The Historical Roots of Firm Access to Finance: Evidence from the African Slave Trade*

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This paper shows that access to finance is the crucial factor in explaining the link between the historical African slave trade and current GDP. We show: (1) The slave trade is strongly linked to current firm access to finance; (2) Among all the business obstacles a firm faces, the slave trade affects only access to finance; and (3) The slave trade erodes access to both formal credit and the trade credit thought to be its substitute. The results suggest a causal link between culture and finance that helps explain the pivotal role of both trust and finance in economic development.

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A well-developed literature in finance shows that firms that cannot access external finance forego profitable and welfare-enhancing investment opportunities.[1] If external finance is so important for firms and economic prosperity, why do we see so much variation in financial development? While a stream of literature has suggested institutional or political economy explanations for persistent financial underdevelopment,[2] we propose an explanation that draws on the long-term persistence of historical shocks to culture. We show that strong negative shocks to culture and trust in the past have a lasting deleterious impact on present day firm access to external finance.[3]

In this paper we use the slave trade in Africa to study how historically persistent cross-country variation in culture shapes access to finance. Prior work has shown that countries with plausibly exogenous higher rates of slave extraction in the 15th – 19th century have both lower levels of trust[4] as well as considerably lower GDP in the 20th century (Nunn 2008; Nunn and Wantchekon 2011).[5] Our paper asks (1) Are historically high levels of slave extraction associated with higher barriers to external finance? (2) Do high levels of slave extraction associate with other quality dimensions of the business environment, or is the relationship with finance exceptional? (3) Does informal credit effectively substitute for formal access to external finance in high slave extraction countries?

We examine this link by combining data on the African slave trade with country-level data from the World Bank's Doing Business Project (DBP) and firm-level data from the World Bank Enterprise Survey (WES). We first apply regression and instrumental variable models to the DBP that strongly support a causal relationship between the historical slave trade and current country-level heterogeneity in the financial climate in Africa.[6] We then use the WES data to show

[1] See Levine (1997), Rajan and Zingales (1998) and Fisman and Love (2003; 2004) for links between access to finance and welfare and development.
[2] See La Porta et al. (1997; 1998) or Benmelech and Moskowitz (2010).
[3] We build on an important related literature on trust and household finance. These studies have shown that variation in household financial decisions has roots in the long-term persistence of deeply-held cultural beliefs such as trust (McMillan and Woodruff 1999; Guiso, Sapienza, and Zingales 2004; 2006; 2008).
[4] This trust-based argument is based on the substantial documentation of betrayal within families and communities during the slave trade period (e.g. Almada 1984; Mahadi 1992).
[5] For other examples from the historical persistence literature, see Banerjee and Iyer (2005), Acemoglu et al. (2001), Feyrer and Sacerdote (2009), Dell (2010), and Tabellini (2010).
[6] The instruments use distance from colonial slave ports in Europe, the Americas, and India as exogenous variation in slave extraction, as suggested by Nunn (2008).

a strong negative relationship between the historical slave trade and the current firm-level access to external finance. The WES data measure firms' business activities and perceptions of the business climate between 2006-2009 for over 15,000 firms in 38 African countries. These firm-level data show that access to external finance is limited by supply-side factors rather than by decreased demand. When asked for the most important reason for not applying for a loan, firms in high slave extraction countries were more likely to report having failed to acquire necessary financing due to factors that include cumbersome applications, excessive collateral requirements, and bribe requirements from bank officials. These firms were much less likely to say they did not apply for a loan due to a lack of need. This finding is inconsistent with an explanation that suggests low levels of external finance are demand driven. Our evidence suggests that the historical shock of the slave trade directly impacts the present-day access to finance that would allow firms to exploit potential investment opportunities.

