Historical Origins of Firm Ownership Structure: The Persistent Effects of the African Slave Trade

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This paper uses evidence from the historical African slave trade to extend prior theory linking modern firm ownership structure to institutions and social capital. We argue that institutions and social capital are not simply predictors of ownership structure, but also can be historically persistent mechanisms through which past traumatic shocks to society shape modern businesses. Using data from over 30,000 firms across 41 sub-Saharan countries, we show that firms in areas that suffered high historical slave extraction are today more likely to have concentrated ownership. High slave export countries have more sole proprietorships and majority ownership, with our model implying a difference of 43 percentage points between the lowest and highest export countries. This difference is particularly pronounced in the manufacturing sector where high capital needs can necessitate diffuse ownership when credit markets are weak. Finally, we present modest evidence that weakened institutions and social capital are among the mechanisms through which the historical slave trade increases modern ownership concentration. Our paper answers recent calls to bring both Africa and history back into management research through our theoretical extension into distinct and quantifiable historical origins of firm structure.

Management and finance scholars have established that concentrated firm ownership is overrepresented in countries with weak institutions and low social capital (La Porta, Lopez-de-Silanes, & Shleifer, 1999; Khanna & Palepu, 2005; Peng & Jiang, 2010). Although concentrated ownership serves an important purpose for firms in both the most- and least-developed markets (Shleifer & Vishney, 1997; Thomsen & Pedersen, 2000), its high prevalence in the latter typically represents low access to equity-based financing that limits investment and growth (Levine, 2005).

Many firms in these countries remain concentrated because of key obstacles to diversification—weak property rights and contract enforcement, poor shareholder protection, and low social capital (La Porta, Lopez-de-Silanes, Shleifer, & Vishney, 1999). Without the option to diversify ownership, concentrated owners such as founding families "*must* run their firms directly" (Peng and Jiang, 2010, p. 256).[1] Although management theory acknowledges the historical origins of the institutional and social capital conditions linked to concentration (Henisz & Williamson, 1999; Peng, Wang, & Jiang, 2008), the sources of cross-national variation are rarely modeled when predicting ownership. Instead, they are treated as fixed effects emerging from the fog of history to shape modern firms.

In this paper we use the tragedy of the African slave trade to extend prior theory on cross-national differences in ownership structure backward in history, arguing that the institutions and social capital in prior models are not simply predictors, but rather historically-persistent mechanisms that carry the effects of punctuated destructive shocks to the ownership concentration of modern firms. These traumatic shocks, which include disease, conflict, foreign occupation, forced migration, and genocide, are known to permanently change society (Nunn, 2014; Klüppel, Pierce, & Snyder, 2018), but they are rarely linked to modern firms. Why is such an extension important to management theory? First, the exogeneity of many such shocks provides better (but still imperfect) confidence in the causal relationship of institutions and social capital with ownership structure. Second, we extend existing management theory by presenting one class of *origins* of the crucial national relationships between firms and the institutional environment. Finally, our extension provides predictions for how ongoing and future traumatic shocks might

[1] Peng and Jiang (2010) explain in detail that the debate about which ownership structure is better is a false one. We do not claim the superiority of diverse ownership, but rather the superiority of the *option* to choose either concentrated or diverse ownership.

affect the business environment. Warfare, genocide, and natural disaster continue to shock modern societies, yet their potential impact on the structure of firms is still unmodeled despite recent evidence that they indeed affect business (Grosfeld, Rodnyansky, & Zhuravskaya, 2013; Paruchuri & Ingram, 2012).

We provide evidence of these historical origins with the African slave trade. The slave trade, which pre-dated colonialism from the 15th to the 18th century, had stolen from Africa nearly half its potential population by the advent of colonialism (Manning, 1990). Between twelve and eighteen million Africans were taken in the Indian Ocean, Red Sea, transatlantic, and trans-Saharan trades. The modern economic consequences of the slave trade are significant; it has been linked to both decreased economic development (Nunn, 2008) and access to credit (Levine, Lin, & Xie, 2018; Pierce & Snyder, 2018).[2]

These and other papers (Nunn & Wantchekon, 2011; Whatley & Gillizeau, 2011) argue that the slave trade changed the historical path of Africa through two interrelated mechanisms: weakened institutions and social capital elements such as ethnic fractionalization and mistrust. The established link between these two mechanisms and African conflict and development (Alesina, Devleeschauwer, Easterly, Kurlat, & Wacziarg, 2003; Easterly & Levine, 1997; Fafchamps, 2006; Michalopoulos & Papaioannou, 2016, 2019) makes it likely that the slave trade also altered the organization and structure of firms. As Klüppel *et al.* (2018) explain, historical shocks such as the slave trade might shape multiple facets of the business environment. Shocks such as conflict, forced occupation, and persecution have been linked to labor market composition (Fernandez, Fogli, & Olivetti, 2004) and entry (Siegel, Licht, & Schwartz, 2011, 2013), entrepreneurship

[2] The slave trade has been linked to other modern societal elements, such as female labor market participation (Teso, 2018), HIV infection (Bertocchi & Dimico, 2019), and polygyny (Dalton & Leung, 2014). See Michalopoulos & Papaioannou (2019) for a detailed review.

(Grosfeld *et al.*, 2013), and industry growth (Brown, Cookson, & Heimer, 2017). Few have linked such shocks to ownership structure.

Our analysis is primarily cross-national. We find that firms in countries with high historical slave exports have a higher proportion of firms that are wholly-owned (sole proprietorship) or controlled (majority ownership) by one individual. Furthermore, we posit a cross-industry test. We show that in low slave trade countries, capital-intensive manufacturing firms are more likely than other firms to have a diffuse ownership structure. However, as the prevalence of the slave trade rises across countries, manufacturing firms become more likely to be sole proprietorships. Our results are robust to specification choice as well as extensive country- and firm-level controls, including the legal origins explanation in La Porta *et al.* (1998). Instrumental variable models support our findings. In addition, we provide modest evidence from two-stage least squares (2SLS) that weak institutions and low social capital are likely historically persistent mechanisms explaining part of this relationship. This evidence on mechanisms is not definitive. The complexity of history and our small country sample make typical mediation analysis inappropriate due to both insufficient statistical power and violation of multiple key model assumptions.[3]

Our contribution to the management and strategy literature is primarily empirical, but these empirics importantly allow us to extend theory through strong evidence on the historical roots of ownership structure. The paper provides these contributions to four important research streams. First, it answers the call to bring history back into the fields management and strategy. (Greve & Rao, 2012; Ingram, Rao, & Silverman, 2012; Jones & Khanna, 2006; Kipping & Üsdiken, 2014; Klüppel *et al*., 2018; Madsen, Bednar, & Godfrey, 2014; Morck & Yeung, 2011). Studies that focus on periods before the 20th century are rare in the management and strategy literature

[3] We explain problems with structural equation models (SEM) models later in the paper.

(Rowlinson & Hassard, 2013).[4] Our paper contributes by introducing the role of traumatic shocks, and by employing one as an empirically-measurable predictor that can help explain one of the many sources of established links between institutions, social capital, and ownership in modern firms.

Second, it contributes to the growing literature on how historical events and conditions continue to shape modern firms through culture and institutions (Tabellini, 2008a). Our theoretical model is heavily informed by the path dependence literature that examines positive shocks such as technological breakthroughs (David, 1994, 2007; Vergne, 2013). We instead model the concept of traumatic shocks (Klüppel *et al.,* 2018) such as conflict, natural disasters, and forced migration that are particularly important for explaining business history in emerging markets (Austin, Dávila, & Jones, 2017). Only a few papers link such shocks to modern firms,[5] and only one of which we know links them to (family) ownership structure—across regions in a single country (Amore, 2017).[6]

Third, the paper contributes to important research on the sources and implications of ownership structure in the developing world. Weak institutions and low social capital in emerging markets foreclose on the option of diffuse ownership due to governance risks from minority ownership. When weak institutions fail to enforce contracts, firms must rely on the social capital of personal relationships for investment (North, 1990; Peng, 2003). Consequently, when institutions and social capital are weak, ownership *must* remain concentrated even when not beneficial (La Porta, Lopez-de-Silanes, Shleifer, & Vishney, 2000). There is increasing interest in identifying how the resulting excessive concentrated family ownership (Bloom, Genakos, Sadun,

[4] Recent exceptions include Carmeli and Markman (2011), and Silverman and Ingram (2017).
[5] Exceptions include Cookson (2010), Greve and Rao (2012), Grosfeld *et al.* (2013), Natividad (2019), Rao and Greve (2018), and Pascali (2016).
[6] Murphy (2005) also presents an interesting case study on historical antecedents of French ownership structure.

& Van Reenen, 2012) and constricted equity investments (Guler & Guillén, 2010; Taussig & Delios, 2015) affect performance in areas such as Africa.

Finally, the paper adds to a nascent literature in management and strategy on Africa. Despite its size and growing economic importance, Africa was until recently ignored by these fields,[7] partly due to the lack of reliable firm-level data. Recent work has sought to remediate this shortfall (Birhanu, Gambardella, & Valentini, 2016; Delecourt & Fitzpatrick, 2019; George, Kotha, Parikh, Alnuaimi, & Bahaj, 2016; Luiz, Stringfellow, & Jefthas, 2017; Michalopoulos & Papaioannou, 2015; Taussig & Delios, 2015; Yenkey, 2015, 2018a, 2018b), but few studies examine cross-national differences. Rivera-Santos, Holt, and Littlewood (2015) and Assenova and Sorenson (2017) are rare exceptions. We answer the call put forth by Zoogah, Peng, and Woldu (2015), Walsh (2015), and Mol, Stadler, and Ariño (2017) to increase attention on African firms and address remaining challenges faced by African managers.

THEORETICAL BACKGROUND

We first present how existing management theory models the cross-national relationship between ownership structure and social capital and modern institutions. We also explain that although many firms might benefit from concentrated ownership even in the absence of weak institutions and social capital, the restrictions on ownership diversification imposed by such weaknesses hurt many other firms by restricting investment and growth. We then provide a theoretical argument for why traumatic shocks from centuries past might predict firm ownership structure, instead presenting institutions and social capital as historically persistent mechanisms connecting these shocks to modern firms. Finally, we present two testable hypotheses linking historical traumatic shocks to concentrated ownership structure through institutions and social capital.

[7] Julian and Ofori-Dankwa (2013) and Acquaah (2007) are exceptions.

Existing Theory: Institutions and Social Capital Explain Ownership Structure

One of the most important dimensions of ownership structure is its concentration. Concentrated ownership comes in many forms, including business groups (Khanna & Rivkin, 2001), family-owned firms (Bertrand & Schoar, 2006; Chua, Chrisman, Steier, & Rau, 2012), limited partnerships (Hitt, Bierman, Shimizu, & Kochhar, 2001), and public firms with large institutional investors (Hoskisson, Hitt, Johnson, & Grossman, 2002). The most highly-concentrated firms have one or a majority owner with controlling interest. In contrast, diffuse firms might be publicly-traded corporations with tens of thousands of individual owners each holding small shares of the firm. Concentrated ownership presents both advantages and disadvantages vis-à-vis diffuse ownership. Concentrated ownership can help incentivize a single or handful of owners to effectively monitor management (Shleifer & Vishny, 1997), thereby avoiding the free riding common with many diffuse minority owners (Berle & Means, 1932; Shleifer & Vishny, 1986).

In contrast, diffuse ownership offers several advantages over concentration that can facilitate investment and firm growth. First, diffuse ownership can reduce the cost of capital by limiting individual exposure to firm-specific risk (Demsetz & Lehn, 1985), allowing smaller investors to pool capital and spread risk across a portfolio of investments. Second, equity-based compensation can attract talented employees (Oyer & Schaefer, 2005) and improve their organizational commitment (Rousseau & Shperling, 2003). Third, diffuse ownership can expand firm networks through the connections of venture capitalists or other investors motivated to help young companies acquire resources (Stuart, Hoang, & Hybels, 1999; Stuart & Yim, 2010). These tradeoffs between ownership structures partially explain why "empirical studies, however, have been unable to reach consensus about the actual relation between managerial ownership and firm value" (Benson & Davidson, 2009, p.574). Conditional on a given business environment, firms

will tend to adopt the best ownership structure based on relative costs and benefits as well as the preferences of its controlling owners.

Existing theory establishes that the substantial variation in ownership structure across regions and countries can largely be explained by local institutions and social capital (Peng & Heath, 1996; Peng et al., 2008; Young, Peng, Ahlstrom, Bruton, & Jiang, 2008). Much of this work is based on Douglass North's (1990: 3) institutional economics, where institutions and culture (including social capital) establish "the rules of the game in a society" that define the business environment. Formal institutions are codified rules that include constitutions, laws, property rights and contracts (North, 1990; Peng, 2002). They establish the ease and efficiency of doing business, with weak and corrupt institutions inhibiting foreign investment and business development both historically and in the modern era (Henisz, 2000; Henisz, Zelner, & Guillén, 2005; Henisz & Zelner, 2001; Ingram & Silverman, 2002; Peng, Sun, Pinkham, & Chen, 2009).

Social capital, while defined somewhat differently across fields, represents how embeddedness within groups and networks benefits individual actors (Burt, 2000; Fafchamps, 2006; Putnam, 2000; Sobel, 2002) or facilitates the provision of socially valuable activities through cooperation and individual contribution (Nanncini, Stella, Tabellini, & Troiano, 2013). Social capital manifests as network connectedness and civic engagement that "enable participants to act together more effectively to pursue shared objectives" (Putnam, 1995, 665). In the management literature, Kwon and Adler (2014: 412) similarly define social capital as the "goodwill available to individuals and groups." Social capital is therefore facilitated by interpersonal trust within groups, networks, and broader society (Glaeser, Laibson, Scheinkman, & Soutter, 2000).

Given its costs and benefits, some firms might choose concentrated ownership even in markets with strong institutions and social capital. Indeed, we observe many successful examples

of concentrated ownership in such countries (La Porta, Lopez-de-Silanes, & Shleifer, 1999; Thomsen & Pedersen, 2000). But substantial evidence shows that weak institutions and social capital destroy *the opportunity* to employ diffuse ownership, meaning that many firms who crucially need its benefits are forced into sub-optimal concentration. Why do these ownership restrictions occur?

Weak institutions tend to limit diffuse ownership by increasing the cost of equity-based capital. In the presence of these "institutional voids" (Khanna & Palepu, 2005, p. 283), investors fear that contracts and property rights will not be enforced (Besley & Ghatak, 2010; Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2003) and that minority shareholders will not be protected (La Porta, Lopez-de-Silanes, & Shleifer, 1999; Peng & Jiang, 2010). Without these institutional protections, investors and other actors feel vulnerable to the exploitation of trust in unenforceable impersonal arms-length transactions or agreements (Peng, 2003), forcing many owners to rely more on personal relationships (North, 1990; Peng, 2003). This relationship-based exchange (Peng, 2003) typically limits ownership to those within social networks such as trusted members of the same group (Cox & Fafchamps, 2008) or family members (Bertrand & Schoar, 2006).

Social capital through networks or ethnic communities can provide investor opportunities with lower hazards (Greif, 1993; Khanna & Palepu, 2000; Li, Hernandez, & Gwon, 2019), but in countries where social capital is low due to fractionalized ethnic groups or mistrust even within such groups, ownership is often limited it to within concentrated family structures (Peng & Jiang, 2010). As both Pollak (1985) and Williamson (1996) argue, the strongest case for family ownership is in countries with low trust or social capital. Low social capital can also limit diffuse ownership by inhibiting the decentralization of decision rights and contracting within the firm

(Bloom, Sadun, & Van Reenen, 2012; Gulati, 1998; Mayer, Davis, & Schoorman, 1995; Tsai & Ghoshal, 1998).

These obstacles to diffuse ownership from weak institutions and social capital mean that many high-quality entrepreneurs, managers, and ideas in such countries cannot grow because they lack access to equity funding, leaving expansion and growth to wealthy families and business groups (Khanna & Yafeh, 2007). This problem is made worse because such countries also typically suffer from restricted access to credit (Levine, 1997)—the other principal capital source.

