofer and Fehr (2014) describe how poverty increases individuals' risk aversion which could translate into lower levels of trust when dealing with strangers. Alesina and Giuliano (2015) delineate the interconnectedness between institutions and culture and a plethora of models have been developed to model this interaction (e.g., Nannicini et al., 2013). To address these identification issues, historic events which exogenously influenced variations in social capital shall be used as instruments. An apt instrument must exhibit a significant relation to the social capital measures but must simultaneously be irrelevant in explaining the proxies of economic development (that is the GNI/capita and the nighttime luminosity). In this thesis the haphazard colonial border demarcation and the slave trade serve as exogenous sources of variation in social capital.

4.2.1. Ethnolinguistic Diversity

Since borders in Africa were arbitrarily drawn by colonial officers without regard of ethnic homelands and religious allocation, African countries exhibit the highest degree of ethnic and religious

diversity. Many scholars believe that the propagation of social conflicts in Africa can be directly attributed to African countries' heterogeneity. Montalvo and Reynal-Querol (2005a), for example, discovered that ethnic polarization is significantly correlated to the onset of civil wars. Esteban, Mayoral, and Ray (2012) corroborate these results finding that both ethnic fractionalization and polarization are strongly significant in explaining the incidence of social conflicts. If ethnic diversity can be attributed to civil wars, it is reasonable to assume that it is also associated with lower levels of generalized trust. Therefore, an index which measures the level of ethnic and religious heterogeneity of every subnational unit shall serve as an instrument for social capital. The data is provided by Gershman and Rivera (2018) who computed ethnic and religious fractionalization (ELF) and polarization (ELP) indices for 360 first-level administrative units in 36 Sub-Saharan African nations[18]. Both indices assume values between zero and one where zero indicates that all individuals belong to the same ethnic group and one maximum diversity. Fractionalization is defined as the probability that two randomly chosen individuals belong to different ethno-linguistic groups. It can be computed as follows:

$$\boldsymbol{ELF = 1 - \sum_{i=1}^{N} (s_i)^2} \tag{4.2}$$

where $\boldsymbol{s_i}(j)$ is the share of group i in the population which sums up to $\sum_{i=1}^{N} \boldsymbol{s_i} = \boldsymbol{1}$. The more groups exist in a certain region, the higher is the fractionalization index.

Polarization indices, instead, are based on the assumption of Horowitz (1985) that inter-group differences are maximized when there is a limited number of relatively large groups. Consequently, polarization measures are maximized when two same-sized groups are present and thereupon decrease with the number of same-sized groups. It is usually calculated using the formular developed by Montalvo and Reynal-Querol (2005a):

$$\boldsymbol{ELP = 4 \cdot \sum_{i=1}^{N} (s_i)^2 \cdot (1 - s_i)} \tag{4.3}$$

Earlier literature has linked ethnic and religious heterogeneity directly with economic growth and found negative correlations (e.g., Easterly & Levine, 1997; Alesina et al., 2003; Montalvo and Reynal-Querol, 2005b). However, one must bear in mind the caveats of cross-country studies in general and that the standard indices treat all groups as equally distinct. To account for group similarities two approaches have gained increasing popularity. The first dates to Laitin (2000) and Fearon (2003) and uses linguistic distances between groups by comparing the relative positions of each two ethnolinguistic groups on the linguistic family tree determined through the number of branches the pair of languages shares. The fractionalization formula then becomes:

[18] Unfortunately, their study does not cover Burundi, Lesotho, Madagascar, Rwanda, and Sudan, so that this instrument reduces the sample to 25 countries.

$$\boldsymbol{ELF} = \sum_{i=1}^{N} \sum_{j=1}^{N} \boldsymbol{s_i s_j \tau_{ij}} \tag{4.4}$$

and the polarization index turns to:

$$\boldsymbol{ELP} = \mathbf{4} \sum_{i=1}^{N} \sum_{j=1}^{N} \boldsymbol{s_i s_j}^{\mathbf{2}} \boldsymbol{\tau_{ij}} \tag{4.5}$$

where $\boldsymbol{\tau_{ij}}$ is the distance between the two groups i and j. Fearon (2003) computes this distance using:

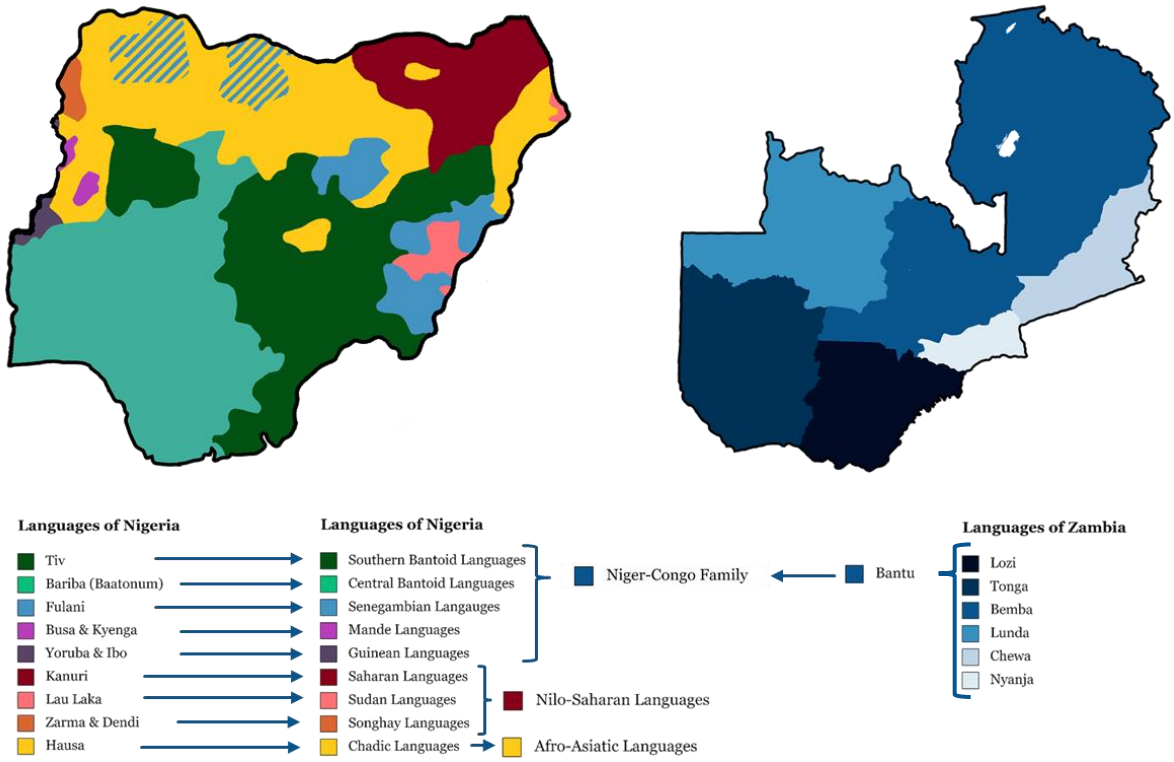
$$\boldsymbol{\tau_{ij}} = \mathbf{1} - \left(\boldsymbol{l}/\boldsymbol{m}\right)^{\boldsymbol{\delta}} \tag{4.6}$$

where $\boldsymbol{l}$ refers to the number of branches in the linguistic tree shared by languages i and j, and $\boldsymbol{m}$ is the maximum possible number of branches the two languages can share (equal to 13 in the case of Sub-Saharan Africa). $\boldsymbol{\delta}$ is a parameter which determines how quickly the distance between two groups declines with an increasing number of shared branches. Thus, the importance of the linguistic distance between two groups increases as $\boldsymbol{\delta}$ rises and in the limit, $\lim_{\delta \to \infty} \boldsymbol{\tau_{ij}}$ becomes equal to one and the weighted fractionalization index converges to its basic version (4.2). Which value of $\boldsymbol{\delta}$ to choose is subject of debates. Fearon (2003) chose a value of $\boldsymbol{\delta} = \mathbf{0,5}$ while Desmet, Ortuño-Ortín, and Weber (2009) chose $\boldsymbol{\delta} = \mathbf{0,05}$. Gershman and Rivera (2018) provide fractionalization and polarization data for 19 different values of $\boldsymbol{\delta}$ [19].

A second approach to account for inter-group differences is conceived by Desmet, Ortuño-Ortín, and Wacziarg (2012). They compute indices of fractionalization and polarization for every tier of each linguistic tree. By moving up the tree, more and more languages are aggregated until at the top, groups are only distinguished according to their language family. Thus, one can differentiate between deep and shallow linguistic cleavages. For example, Zambia exhibits high ethnic fractionalization at the most disaggregate level, but this heterogeneity vanishes completely when the different Bantu languages are lumped together. Nigeria, on the other hand, remains ethnically heterogenous even at levels of high aggregation as it lies on the border between the Afro-Asiatic, the Nilo-Saharan, and the Niger-Congo language family. Figure 4.1 shows the simplified distribution of languages in both countries. Gershman and Rivera (following the language trees constructed by the *Ethnologue*) distinguish 750 languages, six language families and up to eleven subdivisions in between. This makes 13 tiers in total for each of which they calculate the corresponding fractionalization and polarization index.

[19] Ranging from $\boldsymbol{\delta} = \mathbf{0.01}$ to $\boldsymbol{\delta} = \mathbf{0.1}$ in steps of 0.01 and from $\boldsymbol{\delta} = \mathbf{0.1}$ to $\boldsymbol{\delta} = \mathbf{1}$ in steps of 0.1

Figure 4.1: Ethno-linguistic Diversity in Zambia and Nigeria.

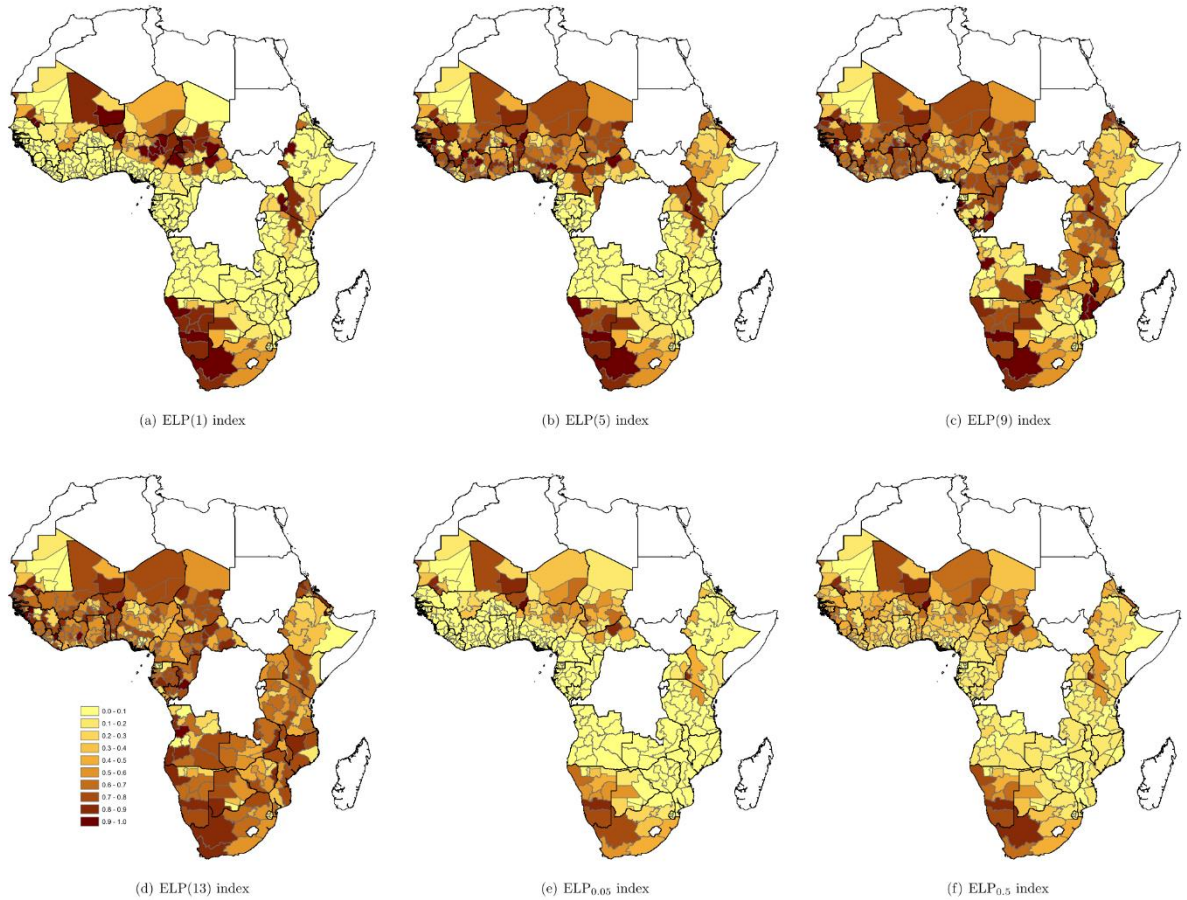


The figure portrays the linguistic diversity in Zambia and Nigeria at the language level. In both countries an abundance of different languages is spoken, however in Zambia they all are Bantu languages (depicted via blue colors) which belong to the Niger-Congo language family whereas the languages of Nigeria can be attributed to three distinct language families (Nilo-Saharan, Niger-Congo, Afro-Asiatic). Source: Own creation.