We also examine whether the relationship between the slave trade and access to finance is exceptional among other obstacles a firm may face, or if the slave trade impacted all dimensions of the business environment. Using the DBP data, we show that while many dimensions of the business environment are correlated with national GDP in ways consistent with the prior literature, few of them are substantively linked to the country-level slave extraction found by Nunn to predict GDP. For example, even though variation in GDP is strongly correlated with the difficulty of enforcing a contract, we find no substantial relationship between historical slave extraction and contract enforcement. The one consistent exception is the DBP measure that proxies for financial development. We find that both GDP and measures of slave extraction are strongly correlated with financial development in a way that other obstacles to firm operational effectiveness are not. The implication is that the relationship between the historical slave trade and finance is a first order mechanism in explaining variation in GDP, even relative to other firm transactions that might be sensitive to culture.[7]

We next use the WES firm-level data to better understand the channels through which the slave trade has affected access to finance. This approach is similar to the household finance

[7] It is important to note that these are marginal effects. In Africa, relative to the rest of the world, contract enforcement is relatively difficult. Thus, well-capitalized foreign entities would still find substantial barriers to exploiting potentially lucrative investment opportunities.

studies (e.g., Guiso, Sapienza, and Zingales 2008) in its focus on micro-level data. We show that historical slave extraction at the country level strongly predict access to finance for firms through both the formal (bank loans) and informal financial sectors (such as supply chain credit or credit from friends and family). Although informal financial channels, often act as substitutes for inaccessible formal financial channels (Meltzer 1960; Fisman and Love 2003), we find no evidence that firms in countries impacted by the slave trade are able to compensate for insufficient formal finance channels with credit from suppliers and customers.

Following Rajan and Zingales (1998), we also examine variation in the use of sales credit across industry sectors to control for fixed differences across countries. If the historical slave truly impacts access to finance, we should observe those industries that depend on sales credit to be most affected by slave extraction. We first calculate the use of sales credit across sectors in South Africa, which has Sub-Saharan Africa's best functioning credit markets. This allows us to calculate the dependence on sales credit across different industry sectors. The garment sector in South Africa, for example, heavily relies on sales credit (.474), while the hotel sector does not (.159). Our analysis shows that in high slave extraction countries, these differences in sectoral sales credit usage are much smaller than in low slave extraction countries. Nigeria, which had high extraction levels, shows little difference between the use of sales credit in the garment sector (.178) and in hotels (.153). In contrast, low-extraction Botswana had large sectoral differences in use of sales credit between the garment sector (.413) and the hotel sector (.192). These results, conditional on country fixed effects, imply that the slave trade has, if anything, reduced the provision of informal credit in industries where it is most needed. This finding is particularly important because supplier and customer credit are key sources of finance in Africa and are known to be influenced by culture (Biggs, Raturi, and Srivastava 2002; Fafchamps 2000; Fisman 2001).

This paper contributes to several lines of research that suggest that the historical foundations of culture are linked to present day firm access to finance. One line of research has shown a strong correlation between individual levels of trust and financial contracting (Kotkin 1993; Greif 1997; McMillan 1997; McMillan and Woodruff 1999; Lyon 2000; Guiso et al. 2004; 2008). The literature on trust and finance has been critical to understanding regional and national variation in financial practices, but has largely been limited to correlating individual self-

reported trust with household financial decisions.[8] While our paper does not directly measure trust, it exploits rich plausibly exogenous cultural variation from the historical slave trade previously connected to both present day trust and GDP (Nunn 2008; Nunn and Wantchekon 2011). Furthermore, we connect this cultural variation to firm-level financial barriers, which allows us to establish the unique importance of finance in linking culture with economic growth. Thus, this paper provides unique support for the increasing focus on trust by finance scholars (e.g. Sapienza and Zingales 2012).