An Extended Model of Traumatic Shocks and Ownership Structure

If existing theory partially explains the relationship of ownership structure with institutions and social capital, where does this correlation originate? Existing management theory, represented in Figure 1, does not provide an answer, instead treating institutions and social capital as independent explanatory variables that predict ownership structure after emerging from history through incremental evolution (North, 1991). Institutions and social capital in these models evolve along some equilibrium path to the present day, where they correlate with ownership structure. Henisz and Williamson (1999), for example, explicitly model cross-sectional and longitudinal variation in institutions without explaining historical sources of that variation. Similarly, Peng and Jiang (2010) based their theoretical framework off institutional variation without explicitly modeling its origins. Again, this theoretical tradition does not ignore historical origins, but doesn't explicitly model them. This approach is understandable given the immense challenge of endogenously-changing institutions and social capital, but it fails to provide predictive power for how many future shocks might change how firms organize.

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We extend these prior theories in Figure 2 to specify one set of historical sources as traumatic shocks to societies, thereby making institutions and social capital historically-persistent *mechanisms* in a model of ownership structure. This extension is consistent with the incremental evolution of institutions and culture in North (1991), but we explicitly model distinct traumatic shocks that heterogeneously disrupt existing local institutions and social capital and ultimately shape ownership structure.[8] As Klüppel *et al.* (2018) explain, traumatic shocks are major destructive events such as war (Miguel & Roland, 2011), disease (Nunn & Qian, 2010), famine (Jia, 2014), natural disaster (Fothergill & Peek, 2004), forced migration and slavery (Dell, 2010), persecution (Grosfeld et al., 2013; Pascali, 2016), and foreign occupation (Burchardi & Hassan, 2013; Dippel, 2014). Similar to disasters (Quarantelli, 2005), traumatic shocks are hard to precisely define, but involve disruptive injuries to society.

--------- INSERT FIGURE 2 HERE ----------

This theoretical extension is informed by the substantial literature on historical persistence in the social sciences that shows how traumatic shocks can destroy or alter institutions and social capital, as well as the meticulous work of historians and anthropologists. Acemoglu, Johnson, and Robinson (2001), for example, showed the long-run impact of European colonization of Africa in destroying institutions and breeding corruption. Banerjee and Iyer (2005) similarly linked property rights and public goods to idiosyncratic colonial institutions in India. Weak public goods also have empirical ties to traumatic shocks such as slavery (Sokoloff & Engerman, 2000), foreign occupation and forced labor (Dell, 2010), and religious proselytism (Nunn, 2014), as has the judicial independence and property rights linked to colonial legal institutions (La Porta et al, 1999; 2008).

[8] See Michalopoulos (2012) for discussions of biogeographical origins that precede these shocks.

Although traumatic shocks can modify culture in a myriad of ways, social capital often deteriorates in the wake of traumatic shocks. Putnam, Leonardi, and Nanetti (1993) and Guiso, Sapienza, and Zingales (2006) both linked low social capital in Italy to historical foreign occupation. Besley and Reynal-Querol (2014) find link historical conflict in Africa with lower trust as well as personal identity that is more ethnically- and less nationally focused—parochialism that limits the development of social capital across broader society (Putnam et al., 1993). Similarly, Nunn and Wantchekon (2011) associate the African slave trade to decreased modern trust in local ethnic groups, reducing social capital even *within* ethnic groups.

There is evidence that traumatic shocks can also reduce social capital through ethnic fractionalization by decreasing the cohesiveness of ethnic networks (Easterly, Ritzen, & Woolcock, 2006). Ethnic fractionalization can be an impediment to economic growth in Africa (Easterly & Levine, 1997; Alesina et al., 2003), with roots in both the slave trade (Whatley & Gillezeau, 2011) and colonialism (Michalopoulos & Papaioannou, 2016). The development costs of ethnic fractionalization may depend on a few powerful and competing groups (Posner, 2004; Woolcock, 2001) and may be less important than ethnic inequality (Alesina, Michalopoulos, & Papaioannou, 2016), but fractionalization typically reduces social capital by restricting ethnic networks.

For our theoretical extension to be valid, traumatic shocks cannot simply alter historical institutions and social capital. Those altered historical conditions must also persist across long periods of time in ways that shape modern firms. Evidence from across social science supports such historical persistence. Cultural elements such as social capital persist across generations through family (Inglehart & Baker, 2000; Michalopoulos, Putterman, & Weil, 2019; Tabellini, 2008b) and religion (Guiso, Sapienza, & Zingales, 2003). More broadly, empirical studies have

linked beliefs, traits, and behavior from ancestral paths to modern day populations (Ashraf & Galor, 2013; Spolaore & Wacziarg, 2009). Nisbett and Cohen (1996), for example, argued that the culture of honor in the American south can be traced to ancestral Scotch-Irish culture, a theory supported by Grosjean (2014). Within Africa, social capital shaped by ethnic fractionalization from both the slave trade (Whatley & Gillezeau, 2011) and colonialism (Michalopoulos & Papaioannou, 2016) has persisted across centuries.

Similarly, institutions such as property rights (Acemoglu *et al.*, 2001) and investor protection (La Porta *et al.*, 1998) persist because of both societal benefits and irreversible investments (Mahoney & Thelen, 2010; Powell, 1991). Pierson (2000: 54-55) argues that "political arrangements are unusually hard to change. (…) the key features of political life—public policies and (especially) formal institutions—are change-resistant." In addition, institutions and cultural elements such as trust reinforce one another over time, strengthening their persistence (Jones, 2006; Tabellini, 2008a).

Despite the many examples of how traumatic shocks can permanently alter institutions and social capital, even powerful shocks need not permanently reshape a country's institutional and cultural paths across time. For example, Boettke, Coyne, and Leeson (2008) argue institutions are inherently "sticky", which is visible in the successful reconstruction of Germany and Japan after the Second World War. This argument is supported by evidence that the war's bombings had no visible long-term impact on poverty or industrial productivity (Brakman et al. 2004; Davis and Weinstein 2008). Similarly, the recent epidemic of mass shootings in the United States has produced few changes in the institutions and culture around firearms (Luca, Malhotra, & Poliquin, 2019).

Under what conditions would we expect traumatic shocks to permanently change institutions and social capital? First, shocks must be destructive enough to destabilize existing society, either by themselves or in combination with other shocks or conditions. For example, Africa suffered multiple sequential shocks with cumulative effects on institutions and culture (Michalopoulos & Papaioannou, 2019). Second, shocks with longer duration will be more likely to permanently displace existing social capital and destroy institutions. Third, shocks will be less likely to change stronger and older institutions than weaker and new ones. Voigtländer and Voth (2013), for example explain the greater resilience of China than Europe to the Black Death due to its stronger institutions. Similarly, Michalopoulos and Papaioannou (2013) demonstrate how precolonial institutional strength resisted the negative effects of the colonial shock. In contrast, the immediate effects of a shock such as the September 11 terrorist attacks (Carnahan, Kryscynski, & Olson, 2018; Paruchuri & Ingram, 2012) may not persist because of its short duration and the strong institutions and social capital of the United States, while extended conflict in locations such as Syria, Iraq, and Afghanistan might have more lasting effects.

TESTABLE HYPOTHESES

As we have argued, traumatic shocks disrupt the historical evolution of institutions and culture, establishing new societal paths that persist to shape the modern business environment. Since traumatic shocks typically weaken formal institutions and destroy social capital, they create a long-term path toward an inhospitable environment that restricts the diffuse ownership option crucial for many firms' productivity and growth. This theoretical argument provides two testable hypotheses on the link between traumatic shocks in history and modern firm ownership structure.

The first empirical prediction is that those traumatic shocks severe enough to disrupt institutions and culture will increase ownership concentration even centuries after the shock. As

we've established, the weakened present-day institutions and social capital associated with traumatic shocks in the past are well-known to limit firm access to diffuse ownership. Without this option, some firms that would benefit from diffuse ownership are unable to achieve it, limiting them to a concentrated structure. In order to empirically identify these relationships, however, the effect of a traumatic shock must be heterogeneous across different areas, societies, or populations of people. There is widespread evidence of such heterogeneity in the effect of shocks such as colonialism (Michalopoulos & Pappaiannou, 2016), the slave trade (Nunn & Wantchekon, 2011), genocide (Grosfeld et al., 2013), and forced migration (Cookson, 2010).

We therefore expect a higher rate of concentrated ownership in areas that have suffered more severe historical traumatic shocks.

Hypothesis 1: Higher exposure to traumatic shocks in history will be associated with higher ownership concentration in modern firms.

In addition, we formally hypothesize about the historically-persistent mechanisms that we argued link traumatic shocks with modern firm ownership. We expect weak institutions and low social capital to each partially explain the relationship between the historical traumatic shocks and modern ownership concentration. More specifically, we expect that the effect of the traumatic shock in weakening these two mechanisms will predict increased ownership concentration, or that the traumatic shock will increase ownership concentration partly through inhibited institutions and low social capital.

Hypothesis 2: The positive relationship between traumatic shocks in history and modern ownership concentration is partly explained by inhibited institutional development and low social capital.

THE LEGACY OF THE AFRICAN SLAVE TRADE

The impact of the slave trade on institutions and social capital

Our empirical analysis focuses on the African slave trade—a devastating traumatic shock to hundreds of kingdoms, confederacies, and distinct ethnic groups. Between the fifteenth and the eighteenth century, twelve to eighteen million Africans were taken into slavery—reducing the continent's population by as much as 50 percent by 1850 (Lovejoy, 2000). There were four major slave trades: Indian Ocean, Red Sea, trans-Saharan, and trans-Atlantic. Most slaves in early periods were prisoners of war or victims of large-scale raids, but later slaves were often sold by friends, family, and co-ethnics to traders. Koelle (1854) documented that 40 percent of a 19th century group of former slaves were kidnapped, 25 percent captured in war, and 20 percent sold by relatives and friends. Betrayals were motivated by payment or rewards (d'Almada, 1984) or in anticipation of betrayal by rivals, generating a culture of distrust within families and groups (Piot, 1996). This culture of mistrust also corrupted institutions, where rivals were condemned to slavery for witchcraft and adultery.

The slave trade had widespread impact on Africa, but its effect on specific ethnic groups varied widely. Nunn (2008) used Murdock's (1967) map of the historical homelands of 970 ethnic groups to link heterogeneous ethnicity-level slave export levels to modern country borders. Although differences across ethnic groups had many reasons, Nunn and others argue that geographic access was crucial in determining slave export levels. Africa is the only location where terrain ruggedness positively correlates with modern GDP (Nunn & Puga, 2012). Peoples in the low-lying fertile areas near demand for the slave trade were most likely to be taken (Nunn, 2008).

The heterogeneous effects on ethnic groups are evident in the psychology and economics of modern Africa. Nunn (2008) demonstrates lower economic growth in the countries with the historical homelands of decimated ethnic groups. His evidence suggests that growth was limited

through inhibited institutional development and reduced social capital resulting from the slave trade. The social capital reduction had two components validated by researchers. First the slave trade generated ethnic fractionalization that inhibited networks and social institutions (Whatley & Gillizeau, 2011; Green, 2013). Second, the slave trade inhibited both inter- and intra-ethnic trust among ethnic groups with higher historical slave trade losses (Nunn and Wantchekon, 2011).

These papers collectively suggest that institutions and social capital are likely historically persistent mechanisms through which the traumatic shock of the slave trade might shape modern firms.

Why should the slave trade influence modern ownership structure?

Pierce and Snyder (2018) provide the first evidence that the slave trade shaped modern markets by restricting financial contracting *between* firms. More specifically, they show that firms cannot access credit or banking services. If these constraints reflect broader contracting problems due to weak institutions and low social capital, they also likely affect organizational structure *within* firms. Pierce and Snyder (2018) find preliminary evidence that in response to limited formal and trade credit, firms in such countries might adopt the business group structure used in developing countries for capital investment (Khanna & Rivkin, 2001; Khanna & Yafeh, 2007; Siegel & Choudhury, 2012).

DATA AND EMPIRICAL APPROACH

Data

We use two primary datasets for our analysis. The first dataset is at the country-level and details the African slave trade between A.D. 1400 and 1900. For these data, Nunn (2008) estimated the total number of slaves captured from each African country in the four major slave routes (Indian Ocean, trans-Saharan, transatlantic, and Red Sea), combining historical slave ethnicity data with

shipping data from African ports and regions. The ethnicity data is based on the records of 80,656 slaves of 229 ethnic designations from 54 separate samples.[9] Nunn matched ethnicity-level data to traditional homelands mapped by Murdock (1967), then aggregated the data to produce slave export data for 52 modern countries. We use this national aggregation for several reasons. Most importantly, the institutions crucial to our theoretical predictions are primarily defined (and measured) at the national level. Second, the vast majority of firms in our dataset are clustered in a few major metropolitan areas with heterogeneous ethnicities, with approximately two-thirds of our observations coming from the 50 most populous regions (out of 181 total regions). Finally, even though most of the modern countries emerged long after the slave trade ended, the historical ethnic homelands in Murdock (1967) still strongly correlate with modern Afrobarometer survey respondents' ethnicities (Michalopoulos & Papaioannou, 2013). These data have been used in multiple papers on the long-term effects of the African slave trade (Michalopoulos & Papaioannou, 2019).

The second dataset is business establishment-level data from the World Bank Enterprise Survey (WES) from 2006-2016, which includes responses from 127,000 firms in 139 countries. The surveys ask managers and owners for opinions and information on firm characteristics, business practices, productivity, and business obstacles. The WES covers 41 African countries where historical slave export data is available, providing rich self-response data on approximately 30,000 firms. Most of the missing countries are in North Africa, where slave exports were relatively low. North Africa is both ethnically, religiously, and culturally very different from sub-Saharan Africa, and historically was far more likely to import slaves than to source them locally, so their exclusion is consistent with studying slave extraction where extraction was targeted.

[9] See Nunn (2008) for details on the development of this database.

We combine these country- and establishment-level datasets and add country-level data for institutions and social capital as well as important control variables that might also correlate with both the slave trade and ownership structure. The combined dataset is a larger extension of one previously used by the authors to study access to finance among African firms (Pierce & Snyder, 2018). The same slave trade data is used in that finance paper and also in economics papers by other authors cited here and reviewed in Michalopoulos and Papaioannou (2019). The control variables used were also used in Pierce and Snyder (2018) and Nunn (2008) because they are standard controls in cross-national studies of Africa and are crucial to addressing alternative explanations. The dependent variables in the present manuscript are unique to this paper. Table 1 provides descriptive statistics for country- and firm-level variables (see Appendix Table A1 for correlations). Figure 3 provides a map with country-level slave extraction as well as one of our key measures of ownership concentration—sole ownership.

--------- INSERT TABLE 1 HERE ----------

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Dependent variables: We use two firm-level dichotomous dependent variables drawn directly from ownership questions in the WES. The first indicates that the firm is a sole proprietorship (57% of sample). The second indicates that the firm has a majority owner. Since this includes sole proprietorships, it represents 85% of our sample. These high concentration levels are representative of firms in developing countries.

We acknowledge that there are many different types of ownership concentration that are untestable here because they are not measured in the WES data, including institutional ownership (Hoskisson et al., 2002), family ownership (Chua et al., 2012; Miller, Le Breton-Miller, & Lester, 2011), and intercorporate networks (Gedajlovic & Shapiro, 2002). Even within each of these

concentrated ownership structures, substantial differences exist (Cannella, Jones, & Withers, 2015). Although it would be ideal to parse out differential implications for these structures, such an exercise will necessarily await the availability of more detailed cross-national ownership data in Africa. Given that 85% of our sample has a majority owner, we are truly testing extreme concentration versus a mix of both diffuse and still moderately concentrated firms. In our African setting, this comparison makes sense because even mildly diversifying ownership to the point of no majority ownership (such as many of the family firms in Cannella *et al.* (2015)) in many of our sample countries is unusual.

Explanatory variable: Our key independent variable is country-level slave exports, which we measure using the logged number of slaves divided by geographic area in square kilometers. There is wide variation in this measure based on some countries with few recorded enslavements (Rwanda or Botswana) and others with millions (Angola or Ghana).