When taking inter-group distances into account, the relationship between both ethnolinguistic diversity and social conflicts or income becomes clearer. First, Desmet, Ortuño-Ortín, and Wacziarg (2012) find that fractionalization and polarization are correlated with the indigence of social conflict at the most aggregate level. Thus, they shed light on the somewhat surprising results of Fearon and Laitin (2001) who have found no relation between the general fractionalization index and social conflict. Although, shallow cleavages seem to be indeed irrelevant for social conflict, deep cleavages are not. Therefore, one can expect that generalized trust should decrease with higher degrees of ethnic diversity. In addition, the same authors discover that the relationship between ethnic diversity and economic growth follows the exact opposite pattern, in that the effect of fractionalization rises with falling levels of linguistic aggregation. Moreover, polarization seems to be not related at all to economic growth. Therefore, at deep levels of polarization, trust should be strongly impaired while economic growth should remain unaffected. Gershman and Rivera (2018) provide further evidence that the exclusion restriction is satisfied. Their estimations of all variants of the two indices of ethnolinguistic diversity with per-capita gross regional product (GRP) and the international wealth index (IWI) yields statistically insignificant effects which are small in magnitude. Altogether, ethnic heterogeneity – especially when measured via ethnic polarization at low levels of aggregation – should constitute valid instruments.

Figure 4.2 depicts the regional distribution of ethnic polarization indices at various stages of linguistic aggregation. Panel (a) displays polarization at the most aggregate level, that is at the level of language families. Panel (b) to (d) differentiate between more and more languages and reveal increasingly shallow ethnolinguistic cleavages. Panel (d) is the most disaggregate level, that is polarization at the level of languages. Panel (e) and (f) portray ethnic polarization using Fearon's and Laitin's method of distinguishing between language groups. Panel (e) uses a delta of 0.05 (as in the study of Desmet et al., 2009) indicating that the distance between two groups declines only slowly with an increasing number of shared branches in the language family tree, hence representing deeper cleavages. Panel (f) uses a delta of 0.5 (as in Fearon, 2003) which corresponds to a quicker convergence of groups, thus visualizing shallower cleavages.

Figure 4.2: Regional Distribution of ethnic polarization indices.



The figure shows the regional distribution of ethnic polarization indices at different levels of linguistic aggregation (panel (a) to (d)) and with different values of the parameter δ (panel (e) and (f)). Source: Gershman and Rivera (2018): Figure C.3.

4.2.2. Distance to Slave Ports

A second source of exogenous variation in trust is the slave trade. This approach is based on Nunn (2008) and Nunn and Wantchekon (2011). The slave trade lasted for a period of more than 400 years

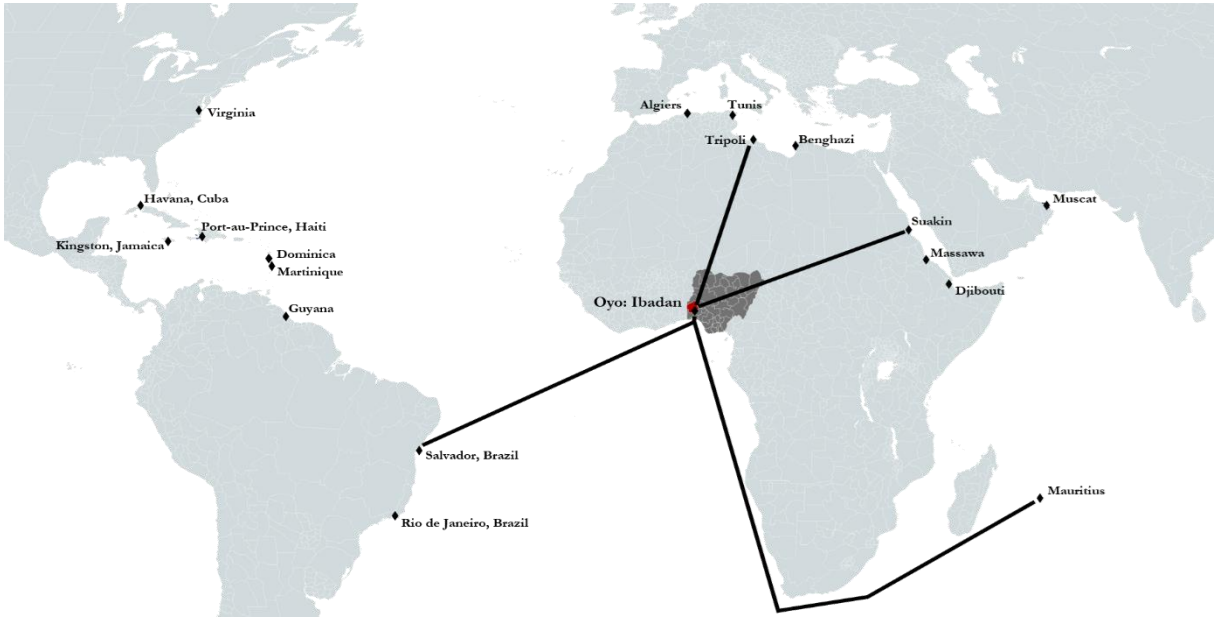
and is believed to have created a culture of deep mistrust in Sub-Saharan Africa. Its dimension is unprecedented and according to Manning (1990, p. 171) by 1850 Africa's total population was only half of what it would have been without the slave trade taking place. It initially started with state organized raids which created a hostile and unsecure environment for individuals outside their local communities. However, as the demand for slaves soared, such local communities became insecure themselves because of the slave trade's perfidious feature that individuals could gain some sort of protection by selling others into slavery in exchange for weapons. This vicious cycle of kidnapping slaves and selling them for weapons to defend oneself, perpetuated the slave trade and its environment of insecurity. As individuals assaulted, betrayed, kidnapped, and turned in their own kin, neighbors, and friends, norms of mistrusting everyone even those closest to you evolved. Nunn and Wantchekon (2011) find empirical evidence for this relationship between the slave trade and low levels of trust in Africa by ascertaining that ethnic groups which were more severely exposed to the slave trade are particularly low trusting today. Models of intergenerational cultural transmission like those presented in section 2.2 (Bisin & Verdier, 2001; Tabellini, 2008; Guiso et al., 2008) demonstrate how a culture of distrust can linger on over centuries and survive until today. Besides the well-known transatlantic slave trade, in which approximately 12 million slaves from all over Africa were shipped to the plantations of the Americas, three further slave trade patterns existed. In the Trans-Saharan slave trade, slaves from beyond the Sahara were brought to North Africa. The Red Sea slave trade conveyed people from Africa to the Middle East and India. The Indian Ocean slave trade too shipped slaves to India and the Middle East but also to plantation islands in the Indian Ocean. Taken together, these three slave trades have enslaved another 6 million people. Nunn (2009) finds a robust negative relationship between the number of slaves exported from each country and its current economic performance. In order to preclude that the negative relationship is caused by reversed causality, that is already poor regions were more inclined to select into the slave trade, the author employs an instrument variable approach. By using the sailing distance to the nearest location of slave demand in each of the four slave trades to represent how much a country was exposed to it, he ensures that the slave trade is responsible for the poor state of development. The same instrument shall be used in this thesis. The idea is that a region which was strongly affected by the slave trade, is less trusting today following the results of Nunn and Wantchekon (2011). The distance of each region's capital to the closest location of slave demand shall serve as proxy for that region's exposure to each of the four slave trades. Following Nunn (2009), the instrument's validity hinges upon the assumption that slave traders procured slaves from locations that were relatively close to the major demand centers. Take for example the Caribbean plantations. It seems more reasonable that slaves on Caribbean plantations were taken from Western Africa due to its proximity rather than to assume that plantations were established in the Caribbean because the West African slave supply was close. Nunn argues that the location of slave demand was determined by factors unrelated to the slave supply, for example the deposit of gold and silver in South America, climates suitable for sugar, tobacco, or cotton production in the

Caribbean, the southern states of the US, and isles in the Indian Ocean. In the Middle East and North Africa slaves were demanded as workers in salt mines and in the Red Sea as pearl divers.

The locations of slave demand are the same as in Nunn (2009) who uses data on slave imports from Eltis and Richardson (2006) to determine the biggest slave markets. Indian and Atlantic Ocean slave trade hubs are generally reached by ship, whereas the centers of the Red Sea and the Trans-Saharan slave trade are reached overland. Unlike Nunn (2009) who uses only the sailing distance from the point on the coast that is closest to the centroid of a landlocked country to the slave demand overseas, this thesis sums the sailing distance from Africa and the distance of each landlocked capital to the nearest coast. The reason for this is that countries far away from the coast were more difficult to reach for slave hunters and hence they were less exposed to the slave trade. Omitting the distance to the coast would neglect this difference between landlocked and shoreside regions. Therefore, the four instruments are:

1. The distance of each region's capital to the major slave markets of the Atlantic slave trade: Virginia, USA; Havana, Cuba; Port-au-Price, Haiti; Kingston, Jamaica; Dominica; Martinique; Guyana; Salvador, Brazil; and Rio de Janeiro, Brazil.
2. The distance of each region's capital to the major slave markets of the Indian Ocean slave trade: Mauritius; and Muscat, Oman
3. The distance of each region's capital to the major slave markets of the Trans-Saharan slave trade: Algiers, Algeria; Tunis, Tunisia; Benghazi, Libya; and Cairo, Egypt.
4. The distance of each region's capital to the major slave markets of the Red Sea slave trade: Massawa, Eritrea; Suakin, Sudan; and Djibouti.

Figure 4.3: Example showing the distance instruments for Oyo, Nigeria with its capital Ibadan.



The figure illustrates the distance instruments for Oyo, Nigeria. Its capital Ibadan is closest to Salvador, Brazil in the Transatlantic slave trade, to Mauritius in the Indian Ocean slave trade, to Tripoli, Libya in the Trans-Saharan slave trade and to Suakin, Sudan, in the Red Sea slave trade. Source: Own creation following figure V in Nunn (2008).

The instruments are illustrated for Oyo State in Nigeria. Its capital Ibadan is closest to Salvador, Brazil in the transatlantic slave trade, to Mauritius in the Indian Ocean slave trade, to Tripoli, Libya in the Trans-Saharan slave trade, and to Suakin, Sudan in the Red Sea slave trade. As the figure shows, sailing ships must circumnavigate the Cape of Good Hope to reach the other side of Africa. Since the Suez Canal was only opened in 1869, when the slave trade was already in retreat, all ships must pass the Cape of Good Hope to reach the other coastline of Africa. Unlike Nunn (2009) the distance from Ibadan to the Nigerian coast is included when computing the distance to slave demand centers in the Indian and Atlantic Ocean slave trade.

The distances are great circle distances computed with the central subtended angle method which takes the curvature of the earth into account. The method first calculates the azimuth – the angle, $\boldsymbol{\alpha}$, between the two vectors that connect the center of the earth with the two respective locations using:

$$\boldsymbol{\alpha = \cos^{-1}\left(\sin \varphi_i \cdot \sin \varphi_j + \cos \varphi_i \cdot \cos \varphi_j \cdot \cos \Delta \eta_{ij}\right)} \tag{4.7}$$

Where $\boldsymbol{\varphi_i}$ is the latitude of region i in degrees and $\boldsymbol{\eta_{ij}}$ is longitude of regions i and j. To then obtain the great circle distance, $\boldsymbol{d_{ij}}$, between the two regions, the angle, $\boldsymbol{\alpha}$, is inserted in the following formular:

$$\boldsymbol{d_{ij} = 2\pi \cdot r_e \cdot \frac{\alpha}{360°}} \tag{4.8}$$

Where $\boldsymbol{r_e}$ is the radius of the earth, which amounts to approximately 6,371 kilometers.

5. Results

The following section presents the estimation results. The first part describes the results of the standard OLS estimation, part two and three the IV estimations using ethnolinguistic diversity and the distance to slave ports as instruments, respectively.