We contribute to a second line of research that uses historical events to establish causal links to both culture and modern outcomes (La Porta et al. 1998; 1999; 2000; Glaeser and Shleifer 2002; Tabellini 2010). Most of these historical events involve quasi-random variation in the propensity of occupying powers to turn their "possessions" into extraction states that lead to present-day underdevelopment (e.g. Bannerjee and Iyer 2005; Acemoglu et al. 2001; Feyrer and Sacerdote 2009; Dell 2010).[9] While this literature frequently argues that this persistent causal relationship is based in institutions (La Porta et al. 1997; 2000; Stulz and Williamson 2003; Djankov, McLiesh, and Shleifer 2007; Jappelli and Pagano 2002) or cultural mistrust transmitted across generations (Knack and Keefer 1997; Guiso et al. 2006; Algan and Cahuc 2010; Dohmen et al. 2012), the historical persistence literature has typically focused on aggregates like GDP or outcomes such as self-reported levels of trust and investment in public goods. Very little attention has been paid to how these deep-rooted cultural explanations manifest themselves in firm behavior. This is important because business practices such as finance *are a principal mechanism through which variation in GDP can be explained.*

Finally, we contribute to an emerging literature on the relationship between culture and business practices, which economists have only recently begun to examine. Bloom et. al (2012) show trust levels in a multinational corporation's home country impact the decision rights given to local managers, while Bottazzi et al. (2011) examine national trust levels and venture capital investment decisions. Related work on bilateral national cultural differences has examined cross-

[8] Guiso, Sapienza, and Zingales (2004; 2008), for example, show that less trusting individuals are more likely to own stock and keep more of their wealth in cash. While important, these studies have few cultural observations and lack the rich variation provided by a large cross-country study.

[9] See Nunn (2009) for a review of the multiple links between history and economic development.

border mergers (Ahern et al. 2012; Siegel et al. 2011), loans (Giannetti and Yafeh 2012), and trade (Guiso et al. 2009). To the best of our knowledge, our paper is unique in this literature in both its focus on developing countries and its use of historical shocks to establish causality.

Section 1 provides a brief history of the slave trade in Africa and describes current access to finance in these countries. Section 2 describes our data and identification strategy. Section 3 presents our result. Section 4 concludes.

I. Historical and Cultural Context

A. Present Day Culture and the African Slave Trade

Between twelve and eighteen million Africans were sold into slavery between the fifteenth and the eighteenth century (Lovejoy 2000; Nunn 2010), depopulating the continent so severely that it may have lost 50% of its potential population by 1850 (Manning 1990). Slaves were distributed and sold through four major trade routes. The trans-Saharan, Red Sea, and Indian Ocean routes were the oldest, dating back to before A.D. 800. The transatlantic trade route, which emerged in the fifteenth century, ultimately became the largest in total volume. Although the majority of slaves in the early periods were kidnapped or taken as prisoners of war, the sourcing of slaves later shifted toward internecine conflict. Africans sold family members, friends, and community members to slave traders, both in exchange for goods or money and for fear that rivals would betray them first (Almada 1984; Mahadi 1992).

The prevalence of betrayal in the slave trade created a culture of insecurity so severe that it extended even within families (Piot 1996). Individuals preemptively betrayed community and family members to avoid being betrayed themselves, even forming alliances with merchants and raiders against community members (Barry 1992; Inikori 2003; Klein 2001). Evidence from a 19th century sample of former slaves in Sierra Leone found that while 25 percent had been captured in war, 40 percent had been kidnapped and another 20 percent had been sold by friends and relatives (Koelle 1854). This culture of insecurity extended beyond personal interactions to institutions. The slave trade corrupted institutions by transforming the legal process into a mechanism through which one could enslave another. Accusations of witchcraft and adultery

were frequently used to resolve personal vendettas (Northrup 1978; Lovejoy 2000), with sentences of enslavement used to eliminate rivals.

Nunn and Wantchekin (2011) explain the impact of this history on cultural trust. In countries with histories of friends and family selling one another into slavery, mistrust developed quickly and severely in personal, professional, and authority relationships. Analyzing over 20,000 modern survey responses from 185 ethnic groups in sub-Saharan Africa, they found trust to be considerably lower in ethnic groups that historically lost high numbers of people to the slave trade. Furthermore, they found evidence that the impact of the slave trade exists both in degraded legal and political institutions and in the norms and beliefs of individuals. The major social and economic impact of this reduced trust, they argue, is in the decreased economic development observed in earlier work (Nunn 2008), an effect so severe that Africa is the only place in the world where the ruggedness of terrain is positively associated with wealth (Nunn and Puga 2012).