Historically-persistent mechanisms: We use both historical and modern country-level measures of our hypothesized mechanisms of institutional strength and social capital. Although modern measures are likely to be less noisy than historical ones, they are also further in time from the slave trade. We operationalize social capital at the country-level using ethnic fractionalization data similar to Alesina et al. (2003). Although ethnic fractionalization is not the only or necessarily best measure of social capital in the literature (Woolcock, 2001), it is available as cross-national data in Africa and is linked to both the slave trade (Nunn, 2008; Whatley & Gillezeau, 2011) and African development (Michalopoulos & Papaioannou, 2016). Our historical fractionalization data is from the Historical Index of Ethnic Fractionalization Dataset on the Harvard Dataverse (Drazanova, 2019), which lists country-level data as far back as 1945. We use the first year for

which a given country has data, which ranges from 1945 to 1970. Our modern fractionalization measure uses the most recent measure from the same dataset (2013).

Our historical measure of institutional strength is a country-level measure of historical government centralization derived by Gennaioli and Rainer (2007) from Murdock's (1967) measures of ethnicity-level government hierarchy before colonialism but after the slave trade. Murdock's original measure, which ranges from 0 to 4, indicated the number of tiers above the village level for each ethnicity, with high values indicating a multi-level institutional hierarchy such as a confederacy and low levels independent villages and petty chiefdoms.[10] Gennaioli and Rainer (2007) dichotomized and aggregated this measure to the country-level using each country's modern ethnic composition. As Gennaioli and Rainer (2007) argue, these precolonial institutional measures are uncorrupted by colonialism in the late 19th and 20th centuries, thus providing a cleaner link to the slave trade than modern institutional measures. Furthermore, Michalopoulos & Papaioannou (2013) link this measure to modern African economic development. To measure modern institutions, we use Transparency International's 2015 Corruption Perceptions Index, which reverse-scores countries on perceived levels of public sector corruption from experts and businesspeople. Corruption is an important measure of institutional strength with strong roots in the precolonial slave trade (Michalopoulos & Papaioannou, 2019).

Country-level controls: The remaining country-level variables represent standard controls for cross-country research in Africa (Besley & Reynal-Querol, 2014; Nunn, 2008) that likely also influence economic outcomes, including colonialism (Michalopoulos & Papaioannou, 2016), environmental and geographic characteristics (Alsan, 2015), religion (Nunn, 2010), and natural resources (Herbst, 2000). Demonstrating the robustness of our models to these controls is crucial

[10] See Michalopoulos and Papaioannou (2013) for a detailed map of this measure.

because of the many factors that influenced economic development (and possibly ownership structure). We include dummies for each European colonizer. Environmental and geographic characteristics include monthly rainfall, longitude, distance from equator, humidity, minimum temperature, coastline length (logged), and an island dummy. Controls for natural resource wealth include per capita oil, diamonds, and gold. Also included are institutional and cultural factors that include adherence to Islam and dummies for historical communism and French legal origins.

Firm-level controls: We include dummies indicating three WES size categories based on employment: small (20 or less), medium (21 to 99), and large (100 or more). We also control for 28 industry sectors.

EMPIRICAL ANALYSIS

The total effect of slave extraction on concentrated ownership

We test Hypothesis 1 by examining whether firms in high slave-export countries are more likely to be sole proprietorships. Our linear probability models (LPM) regress sole proprietorship on the logged number of exported slaves (adjusted by geographic area) and control variables at the firm- and country level. Our primary models use firm-level data, which allows us to account for sector-specific differences in ownership that cannot be averaged at the country level because of limited degrees of freedom. Standard errors are clustered by country. The baseline specification is:

$$(1)\ y_{ik} = \beta_0 + \beta_1 \ln(\text{slave exports}_k/area_k) + \boldsymbol{C}_k'\delta + \boldsymbol{X}_k'\gamma + \boldsymbol{Z}_i'\lambda + \varepsilon_{ik},$$

where y_{ik} is an indicator that respondent i in country k is a sole proprietorship and $\ln(\text{slave exports}_k/area_k)$ is the natural log of the number of slaves exported from country k adjusted by geographic area. $\mathbf{C}_k$ is a vector of variables indicating the European colonizer before independence; $\mathbf{X}_k$ is a vector of climatic, cultural, and geographic variables; and $\mathbf{Z}_i$ is a vector of three firm size and 28 industry sector indicators.

Although dichotomous dependent variables such as ours frequently indicate the use of logistic regression, we use LPM for several important reasons. First, our interaction models are far easier to interpret as LPM than logit (Zelner, 2011). Second, our instrumental variable models cannot be estimated using logit, and instead would require an alternative probit model if not using a linear model. Since the instruments provide an important robustness test for endogenous slave trade severity, we believe it is better to consistently present OLS estimates for comparison.

Most importantly, however, there is no indication that LPM either a)produces different results than logit, or b)gives more biased or inconsistent estimates. LPM produces coefficients that are nearly identical to the marginal effects from either logit or probit models (see Appendix Table A3), and the principal concern that predicted values lie outside the [0,1] interval is not indicated in our data. Over 99.4% of predicted values from our LPM are between zero and one, and correlate at over 0.99 with those from logit and probit models (see Appendix Table A4). Horrace and Oaxaca (2006) demonstrate that LPM converges to consistency and unbiasedness as the percentage of predicted values in the [0,1] interval approaches 100%. For comparison, we provide all models as logits (or probit for IV models) in the appendix.

Figure 4 presents the raw data representing our model, showing that sole proprietorship in a country is positively correlated with slave exports (see Appendix Figure A1 for majority ownership). We present regression results in Table 2A, with standard errors in parentheses and p-values in brackets. Column (1) presents estimates without controls, while columns (2)-(4) cumulatively add controls. Column (5) implements a multi-level model (HLM) with country-level random effects and firm-level and year controls. Column (6) alternatively presents marginal effects from logistic regression (see Appendix for other logit models). All models indicate a substantial positive relationship between slave exports and sole proprietorship that supports Hypothesis 1. We

note our model's robustness to many controls known to influence development in Africa. This consistency raises confidence that omitted variables explain the main effect of the slave trade.

The base model suggests that 67 percent of firms in countries with above-median slave exports would have sole proprietorship, while the below-median would have 46 percent. Furthermore, it implies that the difference in the percentage of sole proprietorships between the lowest and the highest slave trade countries is 43 percentage points.

--------- INSERT FIGURE 4 HERE ----------

--------- INSERT TABLES 2A AND 2B HERE ----------

Column (7) implements a country-level instrumental variable model to address concerns of endogeneity in the location choices of slave traders. Our identification does not require pre-existing social capital and institutions to be equal or random across all areas, but instead that the slave trade not be *negatively* correlated with their pre-existing strength. The primary concern would be if slave traders targeted people living in areas with pre-existing low social capital or weak institutions, which in turn might correlate with modern ownership structure, which could explain our results with selection rather than the effect of the shock. Nunn (2008) refutes this argument with evidence of higher slave trade in wealthier and less geographically rugged societies. For robustness, we use Nunn's (2008) IV model with the distance from each country to the four slave trades' demand market locations: plantations in North America and the Caribbean, mining in South America, Middle Eastern salt mines, and Red Sea pearl diving. The intuition is that exogenous distant natural resources drove demand for slaves, and that the distance of these demand markets from slave sources mattered because of high mortality rates in transit.

We use all four instruments in our IV model. Our weak instruments, with 41 observations (F-stat is 4.52), requires Moreira's (2003) conditional likelihood confidence interval correction

(Andrews, Moreira, & Stock, 2006). The IV model in column (7) is consistent with OLS and logit models, showing slave extraction to have a positive relationship with sole proprietorship. Our IV model does not definitively establish a causal effect from the slave trade to modern ownership concentration, but it raises confidence that our models are not explained by the endogenous historical choice of extraction by slave traders.

Table 2B alternatively uses majority ownership as the dependent variable. Consistent with sole proprietorship, high slave export countries have higher rates of majority ownership in all models. The baseline models suggest that 89 percent of firms in above-median slave extraction countries have a majority owner, with substantially fewer (80 percent) in the below-median extraction countries. The results are also robust to our IV model. Collectively, Tables 2A and 2B support Hypothesis 1.

As an alternative measure of ownership concentration, we use self-reported corporate ownership structure that in Africa likely reflects more diffuse ownership. These results (Appendix Table A5) are consistent with Hypothesis 1, with firms in high slave trade countries significantly less likely to have a corporate structure. Similarly, Appendix Table A6 shows two other measures, business group membership and percent foreign-owned, that indicate higher ownership concentration. This table also links high slave exports with fewer employees, which indicates growth constraints.

Manufacturing sector particularly restricted

We next examine ownership structure in a sector where investment capital is crucial for growth and productivity—manufacturing. Capital investment requirements have grown substantially in manufacturing as technological advances raised the capital equipment to production labor ratio (Berman, Bound, & Griliches, 1994). We repeat our linear probability model in equation (1), but

interact slave exports with the dummy for manufacturing sector. Consequently, the coefficient on slave exports can be interpreted as the relationship between ownership structure and the slave trade in all other sectors, while the interaction is any additional effect in the manufacturing sector.

We present model results in Tables 3A and 3B for both sole proprietorship and majority ownership, respectively. Column (1) presents the model without interactions, and confirms that manufacturing firms are less likely to be solely or majority owned on average. Columns (2)-(6) indicate a much smaller gap between manufacturing and other firms in high slave export countries. In the above-median slave export countries, manufacturing firms are one percentage point more likely to be solely owned, while in below-median slave export countries manufacturing firms are 13 percentage points *less* likely to be solely owned. Given the credit restrictions in high slave export countries, this suggests substantial capital restriction that might limit the investments necessary to reach efficient scale or to adopt modern technology.

--------- INSERT TABLES 3A AND 3B HERE ----------

Evidence on historically persistent mechanisms

We next test for the historically persistent mechanisms of institutions and social capital predicted in Hypothesis 2 using two-stage-least squares (2SLS) models. 2SLS models have strong statistical power advantages over alternatives in small samples. Although we have nearly 30,000 firm observations, our independent variable and measures of institutions and social capital are country-level variables, effectively giving us 35-41 observations. 2SLS represents a rough approach that solely identifies if the relationship between the explanatory and mediating variables is associated with the outcome variables. It asks whether the component of a given mechanism that is predicted by the slave trade is correlated with sole proprietorship. In our case the 2SLS model clearly violates the exclusion restriction. Social capital and institutions cannot be the only paths

through which the slave trade has shaped ownership across time, given its many known effects (Michalopolous and Papaioannou, 2019). Given that we know that high slave exports are positively correlated with sole proprietorships, we seek evidence that weak institutions and low social capital are plausible channels.

Ideally, we would use a more ambitious structural equation modeling (SEM) approach to identify mediation levels for both institutions and social capital. SEM could in theory decompose effects (if they were in fact causal) of slave exports on ownership into two components: a direct effect and an indirect mediated by the mechanism. Unfortunately, mediation analysis is both inappropriate and impractical for testing our mechanisms for multiple reasons. First, SEM is severely underpowered and discouraged in small samples (Bentler & Chou, 1987; Lomax & Schumacker, 2004; Hayes, 2013) such as the 35-40 countries for which we have mechanism measures (Fritz & MacKinnon, 2007; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

In addition, our data violate multiple assumptions that are necessary for interpretations of mediation in SEM models.[11] First, such a model would have potential reverse causal feedback loops between firm structure and institutions, and between institutions and social capital over time. Second, the substantial measurement error in our mediators biases indirect effect estimates downward. Third, our model has numerous omitted variables as that bias estimates through correlation with both the slave trade and ownership structure. Given our low power and the certain violation of key model assumptions, any estimates from SEM mediation analysis are almost certainly meaningless.[12]

[11] See http://davidakenny.net/cm/mediate.htm, Shaver (2005), or MacKinnon (2012) for detailed descriptions of the problems with these assumption violations.

[12] We present single and multiple mediation models in the Appendix as Figures A2, A3c, A4c, A5c, A6a, and A6b, as well as in Table A11. These tables are meant only to demonstrate consistent total effect and path effect estimates. Indirect effects are both severely biased and underpowered, rendering them effectively meaningless. Figures A7a-A7f present non-linear GSEM models.

For our 2SLS models, we introduce each mechanism measure in a separate regression, where slave extraction is used to predict the relationship between modern ownership concentration and each mechanism. To support Hypothesis 2, the first stage should show a relationship between the slave trade and the mechanism, while the second stage should demonstrate a relationship between the variation in that mechanism explained by the slave trade and ownership concentration. We use both historical and modern measures of social capital and institutional strength. Our mechanisms are heavily correlated and are acknowledged to influence one another across history, so a clear causal path is impossible to identify, and we can at best offer suggestive evidence that institutions and social capital are plausible mechanisms.

Historical Mechanisms: Tables 4A and 4B present our evidence for both sole proprietorship and majority ownership using our historical measures: precolonial institutions (institutions) and pre-1970 ethnic fractionalization (social capital). Column (1) of Table 4A presents the 2SLS estimate for institutions, showing that the variation in precolonial institutions explained by the slave trade strongly predicts sole proprietorship. Slave extraction is negatively associated with precolonial institutions in the first stage, which we represent with raw data in Figure 5A. Figure 5B represents the second stage of the 2SLS estimation represented in column (1). Column (2) repeats the results in Table 2A by showing the positive total effect of slave exports on sole proprietorship for the 38 countries with precolonial institution measures, while column (3) shows that precolonial institutions are negatively related with sole proprietorship in a simple regression. Columns (4)-(6) present the same models for historical ethnic fractionalization. 2SLS models in column (4) support that the relationship between the slave trade and social capital explains some of the variation in ownership structure, as do the regressions in columns (5) and (6).

Models predicting majority ownership in Table 4B are similar, although the relationship between precolonial institutions and majority ownership is imprecise. Collectively, these results are consistent with Hypothesis 2, but the evidence should be viewed as merely supportive of institutions and social capital as partial historical channels for the relationship between the slave trade and ownership structure. Stronger evidence is not feasible given our setting and data.

--------- INSERT TABLES 4A AND 4B HERE ----------

--------- INSERT FIGURES 5A AND 5B HERE ----------

Modern Mechanisms: We repeat our 2SLS using our modern measures of the corruption perception index and 2013 ethnic fractionalization. The results, presented in Tables 5A and 5B are similarly supportive of institutions and social capital as mechanisms linking the slave trade to modern ownership concentration. The first stages (Appendix Figures A4a and A5a) show strong relationships with the slave trade, while the second stage estimates in columns (1) and (4) and Appendix Figures A4b and A5b link this relationship to ownership concentration. Collectively, our results are consistent with Hypothesis 2.

--------- INSERT TABLES 5A AND 5B HERE ----------

DISCUSSION AND CONCLUSION

We extend prior management theory by introducing historical traumatic shocks as drivers of the relationship between ownership structure and both institutions and social capital. The extended model therefore recasts institutions and social capital as historically persistent mechanisms through which historical shocks can shape modern firms. We do not claim this extension to be new theory, or a major reshaping of the role of institutions and culture in the business environment. Rather, we present our extended model as a modest but important recognition that identifying the historical

origins of institutions and culture can help establish *causal* evidence for a well-known association with ownership structure in the existing literature.

Our empirical setting of the African slave trade strongly supports our first hypothesis that traumatic shocks increase ownership concentration, and finds modest support for our second hypothesis that weakened institutions and social capital partly explain this relationship. Importantly, our evidence is consistent with broad contracting problems in slave trade countries that also limit credit access, and has major implications for the ability of firms to access important resources or equity-based capital for investment and growth. Although we recognize that many firms might find concentrated ownership optimal or simply preferred even under conditions of strong institutions and social capital, the severe restrictions in our settings (with 85% majority ownership) almost certainly represent many firms giving up resource- and capital-based benefits from diffuse ownership.

We note that the many long-term problems associated with the slave trade compound with the costs of concentrated ownership. Equity markets are an important alternative to corporate debt in markets where credit is scarce. Given the results in Pierce and Snyder (2018) and Levine *et al.* (2018) that show constrained access to credit, our results present a grim picture for access to capital. Indeed, we observe manufacturing firms, who are particularly reliant on capital to achieve production efficiency and scale, comparatively more concentrated in high slave-trade countries.