5.1. OLS Results

At first, the relationship between trust and GNI/capita is estimated using standard OLS procedure. All specifications account for country-fixed effects. Table 5.1 reports the results of the estimation equation (4.1) in which $\boldsymbol{X'_{ci}}$ contains various control measures[20]. Colum 1 shows the simple correlation between generalized trust and GNI/capita. Surprisingly, the correlation is negative in that an increase in average generalized trust by ten percentage point is associated with a decrease in GNI/capita of circa 3.82%[21]. Nevertheless, the estimator is biased due to omitted variables and moreover relatively imprecise. Including the urbanization rate (column 2), climatic controls (column 5), or controls for natural

[20] The full table with coefficients of all control variables can be found in the appendix (table 8.3).

[21] A region's generalized trust was measured in decimal numbers and not in percent. Natural logarithms were applied to GNI/capita. Therefore, the interpretation is as follows:

$$\%\boldsymbol{\Delta y} = \boldsymbol{100 \cdot (e^{-0.3895 \cdot 0.1} - 1) = -3.82\%}$$

resources (column 6) in the vector $\boldsymbol{X'}_{ci}$ the same negative relationship occurs. However, the signs flip when controlling for general geographic determinants (column 4) and as soon as educational controls (column 3 and 8) are included. When all controls are included, trust has the expected positive effect in that an increase of ten percentage points would lead to an increase in income of 0.71%. This implies that a low-trusting region like Rivercess county in Liberia could raise its income levels by 5.4% if it had the same trust level as Denmark and by almost 3% if it were as trusting as Germany[22]. Nevertheless, the estimator remains relatively imprecise. The 95%-confidence interval straddles values from -0.1917511 to 0.3336938 so that the estimator could possibly even be negative or zero. Moreover, the estimation has not yet accounted for potential issues of endogeneity and could hence still be biased. Nevertheless, the OLS results suggest that other factors like urbanization and mean schooling, annual precipitations, and average humidity seem to play a bigger role in determining a region's economic performance. Moreover, some natural resource deposits (iron, precious metals) are positively, others (base metals) negatively associated with regional per-capita income.

Table 5.1: Generalized trust and economic development within countries: OLS estimates.

	(1)	(2) Urbanization	(3) Education	(4) Basic Geography	(5) Climate	(6) Natural resources	(7) All Geography	(8) All controls
Generalized trust	-.3895	-.0974	.1853	.036	-.3205	-.4169	-.0884	.071
	(.3307)	(.3117)	(.1843)	(.2715)	(.2183)	(.3408)	(.184)	(.1285)
Observations	334	334	334	334	334	334	334	334
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	.8167	.9071	.9309	.8734	.8352	.8233	.9281	.9562

The table reports OLS estimates of regressions of ln(GNI/capita) on generalized trust. The unit of observation is a region. In column (1) no additional controls were included, while columns (2) to (8) add the control variables indicated in the top row. All regressions include country fixed effects. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** p < 0.01, ** p < 0.05, * p < 0.1).

5.2. IV Results

To rule out reversed causality, this thesis uses the instrument variables method. A valid instrument causes changes in the explicative variable, that is generalized trust, without independently affecting economic development. Two possible instruments are conceived. The first exploits the haphazard colonial border demarcation, the second the slave trade as exogenous sources of variation in social capital. In the following section, first-stage and reduced form results for both instruments are presented.

5.2.1. Ethnolinguistic Diversity

As explained in the previous section deeper cleavages between ethnic groups should affect trust more than shallow cleavages. The data confirms this intuition. Typically, the relationship drops in significance after the second level of linguistic disaggregation (using the approach of Desmet et al., 2012) or after $\delta = 0.06$ (following Fearon, 2003). Both polarization and fractionalization indices à la Desmet

[22] Rivercess in one of the regions, in which no interviewee responded that people can generally be trusted. Denmark is (according to the latest wave of the WVS) the highest trusting country in the world. 73.9% of the Danish people say that they generally trust others. In Germany, 41.6% of the people believe that most people can be trusted.

et al. perform better in terms of joint significance than the indices of Fearon where δ is somewhat arbitrarily chosen. Fractionalization exhibits the strongest relationship to trust at the first level of disaggregation, that is at the level of whole language families. Polarization, instead, is most relevant at the second level of linguistic disaggregation. The first-stage results and the relevant F-statistic (in the case of clustered standard errors the Kleinbergen-Paap Wald rk F-statistic) are displayed in table 5.2. As expected, both measures are negatively associated with trust in that an increase in fractionalization by ten percentage points reduces trust by approximately one percentage point. Hence, the magnitude of the effect is already small for fractionalization and only half for polarization. Moreover, neither instrument exhibits a large F-statistic. Both are quite far from Staiger's and Stock's (1997) threshold of 10. Therefore, one must conclude that both instruments are rather weak because they are not sufficiently related to trust itself. When both indices are simultaneously used as instruments, the F-statistic drops to 2.29 probably because they are highly correlated with one another and capture the same variation in trust.

Table 5.2: Generalized trust and economic development within countries: IV results using indices of ethnolinguistic diversity.

	(1)	(2)
	First Stage: Dependent variable is generalized trust	
Polarization at level 2	-.0497*	
	(.0283)	
Fractionalization at level 1		-.1028**
		(.0513)
Observations	270	270
F-statistics	3.09	4.02
Country Fixed Effects	YES	YES
Control Variables	YES	YES
	Second Stage: Dependent variable is ln(GNI 2013)	
Polarization at level 2	-.5665	
	(1.4724)	
Fractionalization at level 1		-1.0464
		(1.3034)
Observations	270	270
Country Fixed Effects	YES	YES
Control Variables	YES	YES

The table reports IV estimates of regressions of ln(GNI/capita) on generalized trust. The top panel reports the first-stage estimates, and the bottom panel reports second-stage estimates. The unit of observation is a region. Column (1) uses polarization at the second level of linguistic disaggregation, column (2) fractionalization at the first level of linguistic disaggregation as instrument. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

When interpretating the results of the corresponding IV estimation, one must bear in mind that the two instruments are weak and that they are furthermore likely to be correlated with education and thus are potentially biased. Unlike the OLS results of the corresponding specification (i.e., with the same set of control variables), the IV estimates are negative. This would imply that an increase in trust, decreases

regional economic development. Moreover, the magnitude of the effect increased: A raise in trust of ten percentage points is now associated with a decrease in GNI/capita of approximately 10%. However, this result is not very reliable because the estimator is now even less precise than in the OLS specification. In fact, the 95%-confidence intervals of both estimates reach into the positive part of the distribution. Using polarization as instruments results in a confidence interval that straddles values from circa -3.5 to 1.5 while that using fractionalization spans from -3.5 to 2.3. Again, other factors seem to play a more important role in explaining regional variations in economic development. Urbanization, mean years of schooling, humidity, and natural resource deposits (iron, precious metals, base metals) remain statistically highly significant, whereas annual precipitation becomes statistically insignificant. Instead, terrain ruggedness exhibits a statistically relevant effect, which is however counterintuitive as the estimation suggest that it has a slightly positive effect on regional income[23].

5.2.2. Distance to Slave Ports

If intuition is correct, then trust should increase with higher distances to slave ports. However, as the first-stage results in table 5.3 show, the distance to slave ports is in none of the slave trades statistically relevant. Moreover, the respective F-statistics are very low, indicating that the instrument is underidentified, and that the relevance condition is not fulfilled. The Indian Ocean slave trade exhibits the highest F-statistics; however, the coefficient is negative which is contrary to the intuition that trust rises with distance to slave ports. It would suggest that an increase in the distance to Indian Ocean slave ports by one thousand kilometers is associated with a decrease in trust of 4 percentage points.

Using these instruments simultaneously does not render better results as no combination of the distance instruments surpasses the F-statistic of the Indian Ocean. F-statistics improve when distance instruments are simultaneously used with indices of ethnic diversity. However, the corresponding F-statistics are still lower than those which use polarization or fractionalization individually[24].

[23] The complete table with all coefficients can be found in the appendix (table 8.4).

[24] Using ethnic fractionalization at stage one and either the distances to Atlantic or Red Sea slave ports yields F-statistics of 3.72 and 3.61, respectively. However, neither value surpasses the F-statistic (4.02) when ethnic fractionalization is used individually.

Table 5.3: Generalized trust and economic development within countries: IV results using distances to slave ports

	(1)	(2)	(3)	(4)
	First Stage: Dependent variable is generalized trust			
Transatlantic slave trade	.0107			
	(.0261)			
Indian Ocean slave trade		-.0478		
		(.0344)		
Trans-Saharan slave trade			.0204	
			(.0536)	
Red Sea slave trade				.0075
				(.0535)
Observations	334	334	334	334
F-statistics	.17	1.93	.15	.02
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES
	Second Stage: Dependent variable is ln(GNI 2013)			
Transatlantic slave trade	-1.6401			
	(5.5184)			
Indian Ocean slave trade		1.1568		
		(2.212)		
Trans-Saharan slave trade			-2.447	
			(7.3299)	
Red Sea slave trade				-2.8158
				(18.7839)
Observations	334	334	334	334
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES

The table reports IV estimates of regressions of ln(GNI/capita) on generalized trust. The top panel reports the first-stage estimates, and the bottom panel reports second-stage estimates. The unit of observation is a region. Column (1) uses distances to slave ports in the Transatlantic slave trade, column (2) distances to slave ports in the Indian Ocean slave trade, column (3) distances to slave demand centers of the Trans-Saharan slave trade, and column (4) distances to slave demand centers of the Red Sea slave trade. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Since the instruments are in no way related to generalized trust, one cannot draw any conclusion on how trust affects economic development. As before[25], mean years of schooling and average humidity are highly statistically significant; urbanization, precious metals, and iron, however, lose their significance. Base metals are only sometimes significantly negatively related to economic development.

6. Robustness Checks

To check how reliable these results are, the following section carries out various robustness checks. First, other trust dimensions, viz. trust in relatives, neighbors, and other people you know shall be investigated. Second, a high-trust dummy variable is created and its relation to economic development examined. Third, night-time luminosity is considered as further proxy of subnational development. It

[25] The complete table with coefficients to all control variables can be found in the appendix (table 8.5).

has gained popularity as regional or even local development measure in recent years sparked by the works of Henderson, Storeygard, and Weil (2012) and Michalopoulous and Papaioannou (2017). Light intensity data is available for 25 countries of those included in the Afrobarometer 2011/13 and is provided by Gershman and Rivera (2018). Fourth, Afrobarometer data on membership in voluntary associations and religious groups shall be used as an alternative proxy for social capital.

6.1. Other trust dimensions

The OLS results of the three other trust dimensions are reported in table 6.1. For the sake of comparability, the results of generalized trust are included in the fourth row. Like generalized trust, none of the other trust dimensions is significantly related to regional economic development. However, trust in neighbors and trust in other people is more precise than the other estimates. Both p-values are in the ballpark of 0.14, while generalized trust and trust in relatives exhibits p-values of around 0.59. The effect of trust is always positive. For example, an increase in trust in neighbors of ten percentage points raises per-capita income by approximately 1.3%[26]. This implies that Anambra State in Nigeria, where the least share of people indicate that they trust their neighbors, could increase its income level by almost 11% if it were as trusting as Iceland – the country where people trust their neighbors the most[27]. Therefore, Anambra State could reach a per-capita income of circa 11,31 US-$ (at Purchasing Power Parity) which would correspond to income levels of present-day Ecuador. If it were as trusting as Germany, Anambra State could raise its income by 7.6% to circa 10,96 US-$ (at PPP) surpassing that of present-day Namibia which would make Anambra State one of the richest regions in Africa[28]. Although these values suggest that trust in neighbors (as well as trust in other people you know) has a sizeable effect on economic development, they are not statistically significant and are consequently relatively imprecise. Although, the corresponding 95%-confidence intervals are smaller than that of generalized trust ([-0.191; 0.334]), they are still quite large: [-0.040; 0.295] for trust in neighbors and [-0.050; 0.331] for trust in other people. Furthermore, these coefficients are OLS estimates and therefore do not account for potential endogeneity issues. As before[29], significant factors of regional development are mean years of schooling, urbanization, humidity, precipitation, longitude, and natural resources (base metals, precious metals, iron).

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[26] As for generalized trust, all other trust dimensions were measured in decimal numbers and not in percent. Natural logarithms were applied to GNI/capita. Therefore, the interpretation is as follows:

$$\%\Delta y = 100 \cdot (e^{0.1276 \cdot 0.1} - 1) = 1.28\%$$

[27] Anambra State in Nigeria is the region with the lowest share of people trusting their neighbors: 2.5%. In Iceland 84% of the people indicate that they trust their neighborhood – the highest value in the world, while in Germany the share amounts to 60%. Therefore, the interpretation in comparison to Iceland becomes:

$$\%\Delta y = 100 \cdot (e^{0.1276 \cdot (0.84 - 0.025)} - 1) = 10.96\%$$

[28] GNI/capita in Anambra State amounts to 10,19$ (at PPP) in 2013. As of 2019, Ecuador has a GNI/capita of 11,54$ (at PPP) and Namibia a GNI/capita of 9.78$ (at PPP) (World Bank).