We caution that, like most papers studying shocks from centuries past, we cannot strongly establish the *causal* link between the slave trade and ownership concentration. Still, the robustness of our slave trade evidence to extensive controls and instrumental variables reduces concerns of omitted variable bias and endogenous slave trade intensity. It is impossible to definitively isolate the mechanisms through which the slave trade continued to influence ownership across centuries.

The complexity of history as well as the limitations of cross-national studies are certainly reflected in our inability to implement SEM models that might measure indirect effects. Achieving precise mediation results is inevitably underpowered in studies where both explanatory and mediating variables are at the national level and where standard errors are correctly calculated as clustered. In addition, the assumptions of such models are almost certainly violated in cross-national analysis. Although our 2SLS estimates are precise, the models are suggestive but not strong evidence of our theorized mechanisms. The history of African development is complex, with numerous significant shocks and many historically-persistent mechanisms (Michalopoulos & Papaioannou, 2019).

Consequently, this paper necessarily relies on prior evidence from both history and social science that corroborates the link between our two mechanisms and both the slave trade and contracting problems. As social scientists, we are apt to theorize and estimate single predictors of outcomes that are ultimately determined by complex historical processes. We acknowledge that we are unable to incorporate that complexity here, and instead rely on the lifetime work of the historians and anthropologists such as those referenced in this paper. We hope that our paper can offer a "complementary account of the same phenomenon" (Rowlinson, Hassard, & Decker, 2014, p. 254) and contribute to a growing understanding of the wide-reaching effects of the slave trade. The many historical effects of the slave trade are all likely to influence one another over time, making their historical paths intermingled and impossible to separate.

Given that our paper identifies the impact of a traumatic shock from centuries in the past, it is natural to ask how this example generalizes to recent and emerging events and firms. Traumatic shocks such as climate change (Tumen, 2016), conflict (Blumenstock et al., 2019), natural disaster (Dutta, 2017), and epidemic disease (Rao & Greve, 2017) continue to emerge in modern society and are all likely to reshape institutions and social capital as well as the ownership

structure of future firms. Climate change and conflict, in particular, are likely to disrupt social and ethnic networks through migration. Pandemic disease, which has largely remained in check over the past century, continues to present potential for society-altering catastrophe (Carroll et al., 2018), as do nuclear events and natural disasters whose likelihood humans naturally underestimate due to availability bias (Tversky & Kahneman, 1973).

Finally, our paper highlights important efforts to increase research on the role of firms in African development. As our study shows, African managers and business owners face obstacles to growth in equity markets, with many other obstacles to business identified in the WES survey. Despite the enormity of these problems and the high returns to solving them, management and strategy scholars have typically ignored Africa, with most exceptions published in the last few years. Of these recent papers, only a few exploit data across a broad range of African countries. As Zoogah and colleagues (2015) note, we need more papers studying African firms. Clearly, there is much more to be done, and history can play an important role in this endeavor. As Austin *et al.* (2017) argue, emerging markets such as Africa have unique business histories that are not simply variants of the history of more commonly studied developed economies. Yet the substantial evidence across continents linking traumatic shocks to institutions and culture (Kluppel et al., 2018), as well as emerging work linking them with firm characteristics (e.g., Cookson, 2010) suggests that our model and results apply beyond Africa.

In our view, the principal constraint for expanding this research is accurate firm-level data. To the best of our knowledge, the WES is the only accessible dataset with wide coverage of African firms, and it lacks detailed questions on ethnicity, trust, and networks that would facilitate future research. The Global Database on Events, Location and Tone (GDELT), based on millions of media reports across the globe, provides a promising new opportunity for studying African firms

(Odziemkowska & Henisz, 2019; Henisz & Mansfield, 2017). We are hopeful that future private or public efforts such as this will gather detailed cross-national data, and believe developing such data will be the primary driver of building our knowledge of doing business in Africa.

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Figure 1: Existing Models of Institutions, Social Capital, and Modern Ownership

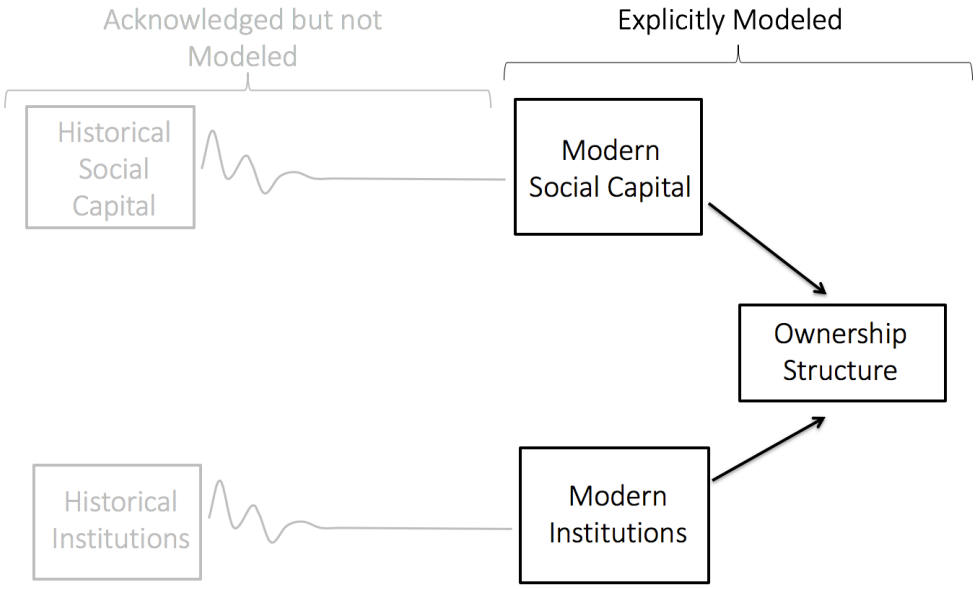


Figure 2: Extended Model of Traumatic Shocks and Modern Ownership

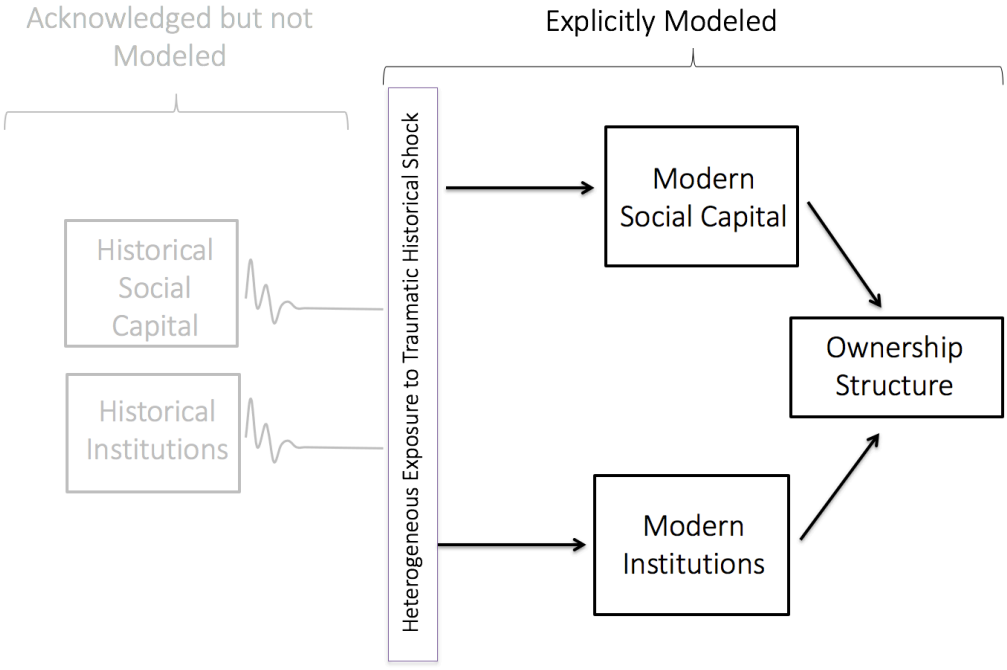
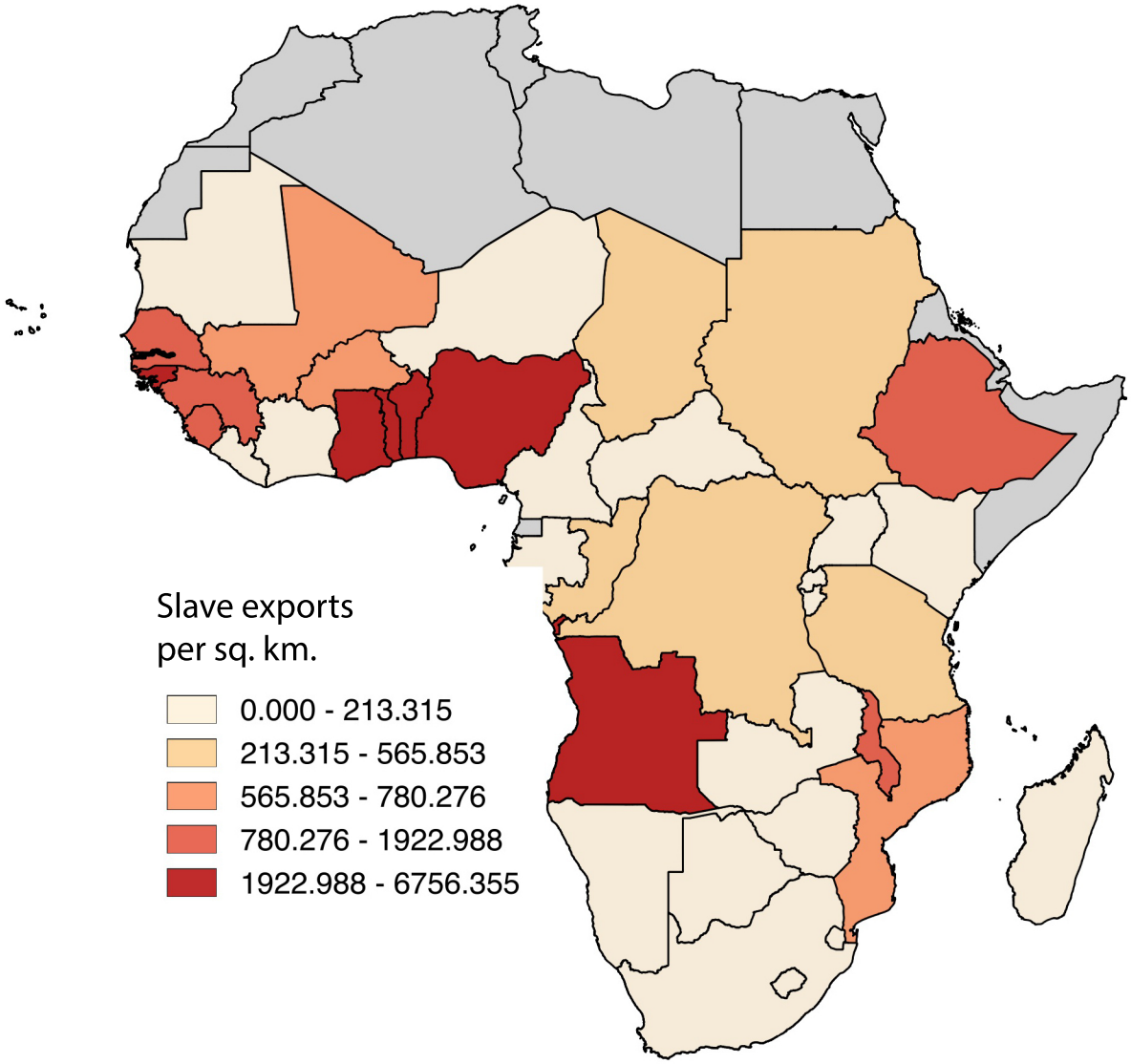
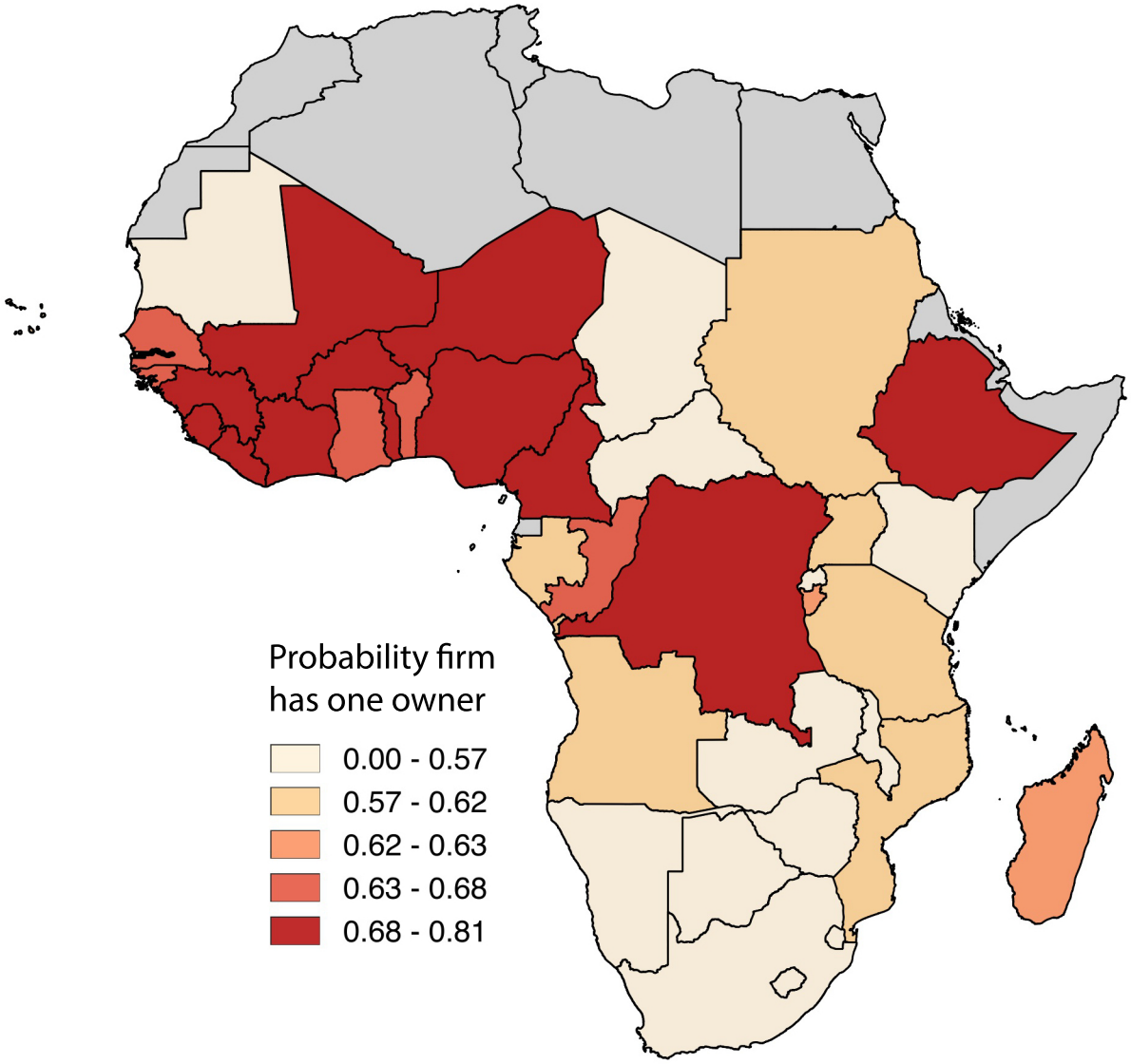


Figure 3a
Slave exports across Africa



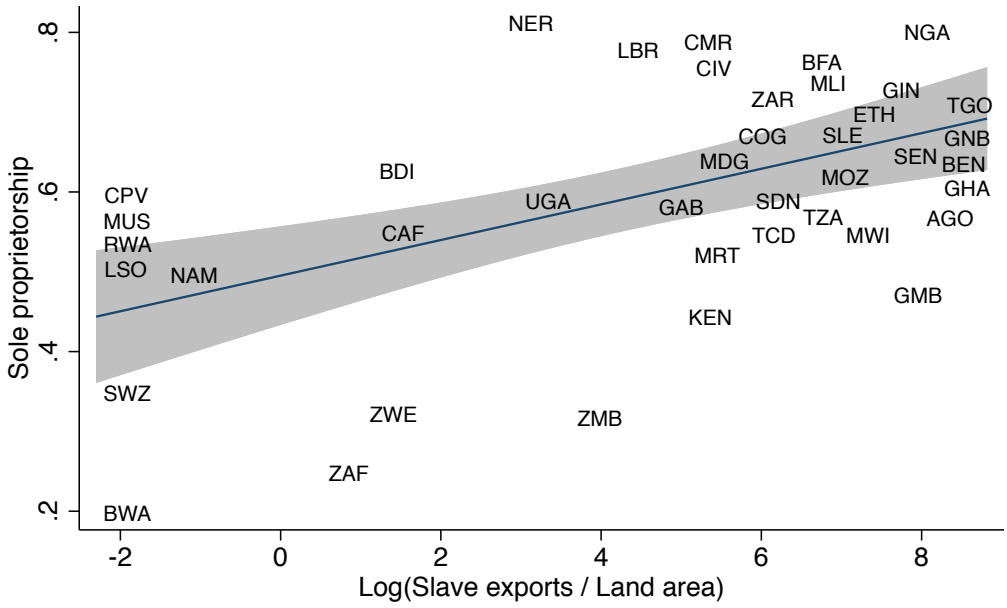
Data comes from Nunn (2008).

Figure 3b
Sole ownership of firms across Africa



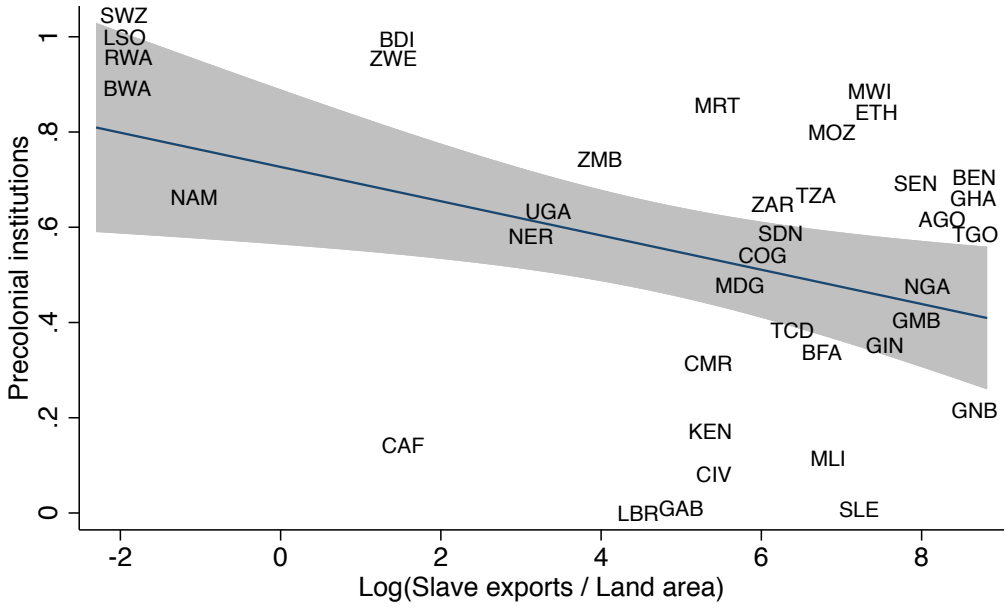
Data comes from the World Enterprise Survey data.

Figure 4
Sole ownership and slave exports



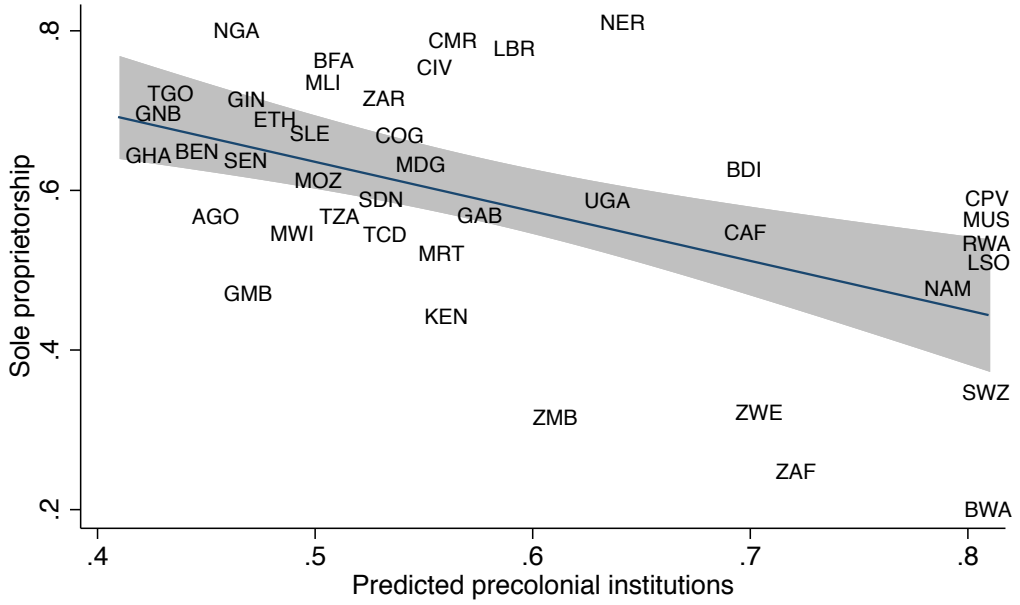
Data comes from Nunn (2008) and the World Enterprise Survey data. Small changes to the positions of the countries were made to prevent the overlapping of the country labels.

Figure 5a
Precolonial institutions and slave exports



Data comes from Nunn (2008) and Gennaioli and Rainer (2007). Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors.

Figure 5b
Sole owner and predicted values for precolonial institutions
(from regression in Figure 5a)



Data comes from Nunn (2008), Gennaioli and Rainer (2007), and the World Enterprise Survey data. Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors.

Table 1
Summary statistics

	Obs	Mean	SD	Min	Max
Country-Level Variables					
Log(Slave exports / Land area)	41	4.26	3.62	-2.30	8.82
Precolonial institutions	38	0.56	0.31	0.00	1.00
Ethnic fractionalization (Pre-1970)	35	0.67	0.24	0.00	0.89
Ethnic fractionalization (2013)	39	0.68	0.19	0.19	0.89
Corruption perceptions index	40	33.00	11.73	12.00	63.00
British colony	41	0.39	0.49	0.00	1.00
French colony	41	0.37	0.49	0.00	1.00
Netherlands colony	41	0.07	0.26	0.00	1.00
Portuguese colony	41	0.10	0.30	0.00	1.00
Log(Coastline / Land area)	41	-0.97	3.05	-4.61	5.48
Log(Population 1400)	41	-1.20	2.05	-8.59	1.74
Absolute latitude	41	12.33	7.89	0.20	30.00
Longitude	41	14.88	19.92	-24.04	57.79
Min of monthly average rainfall (mm)	41	7.68	11.46	0.00	46.00
Max of monthly afternoon avg humidity	41	71.41	11.72	35.00	95.00
Min of avg monthly low temp (C)	41	8.63	7.22	-9.00	19.00
Log(Land area in millions of sq. kms)	41	-1.43	1.74	-6.29	0.92
Indicator variable for small islands	41	0.05	0.22	0.00	1.00
Percent Islamic	41	25.88	31.67	0.00	99.00
Former communist country	41	0.10	0.30	0.00	1.00
Legal origin indicator: French	41	0.59	0.50	0.00	1.00
Log(Diamond production per capita)	41	-5.11	2.57	-6.91	2.19
Log(Oil production per capita)	41	-7.30	3.52	-9.21	2.65
Log(Gold production per capita)	41	-5.99	5.34	-13.82	3.08
Minimum Atlantic distance (000s of kms)	41	6.84	2.95	3.65	15.25
Minimum Indian distance (000s of kms)	41	6.56	3.61	0.03	11.91
Minimum Saharan distance (000s of kms)	41	3.83	1.38	1.77	6.64
Minimum Red Sea distance (000s of kms)	41	3.69	1.39	0.51	6.47
Firm-Level Variables					
Sole proprietorship	30,004	0.57	0.50	0.00	1.00
Small size firm	30,965	0.62	0.49	0.00	1.00
Medium sized firm	30,965	0.27	0.45	0.00	1.00
Large sized firm	30,965	0.11	0.31	0.00	1.00
Majority owner	29,754	0.85	0.36	0.00	1.00

Note: See paper and Nunn (2008) for detailed description of country-level variables and the sources for each variable.

Table 2A and 2B
Slave trade and ownership structure

Table 2A

	Dependent variable: Sole proprietorship						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Slave exports / Land area)	0.039***	0.032***	0.032***	0.016***	0.018***	0.013***	0.043***
	(0.008)	(0.006)	(0.007)	(0.005)	(0.006)	(0.005)	
	[0.00]	[0.00]	[0.00]	[0.01]	[0.01]	[0.01]	[.025 , .083]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No
Sector and firm size controls	No	Yes	Yes	Yes	Yes	Yes	No
Colonizer controls	No	No	Yes	Yes	No	Yes	No
Geography controls	No	No	No	Yes	No	Yes	No
Specification	OLS	OLS	OLS	OLS	RE	Logit	IV
Unit of Analysis	Firm	Firm	Firm	Firm	Firm	Firm	Country
Clusters	41	41	41	41	41	41	41
Observations	30,004	30,004	30,004	30,004	30,004	30,004	41

Table 2B

	Dependent variable: Majority owner						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Slave exports / Land area)	0.016***	0.013***	0.013***	0.013***	0.011***	0.010**	0.024***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.005)	
	[0.00]	[0.00]	[0.00]	[0.01]	[0.00]	[0.05]	[.014 , .051]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No
Sector and firm size controls	No	Yes	Yes	Yes	Yes	Yes	No
Colonizer controls	No	No	Yes	Yes	No	Yes	No
Geography controls	No	No	No	Yes	No	Yes	No
Specification	OLS	OLS	OLS	OLS	RE	Logit	IV
Unit of Analysis	Firm	Firm	Firm	Firm	Firm	Firm	Country
Clusters	41	41	41	41	41	41	41
Observations	29,754	29,754	29,754	29,754	29,754	29,754	41

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level, brackets contain p-values, except in column (7) where they contain confidence intervals. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators. Colonizer controls include British, French, Portuguese, and Belgium indicators. Geography controls include longitude, absolute latitude, lowest month rainfall, maximum humidity, coastline area, island indicator, diamond production per capita, gold production per capita, and oil production per capita. Instrumental variables regression (7) uses distance from slave ports as instruments.

Table 3A and 3B
Slave trade and ownership structure: Cross-industry differences

Table 3A

	Dependent variable: Sole proprietorship					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)	0.038***	0.029***	0.029***	0.013**	0.014**	0.033**
	(0.007)	(0.006)	(0.006)	(0.005)	(0.006)	(0.016)
	[0.00]	[0.00]	[0.00]	[0.02]	[0.03]	[0.05]
Manufacturing sector	-0.120***					
	(0.030)	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed
	[0.00]					
Slave exports * Manufacturing sector		0.024***	0.012**	0.009***	0.018***	0.007**
		(0.003)	(0.004)	(0.002)	(0.004)	(0.003)
		[0.00]	[0.01]	[0.00]	[0.00]	[0.02]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	No	No	Yes	Yes	Yes	Yes
Colonizer controls	No	No	No	Yes	No	No
Geography controls	No	No	No	Yes	No	No
Specification	OLS	OLS	OLS	OLS	RE	OLS
Country fixed effects	No	No	No	No	No	Yes
Clusters	41	41	41	41	41	41
Observations	30,004	30,004	30,004	30,004	30,004	30,004

Table 3B

	Dependent variable: Majority owner					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)	0.015***	0.012***	0.011***	0.011**	0.010***	0.032***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.008)
	[0.00]	[0.00]	[0.00]	[0.02]	[0.00]	[0.00]
Manufacturing sector	0.015***					
	(0.015)	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed
	[0.01]					
Slave exports * Manufacturing sector		0.008***	0.007**	0.006***	0.008***	0.005***
		(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
		[0.00]	[0.02]	[0.01]	[0.00]	[0.01]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	No	No	Yes	Yes	Yes	Yes
Colonizer controls	No	No	No	Yes	No	No
Geography controls	No	No	No	Yes	No	No
Specification	OLS	OLS	OLS	OLS	RE	OLS
Country fixed effects	No	No	No	No	No	Yes
Clusters	41	41	41	41	41	41
Observations	29,754	29,754	29,754	29,754	29,754	29,754

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level and brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators. Colonizer controls include British, French, Portuguese, and Belgium indicators. Geography controls include longitude, absolute latitude, lowest month rainfall, maximum humidity, coastline area, island indicator, diamond production per capita, gold production per capita, and oil production per capita.

Table 4A and 4B
Slave Trade: Historical Mechanisms

Table 4A

	Dependent variable: Sole proprietorship					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)		0.029***			0.035***	
		(0.006)			(0.007)	
		[0.00]			[0.00]	
Precolonial institutions	-1.202***		-0.208*			
	(0.438)		(0.116)			
	[0.01]		[0.08]			
Ethnic fractionalization (Pre-1970)				1.490***		0.237*
				(0.522)		(0.126)
				[0.00]		[0.07]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	2SLS	OLS	OLS	2SLS	OLS	OLS
Clusters	38	38	38	35	35	35
Observations	28,559	28,559	28,559	26,873	26,873	26,873

Table 4B

	Dependent variable: Majority owner					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)		0.015***			0.016***	
		(0.004)			(0.003)	
		[0.00]			[0.00]	
Precolonial institutions	-0.631***		-0.070			
	(0.226)		(0.084)			
	[0.01]		[0.41]			
Ethnic fractionalization (Pre-1970)				0.657***		0.143*
				(0.205)		(0.078)
				[0.00]		[0.08]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	2SLS	OLS	OLS	2SLS	OLS	OLS
Clusters	38	38	38	35	35	35
Observations	26,665	26,6652	26,665	26,665	26,665	26,665

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level and brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators. Column (2) excludes observations where the precolonial institutions variable is missing. Column (5) excludes observations where the ethnic fractionalization (pre-1970) variable is missing. Columns (1) and (4) use Log(Slave exports / Land area) as an instrument for the independent variable.

Table 5A and 5B
Slave Trade: Modern Mechanisms

Table 5A

	Dependent variable: Sole proprietorship					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)		0.031***			0.032***	
		(0.006)			(0.006)	
		[0.00]			[0.00]	
Ethnic fractionalization (2013)	2.152***		0.268**			
	(0.827)		(0.131)			
	[0.01]		[0.05]			
Corruption perceptions index				-0.019***		-0.005**
				(0.007)		(0.002)
				[0.01]		[0.03]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	2SLS	OLS	OLS	2SLS	OLS	OLS
Clusters	39	39	39	40	40	40
Observations	28,832	28,832	28,832	29,552	29,552	29,552

Table 5B

	Dependent variable: Majority owner					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)		0.013***			0.014***	
		(0.003)			(0.003)	
		[0.00]			[0.00]	
Ethnic fractionalization (2013)	0.915***		0.159*			
	(0.315)		(0.080)			
	[0.00]		[0.05]			
Corruption perceptions index				-0.008**		-0.001
				(0.003)		(0.001)
				[0.01]		[0.34]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	2SLS	OLS	OLS	2SLS	OLS	OLS
Clusters	39	39	39	40	40	40
Observations	28,590	28,590	28,590	29,333	29,333	29,333

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level and brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators. Column (2) excludes observations where the ethnic fractionalization (2013) variable is missing. Column (5) excludes observations where the corruption perceptions index variable is missing. Columns (1) and (4) use Log(Slave exports / Land area) as an instrument for the independent variable.