[29] The complete table with coefficients for all control variables is again to be found in the appendix (table 8.6).

Table 6.1: Various trust dimensions and economic development within countries: OLS estimates.

	(1)	(2)	(3)	(4)
Trust in relatives	.035			
	(.0643)			
Trust in neighbors		.1276		
		(.0819)		
Trust in other people you know			.1404	
			(.0931)	
Generalized trust				.071
				(.1285)
Observations	322	334	334	334
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES

The table reports OLS estimates of regressions of ln(GNI/capita) on different dimensions of trust. The unit of observation is a region. Column (1) reports the coefficient that corresponds to trust in relatives, column (2) that corresponding to trust in neighbors, column (3) that corresponding to trust in other people you know. Column (4) is included for the sake of comparability and reports the OLS results for generalized trust. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

To account for potential endogeneity issues the same indices of ethnic diversity (ethnic polarization at stage 2 and ethnic fractionalization at stage 1) as above are used as instruments. The results of the first and second stage estimations are displayed in table 6.2. Again, ethnic fractionalization outperforms ethnic polarization in that its F-statistics are generally higher. Neither polarization nor fractionalization constitutes a valid instrument for trust in relatives since the corresponding F-statistics are quite low. Ethnic polarization is, furthermore, not a useful instrument for trust in neighbors either. However, ethnic fractionalization reaches a F-statistic of 8.52 which is substantially higher than that using generalized trust. Fractionalization (and to a lesser degree polarization as well) perform even better as instruments for trust in other people you know reaching an F-statistic of 11.27 (and 9.01, respectively) and therefore above (slightly below) Staiger's and Stock's (1997) threshold of 10. In addition, both F-statistics surpass the Stock-Yogo critical value with 15% of the maximal IV size which amounts to 8.96. As the instruments are moreover statistically significant at the 1% level, they seem to fulfill the relevance condition. An increase in fractionalization at stage one of ten percentage points corresponds to a decline in trust of other people you know of almost 3 percentage points[30]. Altogether the IV estimates for trust in neighbors and trust in other people you know using fractionalization as instrument can be interpretated with more confidence. Again, using several instruments at once does not yield better F-statistics. Distances to slave ports are never strongly related to any trust of these trust dimensions and are therefore not considered.

[30] Note that all trust dimensions as well as ethnic fractionalization and polarization are indicated in decimal numbers and not percent.

Table 6.2: Various trust dimensions and economic development within countries: IV results using indices of ethnolinguistic diversity.

	(1) Trust in relatives	(2) Trust in neigh-bors	(3) Trust in other people you know	(4) Generalized trust
	First Stage: Dependent variable the corresponding trust dimension			
Polarization at level 2	-.0193	-.0416	-.098***	-.0497*
	(.0254)	(.0284)	(.0327)	(.0283)
Observations	270	270	270	270
F-statistics	0.58	2.15	9.01	3.09
Fractionalization at level 1	-.0669	-.1605***	-.2966***	-.1028*
	(.0538)	(.055)	(.0883)	(.0513)
Observations	270	270	270	270
F-statistics	1.55	8.52	11.27	4.02
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES
	Second Stage: Dependent variable is ln(GNI 2013)			
Polarization at level 2	-1.4612	-.6771	-.2874	-.5665
	(4.2909)	(1.842)	(.7563)	(1.4724)
Fractionalization at level 1	-1.6092	-.6706	-.3628	-1.0464
	(2.9426)	(.9817)	(.5273)	(1.3034)
Observations	270	270	270	270
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES

The table reports IV estimates of regressions of ln(GNI/capita) on different dimensions of trust. The top panel reports the first-stage estimates, and the bottom panel reports second-stage estimates. The unit of observation is a region. Column (1) reports the coefficients that correspond to trust in relatives, column (2) those corresponding to trust in neighbors, column (3) those corresponding to trust in other people you know. Column (4) is included for the sake of comparability and reports the IV results for generalized trust. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** p < 0.01, ** p < 0.05, * p < 0.1).

Like generalized trust, neither trust in other people you know nor trust in neighbors is statistically relevantly related to regional economic performance independent of the instrument applied. As with generalized trust, the signs of the trust coefficients flip and become negative so that an increase in trust in other people you know by ten percentage points would reduce regional GNI/capita by 3.56% (using fractionalization as instrument). However, once again these effects are quite imprecise: The 95%-confidence interval spans from -1.396 to 0.671 and thus reaches far into the positive parts of the distribution[31].

6.2. High-trust Dummy

As a further alternative measure of trust a dummy variable is created which become one if the respective region lies above the median value of generalized trust and zero otherwise. The same procedure is followed for the other trust dimensions. The median values which serve as cutoffs are reported

[31] The appendix contains a table displaying the coefficients of all control variables included (table 8.7).

in table 6.3. As expected, the median value is highest for trust in relatives and lowest for generalized trust.

Table 6.3: Median values of all trust dimensions.

Variable	Obs.	Median
Trust in Relatives	323	.875
Trust in Neighbors	335	.64
Trust in other people you know	335	.4034091
Generalized Trust	335	.1517857

The table reports median values of all trust dimensions which will then serve as cutoffs for the respective dummy variables.

The results of the OLS estimations using trust dummies as social capital proxy are reported in table 6.4[32]. Most dummy variables are not statistically significantly related to regional economic development. However, the dummy for trust in neighbor is unlike its standard measure significant at the 10% level. It suggests that if a region surpasses the median value of trust in neighbors (that is, the dummy becomes one), per-capita rises by 7.28%. This implies that if the Khomas region in Namibia surpassed the threshold of 0.64, it would raise its per-capita income to circa 21,209 US-$ (at PPP) which corresponds to that of present-day Argentina[33].

Table 6.4: Various trust dummies and economic development within countries: OLS estimates.

	(1)	(2)	(3)	(4)
Trust in relatives dummy	.0527			
	(.0353)			
Trust in neighbors dummy		.0703*		
		(.0374)		
Trust in other people you know dummy			.0346	
			(.0296)	
Generalized trust dummy				.0418
				(.033)
Observations	322	334	334	334
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES

The table reports OLS estimates of regressions of ln(GNI/capita) on different trust dummies which become one if the respective region has a share of trusting people above the median value in the respective trust dimension and zero elsewise. The unit of observation is a region. Column (1) reports the coefficient that corresponds to the dummy of trust in relatives. Column (2) reports the coefficient corresponding to the dummy of trust in neighbors. Column (3) reports the coefficient corresponding to the dummy of trust in other people you know. Column (4) reports the coefficient corresponding to the dummy of generalized trust. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Nevertheless, the estimate could be biased due to problems of endogeneity. Therefore, as before ethnic polarization at stage two and ethnic fractionalization at stage one serve as instruments. However,

[32] The complete table with all coefficients can be found in the appendix (table 8.8).

[33] Khomas, Namibia has had a per-capita GNI of 19,770$ (at PPP) in 2013. Argentina's per-capita GNI as of 2019 amounts to 22,120$ (at PPP) (World Bank).

now both indices are transformed into dummy variables just like the trust variables before. They become one if a region is above the median ethnic fractionalization (polarization) and zero otherwise. The median values of both fractionalization at stage one and polarization at stage two are illustrated in table 6.5.

Table 6.5: Median values of ethnic polarization and fractionalization.

Variable	Obs.	Median
Ethnic polarization at stage two	323	.875
Ethnic fractionalization at stage one	335	.64

The table reports median values of ethnic polarization at stage two and ethnic fractionalization at stage one which will then serve as cutoffs for the respective dummy variables.

The results of the first- and second-stage estimations are found in table 6.6. Generally, the relation between the trust and the ethnic diversity dummies is less significant than the respective standard variables. The ethnic polarization dummy is most strongly correlated with the dummy for "trust in other people you know" and exhibits an F-statistic of 6.24. The ethnic fractionalization dummy has its strongest relationship with the "generalized trust" dummy. However, neither F-statistic surpasses the critical value of 10. Therefore, one must conclude that the instruments are weak even in these two more promising cases, making it difficult to draw any final conclusions. Nevertheless, as before the IV estimates are insignificant. In particular, the dummy for "trust in other people you know" instrumented with polarization does not significantly influence regional economic development. Unlike the unaltered version of trust in other people, the dummy has the expected positive sign. However, the coefficient is quite imprecise as the p-value amounts to 0.936 and the confidence interval stretches from -0.661 to 0.718. The same caveat applies to the coefficients of the "trust in neighbors" dummy (estimated via polarization) and that of the "generalized trust" dummy (estimated via fractionalization). The 95%-confidence interval in both cases comprises values of the opposite sign. All other estimates cannot be sensibly interpreted as the corresponding instruments are very weak[34].

[34] The complete table with all coefficients can be found in the appendix (table 8.9).

Table 6.6: Various trust dummies and economic development within countries: IV results using indices of ethnolinguistic diversity.

	(1) Trust in relatives dummy	(2) Trust in neighbors dummy	(3) Trust in other people you know dummy	(4) Generalized trust dummy
	First Stage: Dependent variable the corresponding trust dummy			
Polarization at level 2	-.054	-.1254*	-.1656**	.0419
	(.0524)	(.0717)	(.0663)	(.0774)
Observations	270	270	270	270
F-statistics	1.06	3.06	6.24	.29
Fractionalization at level 1	.0439	.1039	.006	.2367*
	(.1264)	(.0686)	(.0824)	(.1261)
Observations	270	270	270	270
F-statistics	.12	2.29	0.01	3.52
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES
	Second Stage: Dependent variable is ln(GNI 2013)			
Polarization at level 2	.0869	.0374	.0284	-.1121
	(1.0479)	(.4521)	(.3519)	(1.3944)
Fractionalization at level 1	-1.27	-.5361	-9.2302	-.2353
	(3.3863)	(.5586)	(114.3232)	(.2533)
Observations	270	270	270	270
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES

The table reports IV estimates of regressions of ln(GNI/capita) on different trust dummies which become one if the respective region has a share of trusting people above the median value in the respective trust dimension and zero elsewise. Both instruments, ethnic polarization at level two and ethnic fractionalization at level one, are equally turned into dummy variables so that they become one if a region is above the median ethnic polarization/fractionalization and zero elsewise. The top panel reports the first-stage estimates, and the bottom panel reports second-stage estimates. The unit of observation is a region. Column (1) reports the coefficient that corresponds to the dummy of trust in relatives. Column (2) reports the coefficient corresponding to the dummy of trust in neighbors. Column (3) reports the coefficient corresponding to the dummy of trust in other people you know. Column (4) reports the coefficient corresponding to the dummy of generalized trust. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** p < 0.01, ** p < 0.05, * p < 0.1).

6.3. Light-Intensity

In this section night-time luminosity serves as an alternative proxy for regional development. The results of the OLS estimation of the relationship between the trust variables and night-time luminosity are reported in table 6.7[35]. As for the OLS results with GNI/capita as dependent variable, none of the trust variables is statistically significantly related to light intensity at night. For trust in relatives and trust in neighbors the coefficient is counterintuitively negative in that an increase of trust in neighbors by ten percentage points reduces night-time luminosity by 3.5%. Trust in other people you know, and generalized trust exhibit the expected sign: An increase in generalized trust by ten percentage points, leads to a rise in night-time luminosity by approximately 0.63%[36]. As before, the estimates are quite imprecise. Generalized trust, for example, has a p-value of 0.912 and its 95%-confidence interval

[35] The complete table can be found in the appendix (table 8.10).

[36] Night-time luminosity is like per-capita GNI logarithmically transformed. Therefore, the interpretation is as follows:

$$\%\Delta y = 100 \cdot (e^{0.0632 \cdot 0.1} - 1) = 0.63\%$$

straddles values from -1.104 to 1.230. Therefore, the actual relationship could also be negative or non-existent. The most accurate estimation is that for trust in neighbors where the p-value amounts to 0.170. However, even in this specification, the confidence interval [-1.237; 0.231] straddles positive and negative values. Moreover, endogeneity problems could bias the results. However, the so-far most promising instruments ethnic polarization at the second level and fractionalization at the first level of linguistic disaggregation both have been found to be significantly negatively related to night-time luminosity (Gershman & Rivera, 2018), thus failing the exclusion restriction. Since the weak first-stage results using distances to slave ports are unaltered, the endogeneity problem cannot be solved using the instruments at hand. Therefore, one must stick to the correlations revealed by the OLS estimations. Other factors that play a larger role than trust in predicting patterns of night-time luminosity are not very surprisingly urbanization, the capital dummy, and land area. Urbanization and the capital dummy are both positively and highly statistically significantly associated to light intensity at night. Land area exhibits a strong and highly significant negative coefficient probably because larger regions are often less populated (especially the large desert regions in Niger (Agadez), Mali (Timbuktu), and Sudan (Northern and North Darfur)) and are difficult to connect at whole with the electrical grid. The only natural resource which is positively related to night-time luminosity is oil and gas which is mostly found in the densely populated southern states of Nigeria.