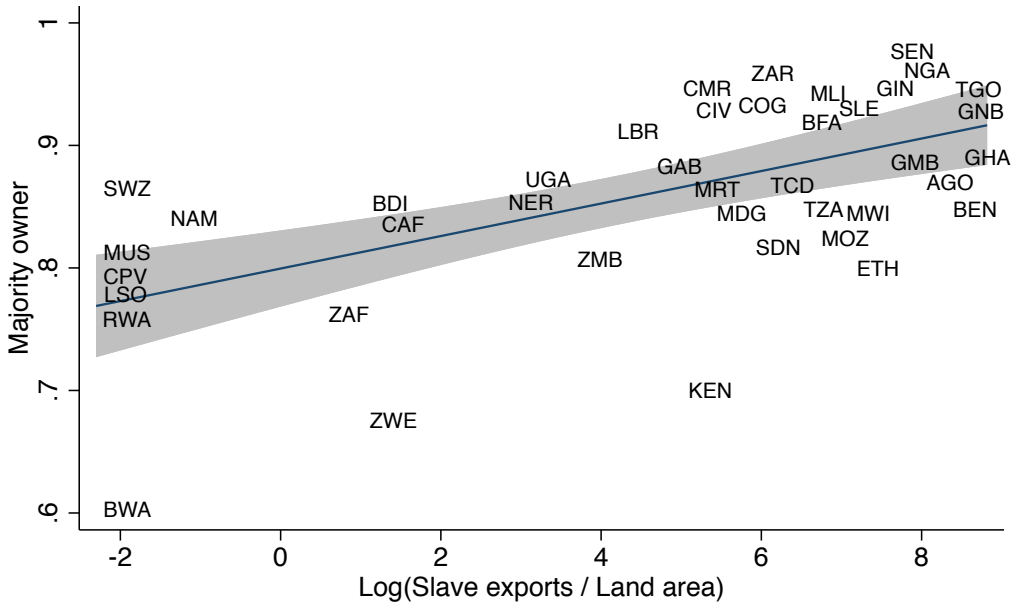
Online Appendix

Historical Origins of Firm Ownership Structure: The Persistent Effects of the African Slave Trade

Lamar Pierce
Olin Business School
Washington University in St. Louis

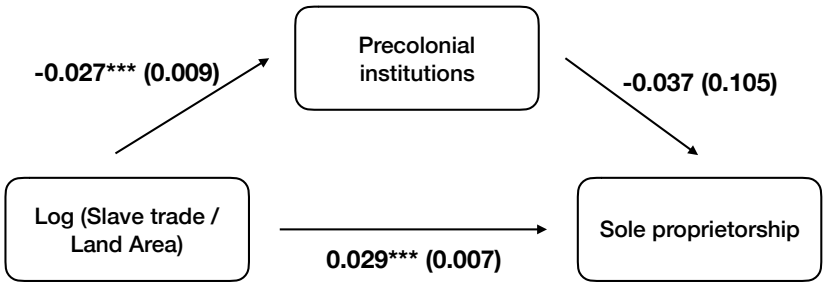
Jason A. Snyder
Eccles School of Business
University of Utah

Appendix Figure A1
Majority owner and slave exports



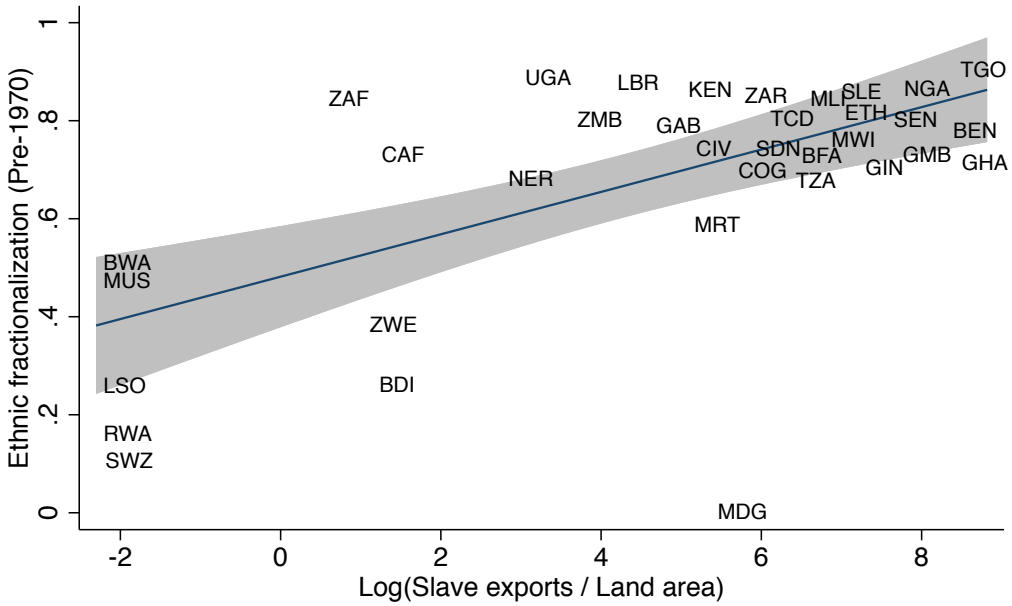
Data comes from Nunn (2008) and the World Enterprise Survey data. Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors.

Appendix Figure A2
Precolonial institutions and slave exports: SEM mediation analysis



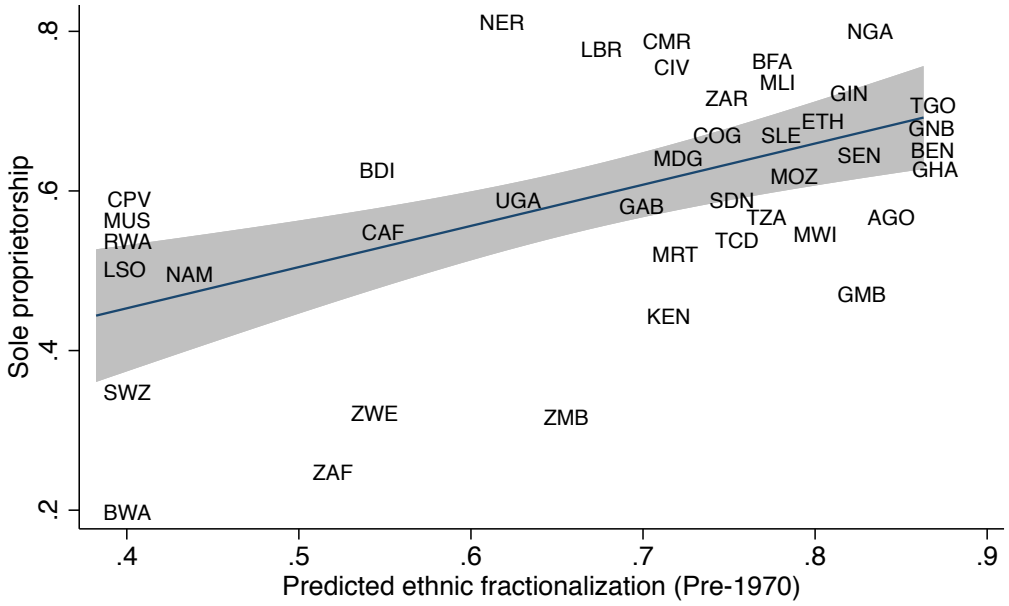
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008), Gennaioli and Rainer (2007), and the World Enterprise Survey. Results correspond to row (1) of appendix table 11.

Appendix Figure A3a
Ethnic fractionalization (pre-1970) and slave exports



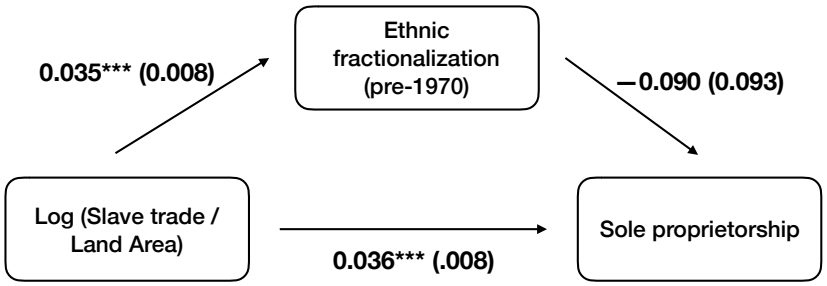
Data comes from Nunn (2008) and the Historical Index of Ethnic Fractionalization Dataset (2013). Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors.

Appendix Figure A3b
Sole owner and predicted values for ethnic fractionalization (pre-1970)
(from regression in Appendix Figure A3a)



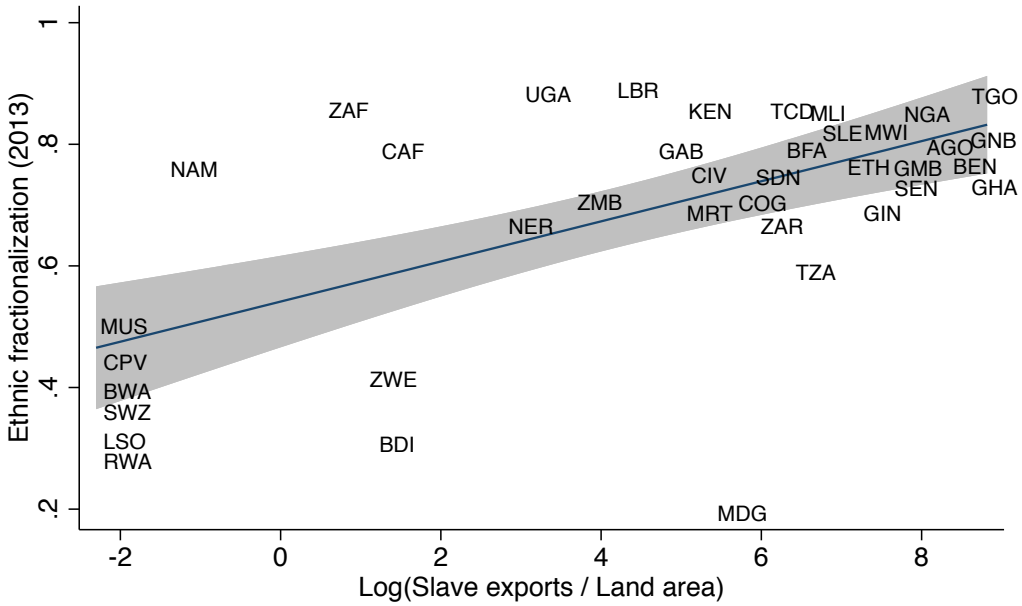
Data comes from Nunn (2008) and the Historical Index of Ethnic Fractionalization Dataset (2013), and the World Enterprise Survey. Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors.

Appendix Figure A3c
Ethnic fractionalization (pre-1970) and slave exports: SEM mediation analysis



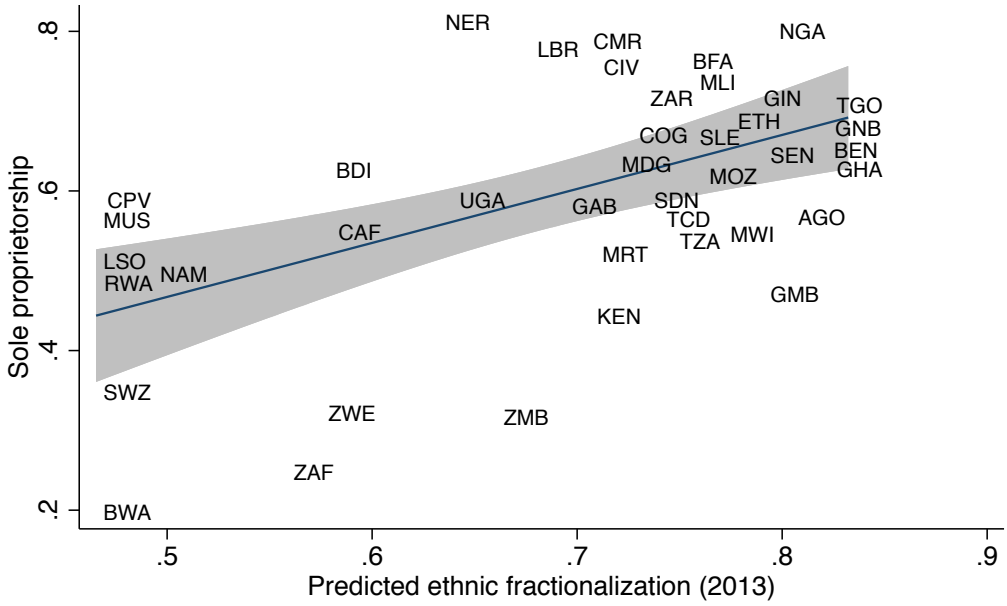
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008) and the Historical Index of Ethnic Fractionalization Dataset (2013), and the World Enterprise Survey. Regressions are calculated at the country-level with robust standard errors. Results correspond to row (2) of appendix table 11.

Appendix Figure A4a
Ethnic fractionalization (2013) and slave exports



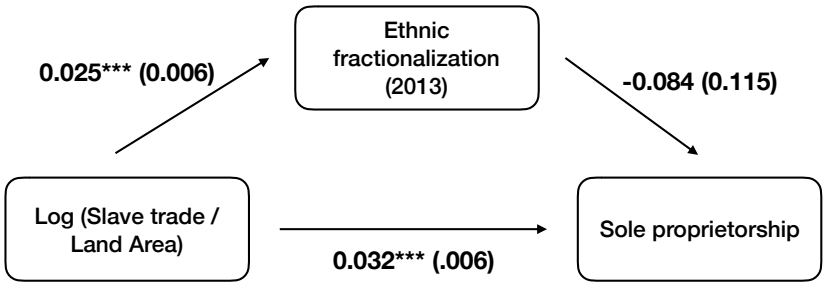
Data comes from Nunn (2008) and the Historical Index of Ethnic Fractionalization Dataset (2013). Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors.

Appendix Figure A4b
Sole owner and predicted values for ethnic fractionalization (2013)
(from regression in Appendix Figure A4a)



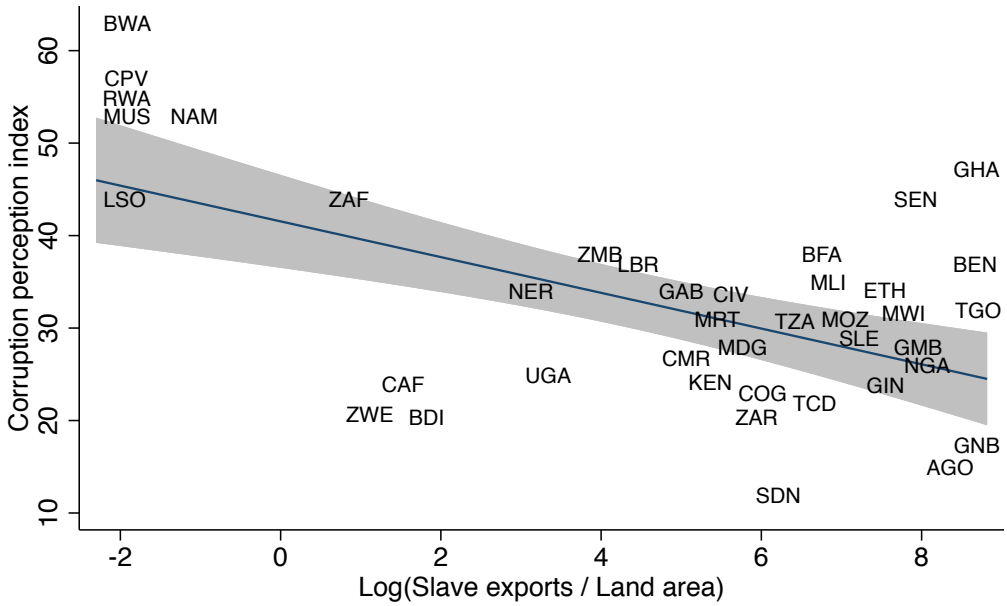
Data comes from Nunn (2008) and the Historical Index of Ethnic Fractionalization Dataset (2013), and the World Enterprise Survey. Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors.

Appendix Figure A4c
Ethnic fractionalization (2013) and slave exports: SEM mediation analysis



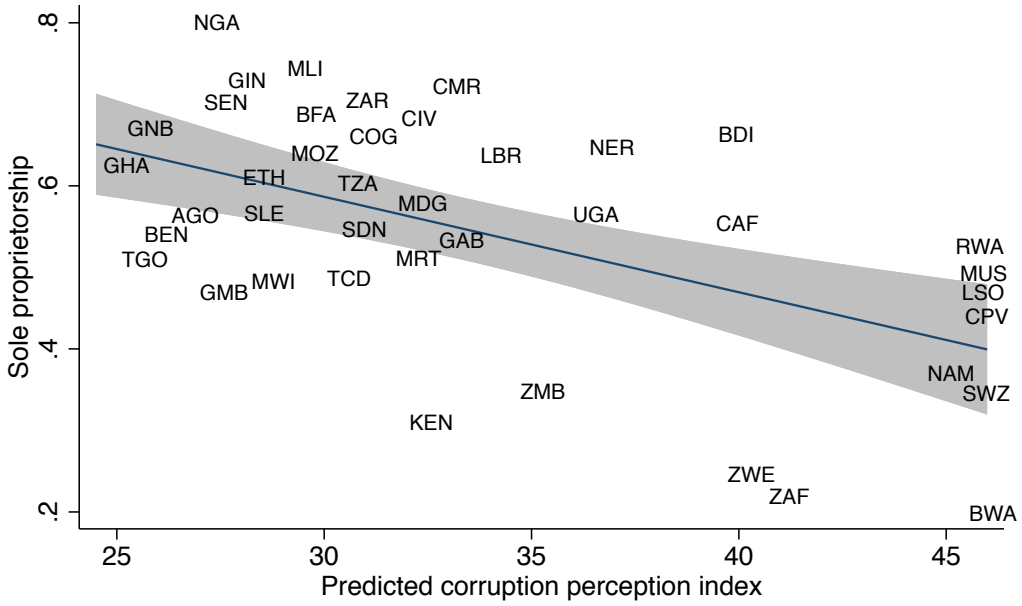
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008) and the Historical Index of Ethnic Fractionalization Dataset (2013), and the World Enterprise Survey. Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors. Results correspond to row (3) of table 5.

Appendix Figure A5a
Corruption perception index and slave exports



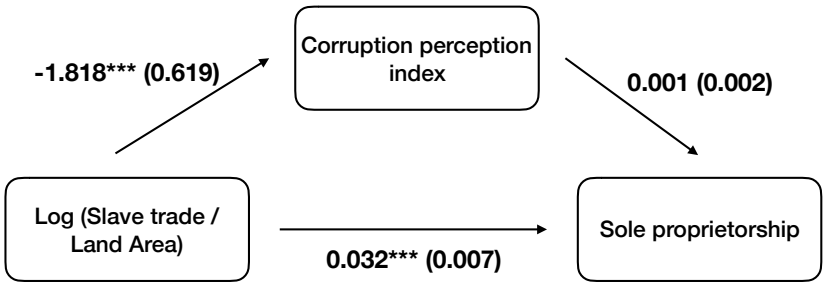
Data comes from Nunn (2008) and the Transparency International's corruption perception index (2015). Higher values of the corruption perception index correspond to less corrupt countries. Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors.

Appendix Figure A5b
Sole owner and predicted values for corruption perception index (from regression in Appendix Figure A5a)



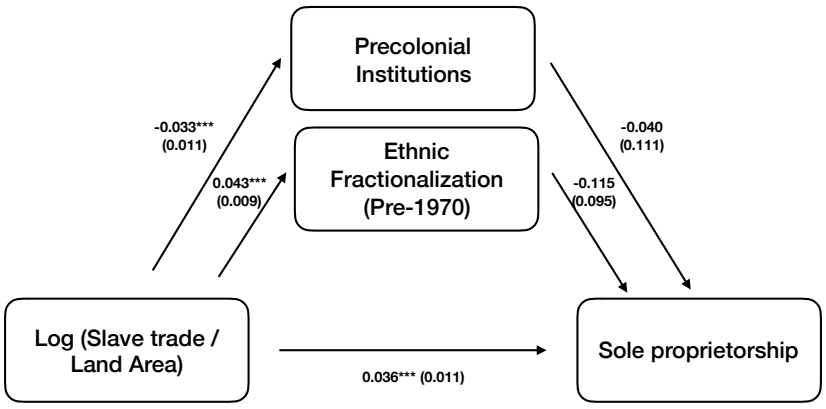
Data comes from Nunn (2008) and the Transparency International's corruption perception index (2015), and the World Enterprise Survey. Higher values of the corruption perception index correspond to less corrupt countries. Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors.

Appendix Figure A5c
Corruption perceptions index and slave exports: SEM mediation analysis



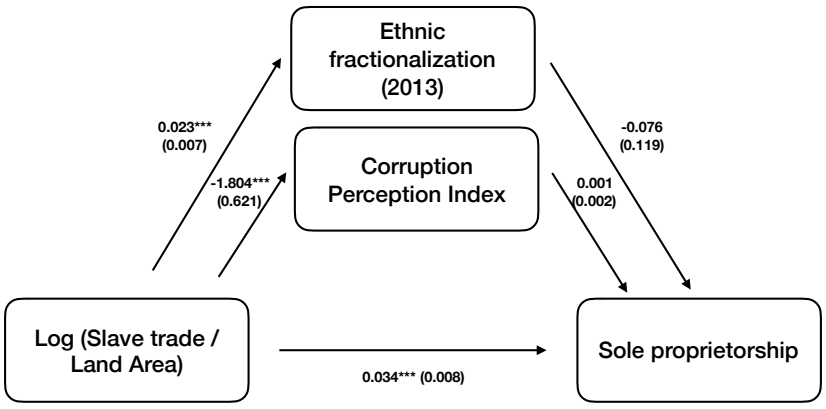
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008) and the Transparency International's corruption perception index (2015), and the World Enterprise Survey. Higher values of the corruption perception index correspond to less corrupt countries. Results correspond to row (4) of appendix table 11.

Appendix Figure A6a: SEM multiple mediation analysis Precolonial institutions and ethnic fractionalization (Pre-1970)



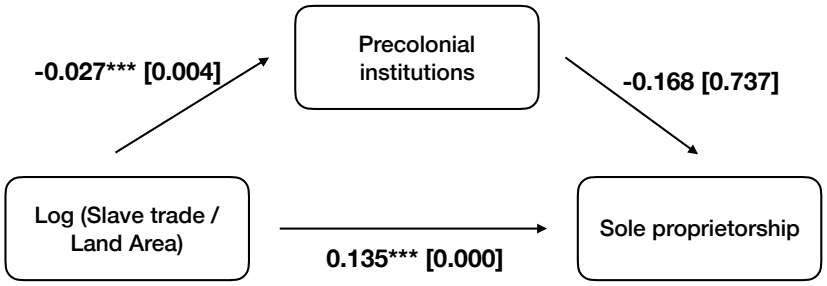
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008), the Historical Index of Ethnic Fractionalization Dataset (2013), and Gennaioli and Rainer (2007), and the World Enterprise Survey. Results correspond to row (5) of appendix table 11.

Appendix Figure A6b: SEM multiple mediation analysis
Ethnic fractionalization (2013) and corruption perceptions index



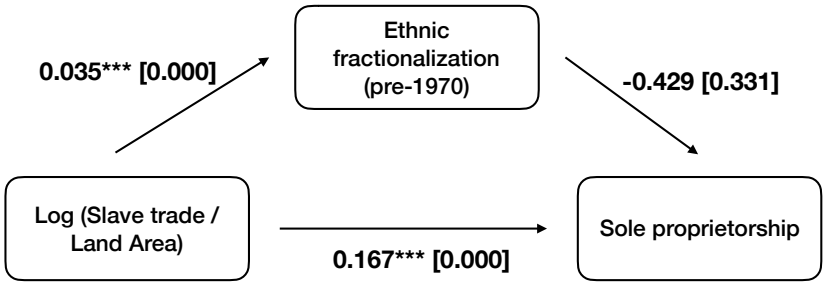
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008), the Historical Index of Ethnic Fractionalization Dataset (2013), and the Transparency International's corruption perception index (2015), and the World Enterprise Survey. Results correspond to row (6) of appendix table 11.

Appendix Figure A7a
Precolonial institutions and slave exports
Mediation analysis using GSEM



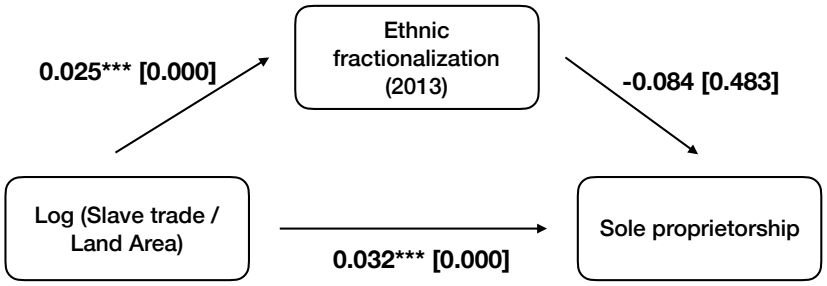
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008), Gennaioli and Rainer (2007), and the World Enterprise Survey. Results correspond to row (1) of appendix table 11. Specification uses GSEM.

Appendix Figure A7b
Ethnic fractionalization (pre-1970) and slave exports: Mediation analysis
Mediation analysis using GSEM



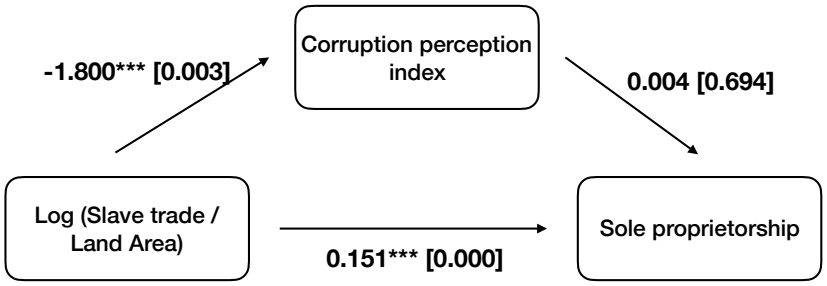
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008) and the Historical Index of Ethnic Fractionalization Dataset (2013), and the World Enterprise Survey. Regressions are calculated at the country-level with robust standard errors. Results correspond to row (2) of appendix table 11. Specification uses GSEM.

Appendix Figure A7c
Ethnic fractionalization (2013) and slave exports: Mediation analysis
Mediation analysis using GSEM



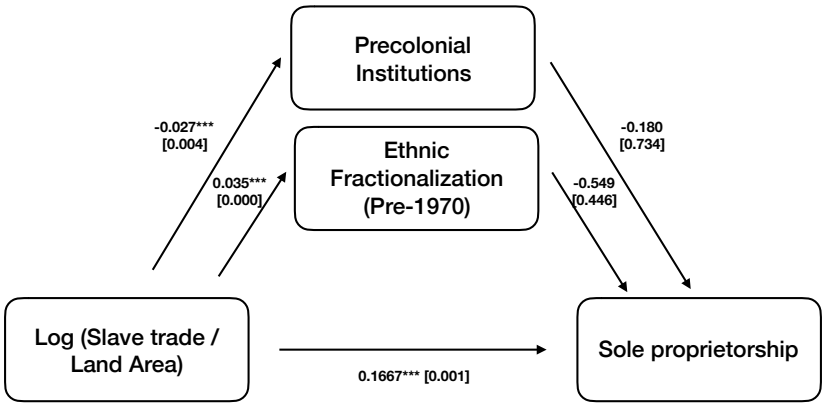
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008) and the Historical Index of Ethnic Fractionalization Dataset (2013), and the World Enterprise Survey. Small changes to the positions of the countries were made to prevent the overlapping of the country labels. Regressions are calculated at the country-level with robust standard errors. Results correspond to row (3) of table 5. Specification uses GSEM.

Appendix Figure A7d
Corruption perceptions index and slave exports: Mediation analysis
Mediation analysis using GSEM



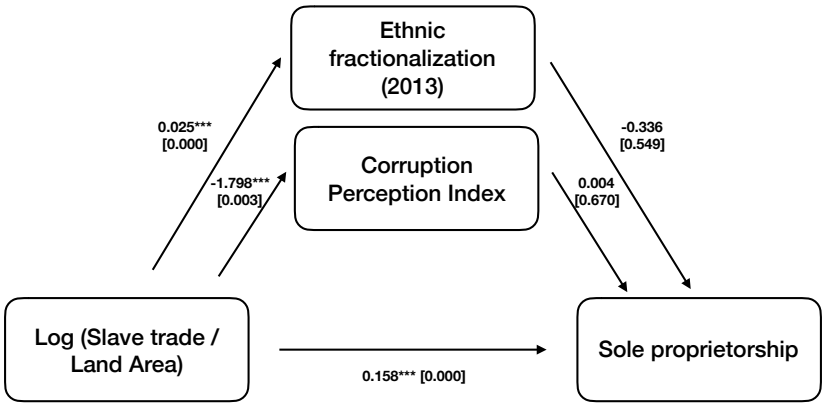
Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008) and the Transparency International's corruption perception index (2015), and the World Enterprise Survey. Higher values of the corruption perception index correspond to less corrupt countries. Results correspond to row (4) of appendix table 11. Specification uses GSEM.

Appendix Figure A7e: Multiple Mediation Analysis: Precolonial institutions and Ethnic fractionalization (Pre-1970) Mediation analysis using GSEM



Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008), the Historical Index of Ethnic Fractionalization Dataset (2013), and Gennaioli and Rainer (2007), and the World Enterprise Survey. Results correspond to row (5) of appendix table 11. Specification uses GSEM.

Appendix Figure A7f: Multiple Mediation Analysis: Ethnic fractionalization (2013) and Corruption perceptions index Mediation analysis using GSEM



Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions. Data comes from Nunn (2008), the Historical Index of Ethnic Fractionalization Dataset (2013), and the Transparency International's corruption perception index (2015), and the World Enterprise Survey. Results correspond to row (6) of appendix table 11. Specification uses GSEM.

Appendix Table A1: Panel 1
Cross-Country Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Log(Slave exports / Land area)	1.00													
(2) Pre-Colonial institutions	-0.39	1.00												
(3) Ethnic fractionalization (pre-1970)	0.63	-0.54	1.00											
(4) Ethnic fractionalization (2013)	0.63	-0.60	0.95	1.00										
(5) Corruption perception index	-0.58	0.26	-0.22	-0.33	1.00									
(6) British colony	-0.20	0.23	-0.02	-0.08	0.09	1.00								
(7) French colony	0.30	-0.37	0.12	0.19	-0.13	-0.61	1.00							
(8) Netherlands colony	-0.21	0.31	-0.33	-0.38	-0.02	-0.22	-0.21	1.00						
(9) Portuguese colony	0.09	0.01	.	-0.00	-0.10	-0.26	-0.25	-0.09	1.00					
(10) Log(Coastline / Land area)	0.24	-0.34	0.21	0.15	0.13	-0.13	-0.07	-0.32	0.35	1.00				
(11) Log(Population 1400)	0.59	-0.15	0.40	0.41	-0.55	-0.12	0.16	0.17	-0.22	-0.30	1.00			
(12) Absolute latitude	-0.47	0.54	-0.45	-0.42	0.37	0.26	-0.28	-0.14	0.09	-0.08	-0.40	1.00		
(13) Longitude	-0.36	0.50	-0.44	-0.39	-0.04	0.34	-0.34	0.18	-0.19	-0.24	0.05	0.22	1.00	
(14) Min of monthly average rainfall (mm)	0.03	-0.19	0.13	0.19	-0.07	0.08	-0.02	-0.07	-0.13	0.02	0.18	-0.31	-0.00	1.00
(15) Max of monthly afternoon avg humidity	0.23	-0.30	0.10	0.10	-0.03	-0.27	0.19	0.19	0.05	0.15	-0.03	-0.38	-0.36	0.32
(16) Min of avg monthly low temp (C)	0.47	-0.51	0.40	0.34	-0.29	-0.41	0.32	0.22	0.14	0.24	0.19	-0.74	-0.48	0.21
(17) Log(Land area in millions of sq. kms)	0.36	-0.12	0.41	0.39	-0.36	-0.13	0.22	-0.11	-0.15	-0.24	0.79	-0.10	0.15	-0.03
(18) Indicator variable for small islands	-0.42	.	-0.14	-0.27	0.42	0.05	-0.17	-0.06	0.31	0.45	-0.78	0.15	0.02	-0.15
(19) Percent Islamic	0.43	-0.19	0.29	0.31	-0.18	-0.11	0.37	-0.20	-0.15	0.06	0.21	-0.05	-0.48	-0.24
(20) Former communist country	0.27	0.17	0.14	0.10	-0.19	-0.26	-0.08	0.22	0.45	0.03	0.21	-0.06	0.08	-0.01
(21) Legal origin indicator: French	0.19	-0.14	-0.08	-0.05	-0.11	-0.85	0.64	0.24	0.28	0.15	-0.02	-0.25	-0.18	-0.18
(22) Log(Diamond production per capita)	-0.26	-0.12	0.05	0.02	0.27	0.12	-0.22	0.03	-0.06	-0.04	-0.02	0.13	-0.04	-0.03
(23) Log(Oil production per capita)	0.27	-0.24	0.25	0.24	-0.27	-0.14	0.19	0.00	0.05	0.15	0.27	-0.39	-0.06	0.17
(24) Log(Gold production per capita)	-0.05	-0.16	0.12	0.11	-0.04	-0.05	0.00	0.17	-0.25	-0.16	0.44	-0.12	0.07	0.05
(25) Minimum Atlantic distance (000s of kms)	-0.22	0.46	-0.31	-0.32	-0.16	0.37	-0.43	0.21	-0.14	-0.13	0.15	0.08	0.83	0.02
(26) Minimum Indian distance (000s of kms)	0.41	-0.57	0.50	0.48	-0.05	-0.45	0.50	-0.18	0.12	0.18	0.04	-0.33	-0.93	-0.03
(27) Minimum Saharan distance (000s of kms)	-0.56	0.44	-0.54	-0.51	0.39	0.38	-0.45	-0.03	0.10	0.00	-0.45	0.66	0.49	-0.06
(28) Minimum Red Sea distance (000s of kms)	-0.05	-0.20	-0.02	-0.02	0.37	-0.07	0.08	-0.28	0.27	0.33	-0.52	0.33	-0.70	-0.08

Note: See Nunn (2008) for detailed description of country-level variables and the sources for each variable. Blank value exists because there is no data on pre-colonial centralization for islands.