Table 6.7: Various trust dimensions and night-time luminosity: OLS estimates.

	(1)	(2)	(3)	(4)
Trust in relatives	-.3571			
	(.4154)			
Trust in neighbors		-.5029		
		(.3558)		
Trust in other people you know			.1742	
			(.4086)	
Generalized trust				.0632
				(.5653)
Observations	270	270	270	270
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES

The table reports OLS estimates of regressions of night-time luminosity on different dimensions of trust. The unit of observation is a region. Column (1) reports the coefficient that corresponds to trust in relatives, column (2) that corresponding to trust in neighbors, column (3) that corresponding to trust in other people you know, column (4) that corresponding to generalized trust. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

6.4. Alternative Social Capital Proxy

Another way of measuring social capital is through membership in groups or clubs. The Afrobarometer asks interviewees whether they are members of religious communities or voluntary groups. Respondents can choose between four answer possibilities: (i) “Not a Member”, (ii) “Passive Member”,

(iii) “Active Member”, and (iv) “Leader”. The individual answers were aggregated to the regional level and used to construct four variables of membership: *Membership religious community* lumps answer possibilities (ii), (iii), and (iv) together, *Active Membership religious community* aggregates (i) and (ii) as well as (iii) and (iv). The same procedure is followed for membership in voluntary associations creating the variables *Membership voluntary association* and *Active membership voluntary association*. The WVS asks similar questions with the same answer opportunities, however it does not include a question regarding membership in voluntary groups in general. Therefore, Rwanda and Ethiopia are only included in the sample when religious membership is considered.

Table 6.8 provides the results of estimating the relationship between GNI/capita and group membership via OLS estimators[37]. Membership in religious or voluntary associations is just like trust only statistically insignificantly related to regional GN/capita differences. The magnitude of the effects is considerably lower than for trust: An increase in membership in religious communities of ten percentage points implies a rise in GNI/capita of 0.03%. If membership in voluntary associations climbs ten percentage point, GNI/capita falls by 0.3%[38]. Similarly, active membership in either religious communities or voluntary associations has a somewhat unexpected negative association with regional income variations. As before, these results must be treated with caution due to the inaccuracy of the estimates.

Group membership is, however, statistically significant in explaining regional differences in night-time luminosity. All membership variables besides active membership in religious communities have a relevant negative impact. For example, an increase in membership in religious communities leads to a fall in night-time luminosity by 10.5%. One can be quite sure that the effect is negative, as the 95%-confidence intervals for all statistically relevant estimates straddle negative values only. However, as before, potential issues of endogeneity can bias the results. It seems more plausible that people in a region where access to electricity is limited spend more time together after dusk has fallen because private households cannot illuminate their homes and therefore gather in churches, mosques, club houses, etc. which are more likely to be connected to the electricity grid. However, neither indices of ethnic diversity nor distances to slave ports is sufficiently related to any of the group membership variables.

[37] Table 8.11 provides the coefficients to all control variables.

[38] Like trust, all membership variables are indicated in decimal numbers and not percent.

Table 6.8: Group membership and proxies of regional economic development: OLS estimates.

	(1)	(2)	(3)	(4)
	GNI/capita			
Membership religious community	.0032			
	(.095)			
Active membership in religious community		-.0737		
		(.1027)		
Membership in voluntary association			-.0309	
			(.0229)	
Active membership in voluntary association				-.026
				(.1474)
Observations	334	334	311	311
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES
	Night-time luminosity			
Membership religious community	-1.1099**			
	(.4193)			
Active membership in religious community		-.2455		
		(.4367)		
Membership in voluntary association			-.3314**	
			(.1185)	
Active membership in voluntary association				-1.2654**
				(.4553)
Observations	270	270	259	259
Country Fixed Effects	YES	YES	YES	YES
Control Variables	YES	YES	YES	YES

The table reports OLS estimates of regressions of night-time luminosity and ln(GNI/capita) on different group membership variables. The top panel reports the OLS results of regressions of ln(GNI/capita) on group membership, the bottom panel reports OLS results of regression of night-time luminosity on group membership. The unit of observation is a region. Column (1) reports the coefficient that corresponds to membership in religious communities, column (2) that corresponding to active membership in religious communities, column (3) that corresponding to membership in voluntary associations, column (4) that corresponding to active membership in voluntary associations. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

7. Conclusion

Social capital is believed to have a benevolent effect on economic development. Putnam hypothesized that it determines how the same nationwide institutions function at the regional level. Various empirical studies (Beugelsdijk & van Schaik, 2005; Neira et al., 2009; Tabellini, 2010) have shown that social capital has indeed a positive association with regional economic performance in Europe. This thesis investigated whether this relationship also persists in the developing countries. Using data from 335 subdivisional units in Sub-Saharan Africa, it estimated the relationship between trust and per-capita GNI.

Standard OLS estimations found that generalized trust is insignificantly positively correlated with per-capita income, whereas the relationship becomes negative in IV estimations using indices of ethnic polarization and fractionalization as instruments (remaining statistically insignificant though). However, both instruments are weak in that they are insufficiently related to generalized trust. This problem is

even more prevalent when using distances to slave ports which exhibits no relation to trust at all. Therefore, all results must be interpreted with great caution. Since neither generalized trust nor other trust dimensions, trust dummies, or group membership are significantly correlated with economic development (whether measured via GNI/capita or night-time luminosity), it seems likely that social capital does not play a decisive role in explaining Sub-Saharan Africa's regional differences in economic performance. Other factors appear to be more important. As shown by Gennaioli, La Porta, Lopez-de-Silanes, and Shleifer (2013) education as measured by mean years of schooling exhibits a strong positive relationship. So does urbanization, although the direction of causality might be reversed. Moreover, like in Mitton (2016) some geographic factors seem to influence regional development: in particular, a region's average humidity and natural resource endowments. While higher annual humidity as well as iron and precious metal deposits are often positively associated with economic performance, an abundance of base metals is rather negatively related to per-capita income. Social capital, however, does not influence regional economic performance significantly.

Nevertheless, the last word has not yet been spoken. The results presented in this thesis are mere correlation and do not claim to represent causal effects as both sets of instruments – indices of ethnic diversity and distances to slave ports – are too weak. Future research should focus on finding more suitable instruments to resolve potential endogeneity issues and thus obtain unbiased estimates. Using panel data could facilitate the search of instruments. However, the Afrobarometer survey has until now asked the generalized trust question only twice (in wave three (2005/06) and wave five (2011/13) used in this thesis). Ideally, future waves of the Afrobarometer surveys should reintroduce the generalized trust question so that one can study how trust evolves over time and use an exogenous trust shock as natural experiment.

8. Appendix

Table 8.1: Correlation matrix of Social Capita proxies.

Variables	(1)	(2)	(3)	(4)
(1) *Generalized Trust*	1.000			
(2) *Trust in Relatives*	0.270	1.000		
(3) *Trust in Neighbors*	0.373	0.808	1.000	
(4) *Trust in other people you know*	0.317	0.637	0.836	1.000
(1) *Religion Member*	1.000			
(2) *Religion Active Member*	0.392	1.000		
(3) *Voluntary Member*	0.590	0.342	1.000	
(4) *Voluntary Active Member*	0.856	0.608	0.505	1.000

The table shows the correlations between the different proxies of social capital. The top panel reports the correlations between the different trust dimensions, the bottom panel the correlations between the different membership variables.

Table 8.2: Correlation matrix of regional development proxies.

Variables	(1)	(2)
(1) *GNI/capita (in thousand US-$)*	1.000	
(2) *ln Light Intensity*	0.511	1.000

The table shows the correlations between the different proxies of regional economic development.

Table 8.3: Economic development and generalized trust: OLS estimates.

	(1)	(2) Urbanization	(3) Education	(4) Basic Geography	(5) Climate	(6) Natural resources	(7) All Geography	(8) All controls
Social capital proxy								
Generalized trust	-.3895	-.0974	.1853	.036	-.3205	-.4169	-.0884	.071
	(.3307)	(.3117)	(.1843)	(.2715)	(.2183)	(.3408)	(.184)	(.1285)
Human geography								
Urbanization		1.0591***					.8538***	.3743***
		(.1318)					(.1196)	(.1197)
Education								
Expected schooling			-.0224					-.0112
			(.0217)					(.013)
Mean schooling			.1836***					.1448***
			(.0228)					(.018)
Literacy rate			-.0394					.0855
			(.1735)					(.1484)
General geography								
Latitude				-.0001			-.0131	.0134
				(.0143)			(.011)	(.0093)
Longitude				.0005			.0049	.0164**
				(.0139)			(.0079)	(.0076)
Landlock				-.1379**			-.0801	-.0106
				(.0615)			(.0518)	(.0365)
Capital				.4075***			.1198*	.0092
				(.09)			(.0635)	(.0392)
Land area				-.0857**			-.0363	-.0139
				(.0372)			(.0308)	(.0209)
Elevation				-.0485**			-.0124	0
				(.0198)			(.0236)	(.0165)
Terrain ruggedness				.0008			.0006	.0003
				(.0009)			(.0008)	(.0007)
Climate								
Temperature					-.0075		-.0074	-.0021
					(.0098)		(.0079)	(.0031)
Precipitation					-.1361*		-.1073*	-.066**
					(.0751)		(.0594)	(.0279)
Temperature range					-.0159		.0115	-.0003
					(.0203)		(.0155)	(.0137)
Precipitation range					-.0002		-.0001	-.0001
					(.0003)		(.0001)	(.0001)
Sunshine					-.0591**		-.0393**	.0126
					(.0262)		(.0175)	(.0148)
Humidity					.0894***		.0543***	.0525***
					(.0095)		(.0111)	(.01)
Rain days					.0011		.0004	-.0003
					(.0011)		(.0007)	(.0005)
Windspeed					.0078		.0035	.0051
					(.008)		(.0034)	(.0033)
Natural resources								
Oil & Gas						.0038***	.0018*	-.0006
						(.0003)	(.001)	(.0008)
Diamonds						.0009	-.0147	-.0019
						(.0317)	(.0193)	(.0123)
Precious metals						.0004	.0012	.0011*
						(.0009)	(.0007)	(.0007)
Base metals						.0303	-.1742*	-.1821**
						(.1278)	(.0886)	(.0821)
Iron						.558***	.3669**	.2279**
						(.1728)	(.1485)	(.0967)
Alloys						-.1272	-.1053	-.0645
						(.2692)	(.1217)	(.1226)
_cons	.7103***	.2061	.2913	1.5822***	2.1023***	.7159***	1.8478***	.4934
	(.1079)	(.125)	(.2509)	(.349)	(.5878)	(.1111)	(.6554)	(.3163)
Observations	335	334	334	334	334	334	334	334
R-squared	.8161	.9071	.9309	.8872	.8396	.8233	.9316	.957
Country FE	YES	YES	YES	YES	YES	YES	YES	YES

The table reports OLS estimates of regressions of ln(GNI/capita) on generalized trust. The unit of observation is a region. In column (1) no additional controls were included, while columns (2) to (8) add the control variables indicated in the top row. All regressions include country fixed effects. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** p < 0.01, ** p < 0.05, * p < 0.1).