Appendix Table A1: Panel 2
Cross-Country Correlations

Variables	(15)	(16)	(17)	(18)	(19)c	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
(1) Log(Slave exports / Land area)														
(2) Pre-Colonial institutions														
(3) Ethnic fractionalization (pre-1970)														
(4) Ethnic fractionalization (2013)														
(5) Corruption perception index														
(6) British colony														
(7) French colony														
(8) Netherlands colony														
(9) Portuguese colony														
(10) Log(Coastline / Land area)														
(11) Log(Population 1400)														
(12) Absolute latitude														
(13) Longitude														
(14) Min of monthly average rainfall (mm)														
(15) Max of monthly afternoon avg humidity	1.00													
(16) Min of avg monthly low temp (C)	0.61	1.00												
(17) Log(Land area in millions of sq. kms)	-0.28	-0.12	1.00											
(18) Indicator variable for small islands	0.04	0.09	-0.59	1.00										
(19) Percent Islamic	0.04	0.15	0.16	-0.14	1.00									
(20) Former communist country	0.07	0.21	0.21	-0.07	-0.20	1.00								
(21) Legal origin indicator: French	0.33	0.47	-0.03	0.19	0.15	0.28	1.00							
(22) Log(Diamond production per capita)	-0.03	-0.12	0.20	-0.16	-0.34	0.14	-0.31	1.00						
(23) Log(Oil production per capita)	0.14	0.38	0.27	-0.12	-0.18	0.32	0.17	0.15	1.00					
(24) Log(Gold production per capita)	-0.07	0.03	0.55	-0.34	-0.06	-0.07	-0.11	0.41	0.12	1.00				
(25) Minimum Atlantic distance (000s of kms)	-0.39	-0.37	0.09	0.01	-0.26	-0.04	-0.24	-0.28	-0.16	0.10	1.00			
(26) Minimum Indian distance (000s of kms)	0.37	0.55	0.02	-0.05	0.51	-0.00	0.32	0.07	0.21	-0.07	-0.87	1.00		
(27) Minimum Saharan distance (000s of kms)	-0.25	-0.60	-0.24	0.17	-0.61	0.09	-0.36	0.41	-0.11	-0.03	0.20	-0.61	1.00	
(28) Minimum Red Sea distance (000s of kms)	0.22	0.06	-0.43	0.24	0.16	-0.06	-0.01	0.25	-0.09	-0.20	-0.76	0.55	0.23	1.00

Note: See Nunn (2008) for detailed description of country-level variables and the sources for each variable.

Appendix Table A2
Firm-Level Correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) Sole proprietorship	1.00				
(2) Small firm	0.31	1.00			
(3) Medium firm	-0.18	-0.78	1.00		
(4) Large firm	-0.24	-0.44	-0.21	1.00	
(5) Majority owner	0.50	0.14	-0.08	-0.12	1.00

Note: Firm data from the World Bank Enterprise Survey (2006-2016)

Appendix Table A3
Comparison of Linear Model, Logit, and Probit

	Dependent variable: Sole proprietorship		
	(1)	(2)	(3)
Log(Slave exports / Land area)	0.016***	0.013***	0.014***
	(0.005)	(0.005)	(0.005)
	[0.01]	[0.01]	[0.01]
Year fixed effects	Yes	Yes	Yes
Sector and firm size controls	Yes	Yes	Yes
Colonizer controls	Yes	Yes	Yes
Geography controls	Yes	Yes	Yes
Specification	OLS	Logit	Probit
Unit of Analysis	Firm	Firm	Firm
Clusters	41	41	41
Observations	30,004	30,004	30,004

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level, brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Marginal effects reported for Probit and Logit. These results use a similar specification to column (4) from table 2a.

Appendix Table A4
Correlation between predictions from different models

Table 1: Cross-correlation table

Variables	(1)	(2)	(3)
(1) Predictions from Linear Model	1.00		
(2) Predictions from Logit Model	0.99	1.00	
(3) Predictions from Probit Model	0.99	1.00	1.00

Note: Predicted values come from regressions in appendix table 3

Appendix Table A5
Slave trade and ownership structure: Corporate organization

	Dependent Variable: Corporation						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Slave exports / Land area)	-0.024***	-0.018***	-0.022***	-0.009*	-0.008*	-0.003	-0.019**
	(0.007)	(0.005)	(0.005)	(0.005)	(0.004)	(0.00)	
	[0.00]	[0.00]	[0.00]	[0.08]	[0.05]	[0.55]	[-.055 , .001]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No
Sector and firm size controls	No	Yes	Yes	Yes	Yes	Yes	No
Colonizer controls	No	No	Yes	Yes	No	Yes	No
Geography controls	No	No	No	Yes	No	Yes	No
Specification	OLS	OLS	OLS	OLS	RE	Logit	IV
Unit of Analysis	Firm	Firm	Firm	Firm	Firm	Firm	Country
Clusters	41	41	41	41	41	41	41
Observations	30,004	30,004	30,004	30,004	30,004	30,004	41

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level and brackets contain p-values. Instrumental variables regressions use Log(Slave exports / Land area) as an instrument. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators. Colonizer controls include British, French, Portuguese, and Belgium indicators. Geography controls include longitude, absolute latitude, lowest month rainfall, maximum humidity, coastline area, island indicator, diamond production per capita, gold production per capita, and oil production per capita.

Appendix Table A6
Slave trade and other organizational variables

	Larger Entity		Pct. Foreign Owner		Log(Employees)	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)	-0.012***	-0.012**	-0.487*	-0.760***	-0.029**	-0.035***
	(0.004)	(0.005)	(0.242)	(0.241)	(0.012)	(0.012)
	[0.01]	[0.02]	[0.05]	[0.00]	[0.02]	[0.01]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Colonizer controls	No	Yes	No	Yes	No	Yes
Specification	OLS	OLS	OLS	OLS	OLS	OLS
Unit of Analysis	Firm	Firm	Firm	Firm	Firm	Firm
Clusters	41	41	41	41	41	41
Observations	30,961	30,961	30,334	30,334	30,540	30,540

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level, brackets contain p-values, except in column (7) where they contain confidence intervals. Slave exports / Land area is measured as slaves exported per million square kilometers.

Appendix Table A7b and A7b
Slave trade and ownership structure: Logit results

Appendix Table A7b

	Dependent variable: Sole proprietorship				
	(1)	(2)	(3)	(4)	(5)
Log(Slave exports / Land area)	0.035***	0.028***	0.029***	0.013***	0.018***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)
	[0.00]	[0.00]	[0.00]	[0.01]	[0.01]
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	No	Yes	Yes	Yes	Yes
Colonizer controls	No	No	Yes	Yes	No
Geography controls	No	No	No	Yes	No
Specification	Logit	Logit	Logit	Logit	RE Logit
Unit of Analysis	Firm	Firm	Firm	Firm	Firm
Clusters	41	41	41	41	41
Observations	30,004	30,004	30,004	30,004	30,004

Appendix Table A7b

	Dependent variable: Majority owner				
	(1)	(2)	(3)	(4)	(5)
Log(Slave exports / Land area)	0.017***	0.015***	0.014***	0.010**	0.011***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)
	[0.00]	[0.00]	[0.00]	[0.05]	[0.00]
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	No	Yes	Yes	Yes	Yes
Colonizer controls	No	No	Yes	Yes	No
Geography controls	No	No	No	Yes	No
Specification	Logit	Logit	Logit	Logit	RE Logit
Unit of Analysis	Firm	Firm	Firm	Firm	Firm
Clusters	41	41	41	41	41
Observations	29,754	29,754	29,754	29,754	29,754

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level and brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators. Colonizer controls include British, French, Portuguese, and Belgium indicators. Geography controls include longitude, absolute latitude, lowest month rainfall, maximum humidity, coastline area, island indicator, diamond production per capita, gold production per capita, and oil production per capita. Marginal effects of logit reported.

Appendix Table A8a and A8b
Cross-industry differences for slave trade and ownership structure: Logit results

Appendix Table A8a

	Dependent variable: Sole proprietorship							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(Slave exports / Land area)	0.028***	0.042***	0.027***	0.031***	0.015**	0.022***	0.005	0.026***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.007)	(0.006)	(0.006)	(0.006)
	[0.00]	[0.00]	[0.00]	[0.00]	[0.03]	[0.00]	[0.39]	[0.00]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Colonizer controls	No	No	No	No	No	No	Yes	Yes
Geography controls	No	No	No	No	No	No	Yes	Yes
Specification	Logit	Logit	Logit	Logit	RELogit	RELogit	Logit	Logit
Manufacturing Sector	No	Yes	No	Yes	No	Yes	No	Yes
Clusters	41	41	41	41	41	41	41	41
Observations	16,228	13,776	16,228	13,776	16,228	13,776	16,228	13,776

Appendix Table A8b

	Dependent variable: Majority owner							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(Slave exports / Land area)	0.013***	0.023***	0.012***	0.020***	0.010***	0.013***	0.014***	-0.001
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.005)	(0.005)
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.87]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Colonizer controls	No	No	No	No	No	No	Yes	Yes
Geography controls	No	No	No	No	No	No	Yes	Yes
Specification	Logit	Logit	Logit	Logit	RELogit	RELogit	Logit	Logit
Manufacturing Sector	No	Yes	No	Yes	No	Yes	No	Yes
Clusters	41	41	41	41	41	41	41	41
Observations	16,026	13,728	16,026	13,728	16,026	13,728	16,026	13,728

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level and brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators. Colonizer controls include British, French, Portuguese, and Belgium indicators. Geography controls include longitude, absolute latitude, lowest month rainfall, maximum humidity, coastline area, island indicator, diamond production per capita, gold production per capita, and oil production per capita. Marginal effects of logit reported.

Appendix Table A9a and A9b
Slave trade and ownership structure
Historical Mechanisms: Logit

Appendix Table A9a

	Dependent variable: Sole proprietorship					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)		0.027***			0.031***	
		(0.005)			(0.005)	
		[0.00]			[0.00]	
Precolonial institutions	-2.876***		-0.204*			
	(0.746)		(0.111)			
	[0.00]		[0.07]			
Ethnic fractionalization (Pre-1970)				3.752***		0.214*
				(1.152)		(0.114)
				[0.00]		[0.06]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	IVProbit	Logit	Logit	IVProbit	Logit	Logit
Clusters	38	38	38	35	35	35
Observations	28,559	28,559	28,559	26,873	26,873	26,873

Appendix Table A9b

	Dependent variable: Majority owner					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)		0.014***			0.017***	
		(0.003)			(0.003)	
		[0.00]			[0.00]	
Precolonial institutions	-2.490***		-0.075			
	(0.680)		(0.083)			
	[0.00]		[0.37]			
Ethnic fractionalization (Pre-1970)				2.721***		0.152**
				(0.823)		(0.074)
				[0.00]		[0.04]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	IVProbit	Logit	Logit	IVProbit	Logit	Logit
Clusters	38	38	38	35	35	35
Observations	28,286	28,286	28,286	26,665	26,665	26,665

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level and brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators. Column (2) excludes observations where the precolonial institutions variable is missing. Column (4) excludes observations where the ethnic fractionalization (pre-1970) variable is missing. Columns (1) and (3) use Log(Slave exports / Land area) as an instrument for the independent variable.

Appendix Table A10a and A10b
Slave trade and ownership structure
Modern Mechanisms: Logit

Appendix Table A10a

	Dependent variable: Sole proprietorship					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)		0.027***			0.028***	
		(0.005)			(0.005)	
		[0.00]			[0.00]	
Ethnic fractionalization (2013)	5.164***		0.245**			
	(1.582)		(0.120)			
	[0.00]		[0.04]			
Corruption perceptions index				-0.050***		-0.005**
				(0.016)		(0.002)
				[0.00]		[0.02]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	IVProbit	Logit	Logit	IVProbit	Logit	Logit
Clusters	39	39	39	40	40	40
Observations	28,832	28,832	28,832	29,552	29,552	29,552

Appendix Table A10b

	Dependent variable: Majority owner					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave exports / Land area)		0.015***			0.015***	
		(0.003)			(0.003)	
		[0.00]			[0.00]	
Ethnic fractionalization (2013)	3.792***		0.176**			
	(1.238)		(0.081)			
	[0.00]		[0.03]			
Corruption perceptions index				-0.036***		-0.002
				(0.013)		(0.002)
				[0.01]		[0.31]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector and firm size controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	IVProbit	Logit	Logit	IVProbit	Logit	Logit
Clusters	39	39	39	40	40	40
Observations	28,832	28,832	28,832	29,552	29,552	29,552

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level and brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators. Column (2) excludes observations where the ethnic fractionalization (2013) variable is missing. Column (4) excludes observations where the corruption perceptions index variable is missing. Columns (1) and (3) use Log(Slave exports / Land area) as an instrument for the independent variable.

Appendix Table A11
Mediation Analysis: Slave trade channels

	Dependent variable: Sole proprietorship		
	Direct effect	Indirect effect	Total effect
(1) Mediator: Precolonial institutions	0.029***	0.001	0.030***
	(0.007)	(0.003)	(0.006)
	[0.00]	[0.737]	[0.00]
(2) Mediator: Ethnic fractionalization(pre-1970)	0.036***	-0.003	0.032***
	(0.008)	(0.004)	(0.007)
	[0.00]	[0.390]	[0.00]
(3) Mediator: Ethnic fractionalization(2013)	0.032***	-0.002	0.030***
	(0.006)	(0.003)	(0.006)
	[0.00]	[0.491]	[0.00]
(4) Mediator: Corruption perception index	0.032***	-0.001	0.031***
	(0.007)	(0.004)	(0.006)
	[0.00]	[0.731]	[0.00]
(5) Mediators: Precolonial institutions and Ethnic fractionalization (pre-1970)	0.036***	-0.004	0.032***
	(0.011)	(0.005)	(0.008)
	[0.001]	[0.503]	[0.00]
(5) Mediators: Ethnic fractionalization (2013) and Corruption perceptions index	0.034***	-0.003	0.031***
	(0.008)	(0.005)	(0.006)
	[0.00]	[0.550]	[0.00]

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level and brackets contain p-values. Slave exports / Land area is measured as slaves exported per million square kilometers. Firm controls include sector indicators and size indicators in all regressions.