Table 8.4: Economic Development and generalized trust: IV estimates with ethnic diversity

	(1) Ethnic Polarization at stage 2	(2) Ethnic Fractionalization at stage 1
Social capital proxy		
Generalized trust	-.5665	-1.0464
	(1.4724)	(1.3034)
Human geography		
Urbanization	.4466***	.437***
	(.1146)	(.1187)
Education		
Expected schooling	-.0218	-.031
	(.0307)	(.0274)
Mean schooling	.1388***	.142***
	(.0208)	(.0196)
Literacy rate	.0249	.0016
	(.1578)	(.1315)
General geography		
Latitude	.0136	.011
	(.0111)	(.0109)
Longitude	.0177*	.0199*
	(.0093)	(.0102)
Landlock	-.0135	-.0003
	(.0527)	(.0507)
Capital	-.0552	-.0504
	(.0496)	(.0554)
Land area	-.0142	-.0105
	(.0257)	(.0256)
Elevation	.0094	.007
	(.0221)	(.0241)
Terrain ruggedness	.0012*	.001**
	(.0006)	(.0005)
Climate		
Temperature	.0007	-.0007
	(.0074)	(.0083)
Precipitation	-.0318	-.0253
	(.0313)	(.0281)
Temperature range	-.0061	-.0011
	(.0142)	(.0122)
Precipitation range	-.0002	-.0002
	(.0001)	(.0002)
Sunshine	.0001	-.0005
	(.0134)	(.0146)
Humidity	.0529***	.0525***
	(.0102)	(.0111)
Rain days	-.0007	-.0008
	(.0007)	(.0008)
Windspeed	.0066	.0076
	(.0043)	(.0052)
Natural resources		
Oil & Gas	.0004	.0009
	(.0018)	(.0018)
Diamonds	-.0062	-.0128
	(.0231)	(.0226)
Precious metals	.0015**	.0014***
	(.0006)	(.0005)
Base metals	-.2129***	-.2098***
	(.0762)	(.072)
Iron	.2669**	.3041***
	(.1203)	(.1123)
Alloys	-.1481	-.1903
	(.1742)	(.1541)
_cons	.635	.859
	(.762)	(.721)
Observations	270	270
R-squared	.958	.9486
All Control Variables	YES	YES
Country Fixed Effects	YES	YES

The table reports second-stage IV estimates of regressions of ln(GNI/capita) on generalized trust. The unit of observation is a region. Column (1) uses polarization at the second level of linguistic disaggregation, column (2) fractionalization at the first level of linguistic disaggregation as instrument. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table 8.5: Economic Development and generalized trust: IV estimates with distances to slave ports

	(1) Transatlantic slave trade	(2) Indian Ocean slave trade	(3) Trans-Saharan slave trade	(4) Red Sea slave trade
Social capital proxy				
Generalized trust	-1.6401	1.1568	-2.447	-2.8158
	(5.5184)	(2.212)	(7.3299)	(18.7839)
Human geography				
Urbanization	.4923	.2995*	.5479	.5733
	(.4307)	(.1599)	(.5413)	(1.2557)
Education				
Expected schooling	-.0297	.0005	-.0384	-.0424
	(.0611)	(.025)	(.0843)	(.2105)
Mean schooling	.135***	.1511***	.1303**	.1282
	(.0387)	(.0283)	(.0527)	(.1073)
Literacy rate	.0842	.0864	.0836	.0833
	(.1539)	(.1828)	(.2021)	(.2281)
General geography				
Latitude	-.0096	.028	-.0204	-.0253
	(.0805)	(.0361)	(.091)	(.2456)
Longitude	.0231	.0122	.0262	.0277
	(.0211)	(.011)	(.0314)	(.0743)
Landlock	.0367	-.0406	.059	.0692
	(.1609)	(.0934)	(.2159)	(.5273)
Capital	-.0059	.0187	-.013	-.0162
	(.0823)	(.0444)	(.0984)	(.1743)
Land area	.0087	-.0282	.0194	.0242
	(.0779)	(.0242)	(.0976)	(.2467)
Elevation	-.0166	.0105	-.0244	-.0279
	(.0625)	(.0303)	(.0711)	(.1823)
Terrain ruggedness	0	.0005	-.0001	-.0002
	(.0012)	(.0009)	(.0014)	(.0035)
Climate				
Temperature	-.0086	.002	-.0116	-.013
	(.0229)	(.0083)	(.0273)	(.0695)
Precipitation	-.1069	-.0401	-.1261	-.135
	(.1641)	(.0507)	(.1449)	(.4178)
Temperature range	.0391	-.0253	.0577	.0662
	(.1383)	(.054)	(.157)	(.4229)
Precipitation range	-.0003	-.0001	-.0003	-.0003
	(.0004)	(.0002)	(.0005)	(.0011)
Sunshine	.0118	.0132	.0113	.0112
	(.0174)	(.0143)	(.0228)	(.0278)
Humidity	.0532***	.052***	.0536***	.0537***
	(.013)	(.0085)	(.0158)	(.0182)
Rain days	0	-.0005	.0001	.0002
	(.0013)	(.0006)	(.0013)	(.003)
Windspeed	.0116	.0009	.0147	.0162
	(.0225)	(.0086)	(.0273)	(.0698)
Natural resources				
Oil & Gas	.0016	-.002	.0026	.0031
	(.0069)	(.0028)	(.0096)	(.0241)
Diamonds	-.0455	.0257	-.066	-.0754
	(.1461)	(.0533)	(.1791)	(.4695)
Precious metals	.0009	.0013	.0008	.0008
	(.001)	(.0008)	(.001)	(.0024)
Base metals	-.2035**	-.1685**	-.2136	-.2182
	(.0964)	(.0838)	(.135)	(.2588)
Iron	.4473	.0886	.5508	.5981
	(.719)	(.323)	(.9464)	(2.3948)
Alloys	-.1144	-.0329	-.1379	-.1486
	(.2191)	(.1345)	(.2613)	(.5599)
_cons	1.4435	-.1095	1.8914	2.0963
	(3.2579)	(1.3455)	(3.9726)	(10.4019)
Observations	334	334	334	334
R-squared	.9138	.9396	.8635	.8341
All Control Variables	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES

The table reports second-stage IV estimates of regressions of ln(GNI/capita) on generalized trust. The unit of observation is a region. Column (1) uses distances to slave ports in the Transatlantic slave trade, column (2) distances to slave ports in the Indian Ocean slave trade, column (3) distances to slave demand centers of the Trans-Saharan slave trade, and column (4) distances to slave demand centers of the Red Sea slave trade. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table 8.6: Economic Development and various trust dimensions: OLS estimates

	(1) Trust in relatives	(2) Trust in neighbors	(3) Trust in other people you know	(4) Generalized trust
Social capital proxy				
Respective Trust Dimension	.035	.1276	.1404	.071
	(.0643)	(.0819)	(.0931)	(.1285)
Human geography				
Urbanization	.3639***	.3728***	.3753***	.3743***
	(.1184)	(.1165)	(.1169)	(.1197)
Education				
Expected schooling	-.0108	-.0117	-.0113	-.0112
	(.0128)	(.0131)	(.0131)	(.013)
Mean schooling	.1447***	.1473***	.1452***	.1448***
	(.0168)	(.0177)	(.0175)	(.018)
Literacy rate	.0868	.097	.0898	.0855
	(.1398)	(.1462)	(.1486)	(.1484)
General geography				
Latitude	.0129	.0133	.0134	.0134
	(.0101)	(.01)	(.0098)	(.0093)
Longitude	.0166**	.0164**	.0161**	.0164**
	(.0079)	(.0075)	(.0075)	(.0076)
Landlock	-.0086	-.0128	-.0094	-.0106
	(.0349)	(.0348)	(.0347)	(.0365)
Capital	-.0079	.0131	.0125	.0092
	(.0375)	(.0391)	(.0399)	(.0392)
Land area	-.0161	-.0125	-.014	-.0139
	(.0201)	(.0203)	(.0206)	(.0209)
Elevation	.0008	-.0005	-.0007	0
	(.0171)	(.0169)	(.0174)	(.0165)
Terrain ruggedness	.0003	.0003	.0003	.0003
	(.0007)	(.0007)	(.0007)	(.0007)
Climate				
Temperature	-.0023	-.002	-.0023	-.0021
	(.0037)	(.0032)	(.0033)	(.0031)
Precipitation	-.0725**	-.0623**	-.0667**	-.066**
	(.0301)	(.0282)	(.028)	(.0279)
Temperature range	.0001	-.0008	.0001	-.0003
	(.0148)	(.0141)	(.0142)	(.0137)
Precipitation range	-.0002	-.0002	-.0002	-.0001
	(.0001)	(.0001)	(.0001)	(.0001)
Sunshine	.0128	.0115	.0114	.0126
	(.0152)	(.0143)	(.0144)	(.0148)
Humidity	.0526***	.0513***	.0514***	.0525***
	(.0101)	(.0104)	(.0108)	(.01)
Rain days	-.0003	-.0003	-.0002	-.0003
	(.0005)	(.0005)	(.0005)	(.0005)
Windspeed	.0055	.0056*	.0057*	.0051
	(.0033)	(.0032)	(.0032)	(.0033)
Natural resources				
Oil & Gas	-.0004	-.0005	-.0005	-.0006
	(.0008)	(.0008)	(.0008)	(.0008)
Diamonds	-.0038	-.0022	-.0022	-.0019
	(.0119)	(.0124)	(.0126)	(.0123)
Precious metals	.0011*	.0012*	.0012*	.0011*
	(.0006)	(.0007)	(.0007)	(.0007)
Base metals	-.1552*	-.1832**	-.1889**	-.1821**
	(.0815)	(.0843)	(.0839)	(.0821)
Iron	.2181**	.2304**	.2618**	.2279**
	(.0982)	(.0951)	(.0976)	(.0967)
Alloys	-.2027	-.0587	-.0535	-.0645
	(.1456)	(.123)	(.1262)	(.1226)
_cons	1.4435	-.1095	1.8914	2.0963
	(3.2579)	(1.3455)	(3.9726)	(10.4019)
Observations	322	334	334	334
R-squared	.9572	.9573	.9574	.957
All Control Variables	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES

The table reports OLS estimates of regressions of ln(GNI/capita) on different dimensions of trust. The unit of observation is a region. Column (1) reports the coefficient that corresponds to trust in relatives, column (2) that corresponding to trust in neighbors, column (3) that corresponding to trust in other people you know. Column (4) is included for the sake of comparability and reports the OLS results for generalized trust. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table 8.7: Economic Development and various trust dimensions: IV estimates

	(1) Trust in relatives	(2) Trust in neighbors	(3) Trust in other people	(4) Trust in relatives	(5) Trust in neighbors	(6) Trust in other people
	Instrument: Polarization at stage 2			*Fractionalization at stage 1*		
Social capital proxy						
Resp. Trust Dim.	-1.4612	-.6771	-.2874	-1.6092	-.6706	-.3628
	(4.2909)	(1.842)	(.7563)	(2.9426)	(.9817)	(.5273)
Human geography						
Urbanization	.5261*	.4937**	.4617***	.533**	.4934***	.4627***
	(.2865)	(.1973)	(.1335)	(.2293)	(.166)	(.1327)
Education						
Expected schooling	-.0142	-.017	-.0148	-.0145	-.0169	-.0159
	(.0185)	(.021)	(.016)	(.0184)	(.0172)	(.0159)
Mean schooling	.1113*	.1224***	.1346***	.1089**	.1226***	.1345***
	(.067)	(.0407)	(.019)	(.043)	(.0292)	(.0193)
Literacy rate	-.072	-.0154	.0351	-.0846	-.0148	.0306
	(.407)	(.2608)	(.152)	(.2927)	(.1783)	(.1371)
General geography						
Latitude	.0039	.0123	.0151	.0026	.0123	.0147*
	(.0355)	(.0139)	(.0094)	(.0244)	(.0098)	(.0088)
Longitude	.0124	.013	.0146	.0121	.013	.0144
	(.0146)	(.0128)	(.009)	(.0126)	(.0111)	(.0089)
Landlock	-.0275	-.0192	-.0353	-.0273	-.0193	-.037
	(.0588)	(.0346)	(.0355)	(.0637)	(.0292)	(.0345)
Capital	-.072	-.0935	-.0693	-.0731	-.0932	-.0715
	(.0745)	(.1102)	(.0536)	(.0721)	(.0785)	(.0519)
Land area	-.0296	-.0208	-.0172	-.0307	-.0208	-.0168
	(.0296)	(.0201)	(.022)	(.0219)	(.02)	(.0219)
Elevation	-.005	.0106	.0139	-.0068	.0107	.0143
	(.0487)	(.0214)	(.0164)	(.0327)	(.0208)	(.0166)
Terrain ruggedness	.0005	.0012	.0014*	.0004	.0012*	.0014*
	(.0022)	(.0007)	(.0008)	(.0016)	(.0007)	(.0008)
Temperature	-.0077	.0011	.0037	-.0087	.0011	.004
	(.0273)	(.0081)	(.0072)	(.0186)	(.0077)	(.0073)
Precipitation	-.0941	-.0457	-.0316	-.0996	-.0457	-.0295
	(.1664)	(.0344)	(.0301)	(.1174)	(.0319)	(.0243)
Temperature range	-.01	-.007	-.0126	-.0098	-.007	-.0128
	(.0117)	(.0135)	(.0104)	(.0123)	(.0099)	(.0107)
Precipitation range	0	0	-.0001	0	0	0
	(.0004)	(.0005)	(.0003)	(.0003)	(.0003)	(.0002)
Sunshine	.0127	.0061	.0023	.0138	.0061	.0026
	(.0405)	(.0229)	(.014)	(.0319)	(.0193)	(.0142)
Humidity	.0413	.0554***	.055***	.0401*	.0554***	.0555***
	(.034)	(.0117)	(.0106)	(.0226)	(.0106)	(.01)
Rain days	-.0018	-.0013	-.001	-.0019	-.0013	-.0011
	(.0037)	(.0021)	(.0013)	(.0026)	(.0012)	(.001)
Windspeed	.0025	.0015	.003	.0022	.0016	.0024
	(.0105)	(.012)	(.008)	(.0078)	(.0068)	(.0057)
Natural resources						
Oil & Gas	-.0029	-.0005	-.0003	-.0031	-.0004	-.0003
	(.0078)	(.001)	(.0008)	(.0055)	(.0009)	(.0008)
Diamonds	-.0033	-.0058	-.0005	-.0038	-.0057	-.0011
	(.0212)	(.0236)	(.0121)	(.0196)	(.0165)	(.0113)
Precious metals	.0014**	.0015***	.0015***	.0014***	.0015***	.0015***
	(.0006)	(.0005)	(.0006)	(.0005)	(.0005)	(.0005)
Base metals	-.2142***	-.224***	-.216***	-.214***	-.2239***	-.2159***
	(.0769)	(.0719)	(.0763)	(.0782)	(.0707)	(.0747)
Iron	.353	.2519**	.1666	.3661*	.2516***	.1518
	(.3176)	(.0984)	(.1808)	(.2089)	(.0858)	(.1451)
Alloys	-.1687	-.1361	-.0999	-.1758	-.1358	-.1004
	(.2147)	(.1441)	(.1405)	(.149)	(.1134)	(.1371)
_cons	2.8061	.9868	.472	3.0528	.9809	.4986
	(6.9219)	(1.6714)	(.4183)	(4.5946)	(.9247)	(.3905)
Observations	270	270	270	270	270	270
R-squared	.9239	.9497	.9598	.9163	.9499	.9586
All Controls	YES	YES	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES	YES	YES

The table reports second-stage IV estimates of regressions of ln(GNI/capita) on different dimensions of trust. The left panel reports the IV estimates using polarization at stage two as instrument, the right panel reports IV estimates using fractionalization at stage one as instrument. The unit of observation is a region. Columns (1) and (4) report the coefficients that correspond to trust in relatives, columns (2) and (5) those corresponding to trust in neighbors, columns (3) and (6) those corresponding to trust in other people you know. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** p < 0.01, ** p < 0.05, * p < 0.1).

Table 8.8: Economic Development and various trust dummies: OLS estimates

	(1) Trust in relatives	(2) Trust in neighbors	(3) Trust in other people you know	(4) Generalized trust
Social capital proxy				
Respective Trust Dimension	.0527	.0703*	.0346	.0418
	(.0353)	(.0374)	(.0296)	(.033)
Human geography				
Urbanization	.3848***	.3724***	.3721***	.365***
	(.1172)	(.1176)	(.1172)	(.1162)
Education				
Expected schooling	-.0139	-.0125	-.013	-.0119
	(.0125)	(.0137)	(.0135)	(.0132)
Mean schooling	.1461***	.1478***	.1453***	.1449***
	(.0174)	(.0178)	(.018)	(.0181)
Literacy rate	.1032	.0922	.0828	.0966
	(.1468)	(.1506)	(.1517)	(.1559)
General geography				
Latitude	(.0103)	(.0105)	(.0105)	.0148
	.0198**	.0195**	.0191**	(.011)
Longitude	(.0079)	(.0074)	(.0078)	.0191**
	-.0022	-.0092	-.0043	(.0079)
Landlock	(.0314)	(.0347)	(.0345)	-.012
	.0124	.0237	.0208	(.0378)
Capital	(.0389)	(.0393)	(.0399)	.0174
	-.0115	-.0121	-.0143	(.0408)
Land area	(.0206)	(.0203)	(.0208)	-.014
	-.0019	.0001	-.0009	(.0202)
Elevation	(.0165)	(.0164)	(.0164)	-.0019
	.0003	.0003	.0004	(.0166)
Terrain ruggedness	(.0007)	(.0007)	(.0007)	.0004
	-.0028	-.0027	-.0031	(.0007)
Climate				
Temperature	(.0033)	(.0036)	(.0036)	-.0034
	-.0508	-.0595*	-.0602*	(.0036)
Precipitation	(.0348)	(.0324)	(.0326)	-.0589*
	-.0042	-.006	-.0044	(.0336)
Temperature range	(.016)	(.0154)	(.0154)	-.0041
	-.0001	-.0001	-.0001	(.0163)
Precipitation range	(.0001)	(.0001)	(.0001)	-.0001
	.0122	.0111	.0119	(.0001)
Sunshine	(.0149)	(.0146)	(.0151)	.0111
	.0503***	.0516***	.0516***	(.0146)
Humidity	(.0101)	(.01)	(.01)	.0528***
	-.0004	-.0003	-.0003	(.0094)
Rain days	(.0005)	(.0005)	(.0005)	-.0003
	.0046	.0047	.0048	(.0005)
Windspeed	(.0032)	(.0032)	(.0033)	.0044
	-.0007	-.0007	-.0006	(.0032)
Natural resources				
Oil & Gas	(.0007)	(.0008)	(.0008)	-.001
	.0004	.0018	.0024	(.0009)
Diamonds	(.0129)	(.0138)	(.0138)	.006
	.0011	.0012*	.0011	(.0131)
Precious metals	(.0007)	(.0007)	(.0007)	.0011
	-.1803**	-.1795**	-.1848**	(.0007)
Base metals	(.0818)	(.0862)	(.0828)	-.1769**
	.2076**	.2101**	.2258**	(.0817)
Iron	(.0979)	(.0994)	(.0993)	.2154**
	-.0614	-.0582	-.0586	(.1002)
Alloys	(.1179)	(.1229)	(.1216)	-.0604
	(.1456)	(.123)	(.1262)	(.1199)
_cons	.442	.487	.5416	.5096
	(.3906)	(.3655)	(.3704)	(.3692)
Observations	336	336	336	336
R-squared	.9562	.9562	.9567	.9561
All Control Variables	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES

The table reports OLS estimates of regressions of ln(GNI/capita) on different trust dummies which become one if the respective region has a share of trusting people above the median value in the respective trust dimension and zero elsewise. The unit of observation is a region. Column (1) reports the coefficient that corresponds to the dummy of trust in relatives. Column (2) reports the coefficient corresponding to the dummy of trust in neighbors. Column (3) reports the coefficient corresponding to the dummy of trust in other people you know. Column (4) reports the coefficient corresponding to the dummy of generalized trust. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table 8.9: Economic Development and various trust dummies: IV estimates

	(1) Trust in relatives	(2) Trust in neighbors	(3) Trust in other people	(4) Generalized trust	(5) Trust in rel-atives	(6) Trust in neighbors	(7) Trust in other people	(8) Generalized trust
	Instrument: Polarization at stage 2				*Fractionalization at stage 1*			
Social capital proxy								
Resp. trust dim.	.0869	.0374	.0284	-.1121	-1.27	-.5361	-9.2302	-.2353
	(1.0479)	(.4521)	(.3519)	(1.3944)	(3.3863)	(.5586)	(114.3232)	(.2533)
Human geography								
Urbanization	.391**	.3738***	.3727***	.4031	.1462	.3973***	1.2288	.4336***
	(.162)	(.116)	(.1252)	(.3079)	(.6271)	(.1458)	(10.9738)	(.1279)
Education								
Exp. schooling	-.0143	-.0129	-.013	-.0171	-.0002	-.0195	-.1142	-.0213
	(.0155)	(.0131)	(.0127)	(.0486)	(.0462)	(.0167)	(1.2823)	(.0148)
Mean schooling	.1471***	.1463***	.1452***	.144***	.1091	.1202***	-.0273	.1432***
	(.0326)	(.0251)	(.017)	(.0191)	(.1024)	(.0412)	(2.1069)	(.0178)
Literacy rate	.1156	.0885	.083	.051	-.3738	.023	.4634	.0144
	(.4181)	(.1514)	(.1352)	(.4198)	(1.2042)	(.1915)	(4.8977)	(.1418)
General geography								
Latitude	.0119	.0135	.0132	.0071	.0237	.0012	-.1419	.001
	(.0153)	(.0106)	(.0092)	(.0734)	(.0364)	(.017)	(1.9669)	(.0161)
Longitude	.0203	.0193**	.0191***	.0194**	.0026	.0166	.0288	.0197**
	(.0167)	(.0076)	(.007)	(.0089)	(.0483)	(.0142)	(.1705)	(.0082)
Landlock	.0003	-.0078	-.0046	.0097	-.0996	.0173	-.5015	.0271
	(.0911)	(.0278)	(.0433)	(.2067)	(.2908)	(.0414)	(6.3491)	(.0382)
Capital	-.0101	-.0128	-.0142	-.0124	-.0639	-.0244	.1858	-.0112
	(.0327)	(.0138)	(.0242)	(.0143)	(.1417)	(.0227)	(2.5887)	(.0203)
Land area	.0105	.0198	.0198	.01	.0863	-.0483	-1.4452	.0042
	(.0717)	(.0632)	(.065)	(.0786)	(.1858)	(.0705)	(17.8183)	(.0431)
Elevation	-.0023	-.0005	-.001	.0007	.015	-.0111	-.0816	.0028
	(.0197)	(.0168)	(.0152)	(.0303)	(.0506)	(.0263)	(1.0591)	(.0166)
Terrain ruggedness	.0004	.0003	.0004	.0002	.0001	.0003	-.0061	.0001
	(.0006)	(.0006)	(.0006)	(.0015)	(.0014)	(.0006)	(.0776)	(.0006)
Climate								
Temperature	-.0025	-.0029	-.0031	-.0027	-.0132	-.007	-.0276	-.0021
	(.0094)	(.0052)	(.0036)	(.0079)	(.03)	(.0064)	(.3204)	(.0034)
Precipitation	-.0449	-.0597**	-.0601**	-.0627	-.2789	-.0633	.0198	-.0658**
	(.1864)	(.0302)	(.0289)	(.0418)	(.6073)	(.0442)	(1.138)	(.0306)
Temperature range	-.0049	-.0047	-.0042	-.0006	.022	.019	.335	.0021
	(.0214)	(.0195)	(.0156)	(.0387)	(.0723)	(.0274)	(4.1932)	(.0154)
Precipitation range	-.0001	-.0001	-.0001	-.0001	.0001	0	.0046	-.0001
	(.0003)	(.0002)	(.0002)	(.0001)	(.0007)	(.0002)	(.058)	(.0001)
Sunshine	.0121	.0117	.012	.0156	.0149	.0213	.1222	.0192
	(.0134)	(.0154)	(.0142)	(.0442)	(.0222)	(.0295)	(1.411)	(.0213)
Humidity	.0495*	.0515***	.0516***	.0479	.0799	.0502***	.0037	.044***
	(.027)	(.0088)	(.0088)	(.0464)	(.0744)	(.0131)	(.5955)	(.0139)
Rain days	-.0004	-.0003	-.0003	-.0005	.0002	-.0009	-.0167	-.0007
	(.0006)	(.0006)	(.0008)	(.002)	(.002)	(.0011)	(.1999)	(.0006)
Windspeed	.0047	.0046	.0047	.0049	.0018	.0032	-.0733	.0053
	(.0043)	(.0035)	(.005)	(.007)	(.011)	(.0054)	(.9546)	(.004)
Natural resources								
Oil & Gas	-.0007	-.0006	-.0006	.0006	.0013	.0003	.0056	.0019
	(.0017)	(.001)	(.0007)	(.0146)	(.005)	(.0016)	(.0731)	(.0026)
Diamonds	-.0003	.0017	.0022	-.0103	.03	.0004	-.2	-.0234
	(.0251)	(.0124)	(.0151)	(.1475)	(.0822)	(.0141)	(2.5391)	(.0329)
Precious metals	.0011*	.0011	.0011*	.0009	.0006	.0002	-.0053	.0008
	(.0007)	(.0008)	(.0006)	(.0018)	(.0016)	(.001)	(.0801)	(.0006)
Base metals	-.1794**	-.1805**	-.1843**	-.1947	-.2155	-.1986***	.6479	-.209***
	(.0767)	(.0757)	(.0821)	(.1823)	(.1486)	(.0731)	(10.678)	(.0787)
Iron	.1998	.2145**	.2247*	.2311	.5093	.2929*	-1.4215	.2437***
	(.2286)	(.0901)	(.1223)	(.1862)	(.8262)	(.1725)	(21.1523)	(.0884)
Alloys	-.0581	-.0621	-.06	-.0828	-.1894	-.1297	-2.177	-.1006
	(.1491)	(.1228)	(.137)	(.2256)	(.4083)	(.1858)	(26.6483)	(.1201)
_cons	.3673	.5196	.5443	.6832	3.3239	1.0888	4.5979	.8222*
	(2.2473)	(.5235)	(.3585)	(1.6392)	(7.7516)	(.7795)	(49.2896)	(.4309)
Observations	270	270	270	270	270	270	270	270
R-squared	.9561	.9565	.9561	.9513	.7204	.894	-17.607	.9403
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES

The table reports second-stage IV estimates of regressions of ln(GNI/capita) on different trust dummies which become one if the respective region has a share of trusting people above the median value in the respective trust dimension and zero elsewise. Both instruments, ethnic polarization at level two and ethnic fractionalization at level one, are equally turned into dummy variables so that they become one if a region is above the median ethnic polarization/fractionalization and zero elsewise. The left panel reports the second-stage estimates using the dummy for polarization at stage two, and the right panel reports second-stage estimates using the dummy for fractionalization at stage one. The unit of observation is a region. Columns (1) and (5) report the coefficients that corresponds to the dummy of trust in relatives. Columns (2) and (6) report the coefficients corresponding to the dummy of trust in neighbors. Columns (3) and (7) report the coefficients corresponding to the dummy of trust in other people you know. Columns (4) and (8) report the coefficients corresponding to the dummy of generalized trust. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table 8.10: Night-time luminosity and various trust dimensions: OLS estimates

	(1) Trust in relatives	(2) Trust in neighbors	(3) Trust in other people you know	(4) Generalized trust
Social capital proxy				
Respective Trust Dimension	-.3571	-.5029	.1742	.0632
	(.4154)	(.3558)	(.4086)	(.5653)
Human geography				
Urbanization	1.9041***	1.9141***	1.885***	1.8887***
	(.6617)	(.6578)	(.6551)	(.656)
Education				
Expected schooling	-.0324	-.0361	-.0291	-.0303
	(.0377)	(.037)	(.0371)	(.0405)
Mean schooling	.0104	.0069	.0164	.0158
	(.0909)	(.0904)	(.0887)	(.0884)
Literacy rate	.949	.929	.9898	.9824
	(.5887)	(.577)	(.5798)	(.5926)
General geography				
Latitude	-.0298	-.0299	-.0257	-.0263
	(.0436)	(.0422)	(.0444)	(.043)
Longitude	.0292	.0283	.0301	.0295
	(.0243)	(.0248)	(.0234)	(.0226)
Landlock	-.1091	-.1022	-.1057	-.1112
	(.1715)	(.171)	(.1684)	(.1708)
Capital	.6815***	.66***	.6892***	.6835***
	(.2312)	(.2344)	(.2363)	(.2357)
Land area	-.7177***	-.7167***	-.7159***	-.7155***
	(.0807)	(.0801)	(.0811)	(.0799)
Elevation	-.0181	-.0151	-.0148	-.0135
	(.0607)	(.0616)	(.0617)	(.0621)
Terrain ruggedness	.0002	.0003	.0004	.0004
	(.0028)	(.0028)	(.0026)	(.0027)
Climate				
Temperature	.0259	.0275	.0275	.0285
	(.0249)	(.0261)	(.0264)	(.0261)
Precipitation	-.0649	-.0562	-.0564	-.0525
	(.0953)	(.0934)	(.0997)	(.0952)
Temperature range	-.0643	-.0611	-.0644	-.0655
	(.0572)	(.0576)	(.0553)	(.0589)
Precipitation range	-.0003	-.0002	-.0004	-.0003
	(.0005)	(.0005)	(.0006)	(.0005)
Sunshine	-.0528	-.0518	-.0565	-.0556
	(.0524)	(.0532)	(.054)	(.0537)
Humidity	.0396	.0441	.0415	.0426
	(.0294)	(.0262)	(.0267)	(.0269)
Rain days	-.0013	-.0015	-.0008	-.001
	(.0024)	(.0023)	(.0023)	(.0021)
Windspeed	-.001	-.0031	.0012	-.0004
	(.0145)	(.015)	(.016)	(.0144)
Natural resources				
Oil & Gas	.0195***	.02***	.0201***	.02***
	(.0022)	(.0022)	(.0024)	(.0024)
Diamonds	-.0559	-.0602	-.0535	-.0539
	(.0982)	(.0994)	(.1009)	(.1002)
Precious metals	.0022	.0022	.0023	.0023
	(.0017)	(.0016)	(.0017)	(.0018)
Base metals	-.2175	-.2236	-.2184	-.2185
	(.3297)	(.3179)	(.3474)	(.3452)
Iron	.5454	.535	.5478	.5087
	(.5274)	(.5158)	(.5181)	(.5256)
Alloys	.5909	.58	.6092	.6137
	(.564)	(.5386)	(.5979)	(.6135)
_cons	6.0685***	5.931***	5.4118***	5.4438**
	(1.82)	(1.8723)	(1.7808)	(1.9477)
Observations	270	270	270	270
R-squared	.9032	.9038	.903	.9029
All Control Variables	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES

The table reports OLS estimates of regressions of night-time luminosity on different dimensions of trust. The unit of observation is a region. Column (1) reports the coefficient that corresponds to trust in relatives, column (2) that corresponding to trust in neighbors, column (3) that corresponding to trust in other people you know, column (4) that corresponding to generalized trust. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table 8.11: GNI/capita, night-time luminosity, and group membership variables: OLS estimates

	(1) Membership religious community	(2) Active membership religious com.	(3) Membership voluntary association	(4) Active membership voluntary associat.	(5) Membership religious community	(6) Active membership religious com.	(7) Membership voluntary association	(8) Active membership voluntary associat.
	Dependent Variable: ln(GNI/capita)				*Dependent Variable: Night-time luminosity*			
Social capital proxy								
Resp. membership var.	.0032	-.0737	-.0309	-.026	-1.1099**	-.2455	-.3314**	-1.2654**
	(.095)	(.1027)	(.0229)	(.1474)	(.4193)	(.4367)	(.1185)	(.4553)
Human geography								
Urbanization	.3796***	.3659***	.3438**	.3591***	1.7077**	1.8398**	1.5421**	1.5917**
	(.12)	(.1187)	(.1257)	(.1263)	(.6612)	(.7086)	(.6702)	(.6166)
Education								
Exp. schooling	-.0121	-.0114	-.0058	-.008	-.0195	-.0301	-.0069	-.0248
	(.0131)	(.0131)	(.0124)	(.013)	(.0354)	(.0393)	(.0364)	(.0374)
Mean schooling	.1444***	.1446***	.1401***	.1411***	.0178	.0169	.0591	.0723
	(.0177)	(.0174)	(.0169)	(.0169)	(.0831)	(.0886)	(.0683)	(.0709)
Literacy rate	.0856	.0936	.0738	.0771	.9772*	1.0112	.8235	.8501
	(.1449)	(.1473)	(.138)	(.1414)	(.5577)	(.6175)	(.6085)	(.6042)
General geography								
Latitude	.0124	.0119	.0113	.0114	-.0323	-.0288	-.0313	-.0259
	(.0101)	(.01)	(.0103)	(.0102)	(.0429)	(.0437)	(.0449)	(.0429)
Longitude	.0167**	.0168**	.015*	.0147*	.0298	.0313	.0276	.027
	(.0079)	(.0078)	(.0084)	(.0084)	(.0217)	(.0221)	(.0225)	(.0231)
Landlock	-.0088	-.0069	-.0076	-.0098	-.0618	-.1017	-.025	-.0603
	(.0344)	(.0343)	(.0333)	(.0331)	(.1767)	(.1693)	(.1626)	(.1693)
Capital	.0086	.0085	-.0073	-.0057	.6712***	.6849***	.5201**	.5365**
	(.039)	(.0395)	(.0397)	(.04)	(.2362)	(.2377)	(.2055)	(.2049)
Land area	-.013	-.0135	-.0083	-.0089	-.7077***	-.7169***	-.7685***	-.7752***
	(.0203)	(.02)	(.0253)	(.0251)	(.0818)	(.0827)	(.0732)	(.0691)
Elevation	-.0007	.0002	-.0042	-.006	-.0193	-.0121	.0132	.0117
	(.0168)	(.0166)	(.0175)	(.0176)	(.0776)	(.0608)	(.0714)	(.0757)
Terrain ruggedness	.0003	.0003	.0004	.0003	.0005	.0004	-.0021	-.002
	(.0007)	(.0007)	(.0009)	(.0009)	(.0027)	(.0027)	(.0022)	(.0022)
Climate								
Temperature	-.0024	-.0025	-.0027	-.0031	.0295	.0274	.0259	.025
	(.0033)	(.0033)	(.0041)	(.0041)	(.0264)	(.0266)	(.0278)	(.0276)
Precipitation	-.0678**	-.0695**	-.0733**	-.0746**	-.0058	-.0551	-.1167	-.0486
	(.0282)	(.0312)	(.0282)	(.0299)	(.1054)	(.0988)	(.0979)	(.1078)
Temperature range	.0013	.001	.0034	.0031	-.0587	-.066	-.0367	-.0443
	(.0151)	(.0151)	(.0146)	(.0146)	(.0573)	(.0569)	(.0579)	(.0584)
Precipitation range	-.0002	-.0001	-.0002	-.0002	-.0002	-.0003	-.0006	-.0005
	(.0001)	(.0001)	(.0001)	(.0001)	(.0005)	(.0005)	(.0005)	(.0005)
Sunshine	.0127	.0131	.0122	.0133	-.0746	-.0544	-.0258	-.0337
	(.0146)	(.015)	(.0153)	(.0158)	(.0507)	(.0542)	(.0422)	(.0428)
Humidity	.0525***	.0522***	.0523***	.0529***	.0242	.0414	.0262	.017
	(.0103)	(.0102)	(.0112)	(.0112)	(.0267)	(.0268)	(.03)	(.0287)
Rain days	-.0003	-.0003	-.0002	-.0002	-.0011	-.0009	.0002	-.0006
	(.0005)	(.0005)	(.0005)	(.0005)	(.0021)	(.0022)	(.0023)	(.0023)
Windspeed	.0053	.0052	.0058	.0053	-.0031	-.0006	.0092	.003
	(.0033)	(.0034)	(.004)	(.004)	(.0142)	(.0151)	(.0146)	(.0163)
Natural resources								
Oil & Gas	-.0005	-.0002	-.0003	-.0006	.0222***	.0209***	.023***	.0225***
	(.0008)	(.0008)	(.0008)	(.0008)	(.0024)	(.0021)	(.002)	(.0022)
Diamonds	-.0037	-.0034	-.0049	-.0055	-.0542	-.0524	-.0828	-.0748
	(.0129)	(.0126)	(.0114)	(.0115)	(.1021)	(.0994)	(.0927)	(.0907)
Precious metals	.0011*	.0011*	.0011*	.0011*	.0022	.0021	.0025	.0021
	(.0007)	(.0006)	(.0006)	(.0006)	(.0017)	(.0018)	(.0018)	(.0018)
Base metals	-.183**	-.1796**	-.1428*	-.1436*	-.2288	-.204	-.236	-.2472
	(.0819)	(.08)	(.0773)	(.0779)	(.3252)	(.3498)	(.314)	(.3217)
Iron	.2372**	.2285**	.2206**	.2274**	.4517	.4814	.6605	.6433
	(.0923)	(.0944)	(.0981)	(.0967)	(.5816)	(.5385)	(.4913)	(.5587)
Alloys	-.0667	-.0687	-.2128	-.2097	.7305	.5988	.4832	.6283
	(.1236)	(.1205)	(.1443)	(.1536)	(.5573)	(.5876)	(.5047)	(.5269)
_cons	.5327	.5507	.5688	.5627	5.6005***	5.5431***	6.2507***	5.7896***
	(.3549)	(.3617)	(.3716)	(.3729)	(1.9575)	(1.9124)	(1.8559)	(1.9343)
Observations	270	270	270	270	270	270	270	270
R-squared	.9561	.9565	.9561	.9513	.7204	.894	-17.607	.9403
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES

The table reports OLS estimates of regressions of night-time luminosity and ln(GNI/capita) on different group membership variables. The left panel reports the OLS results of regressions of ln(GNI/capita) on group membership, the right panel reports OLS results of regression of night-time luminosity on group membership. The unit of observation is a region. Columns (1) and (5) report the coefficients that correspond to membership in religious communities, columns (2) and (6) those corresponding to active membership in religious communities, columns (3) and (7) those corresponding to membership in voluntary associations, columns (4) and (8) those corresponding to active membership in voluntary associations. All regressions include country fixed effects and the complete set of educational and geographic controls presented in section 3. Robust standard errors, adjusted for clustering at the country-level, are reported below coefficients in parentheses. Asterisks denote levels of statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

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