Whatley and Gillezeau (2011) argue that the slave trade also fragmented ethnic groups, which could alternatively explain inhibited development. Their results are consistent other studies of how ethnic fractionalization can impact economic development (Levine and Easterly 1997). Their results are also consistent with trust as a mechanism for development, however. Studies of parochial trust and altruism in evolutionary psychology and behavioral economics (e.g. Fershtman and Gneezy 2001; Bernhard et al. 2006; Choi and Bowles 2007) strongly suggest that such fractionalization would further amplify mistrust generated through historical betrayal.

B. Culture and Access to Finance in Africa

There are several reasons to believe that firm access to finance is the exceptional link between the slave trade and the lack of economic development in sub-Saharan Africa. First, access to finance is a critical element for economic development (Rajan and Zingales 1998; Bertrand, Schoar, and Thesmar 2007), particularly in the developing world. Second, extensive evidence shows cultural elements such as trust play a major role in facilitating financial markets. Below, we detail existing literature on both relationships in Africa.

Access to finance in Africa through formal channels such as banks is a major constraint on economic activity. While over 80 percent of households in Western Europe and North America have banking accounts (Beck et al. 2007), this number is less than 20 percent in sub-

Saharan Africa (Beck et al. 2008). Banks and other formal financial institutions are underdeveloped, with limits the possibility of checking and savings accounts as well as formal institutional loans. Beck et al (2008) note that the cost to open accounts in countries such as Cameroon and Sierra Leone exceeds GDP per capita. Despite this scarcity of finance across Africa, there is evidence of heterogeneity across populations and countries. Private credit to GDP ratios range from 1.9 percent in Mozambique to 19.1 percent in Ethiopia (Beck et al. 2008).

In the absence of formal institutional sources, individuals and firms in Africa access finance through informal channels. Friends, family, and ethnic networks play critical roles in Africa (Biggs et al. 2002; Beck and Demirguc-Kunt 2006). Similarly, long-term business relationships become critical in providing financing such as trade credit, which functions as an important substitute for institutional lending (Fisman and Love 2003). Firms frequently buy inputs on credit, with the promise to repay in anywhere from two weeks to half a year. A survey by Lyon (2000) found that 27% of farmers in Ghana bought agrochemicals on credit from their suppliers, who in turn used credit with wholesalers for 69 percent of their products.

There are substantial reasons to believe that culture might impact both formal and informal access to finance. Bottazzi et al. (2011) show that local cultural trust is highly correlated with the flow of venture capital funds across European countries. This work is consistent with experimental evidence showing trust games predict repayment of micro-loans (Karlan 2005). Furthermore, trust may impact formal loans more indirectly by facilitating the development of stronger institutions that reduce financial obstacles (Putnam 1993; Beck et al. 2005a; 2005b), although recent work suggests regulation may instead substitute for or diminish trust (Carlin et al. 2009; Aghion et al. 2010). Given the lack of institutional development, the impact of this lack of finance on economic development in Africa has been severe (Sleuwaegen and Goedhuys 2002; Beck and Demirguc-Kunt 2006).

Trade credit and other informal finance arrangements also rely on substantial trust between parties.[10] Honohan and Beck (2007), in a report for the World Bank, argue that sub-Saharan Africa's lowest level of trade credit in the world can be partially explained by extremely

[10] See Klapper, Laeven, and Rajan (2012) for a discussion of the substantial literature on the multiple uses of trade credit.

low levels of trust. This is consistent with Fisman (2003) finding that supplier credit is much more likely to occur within ethnic networks, and Allen and colleagues' (2012) studies of trust-based financing in India.

2. Data

Our analysis uses three primary datasets. The first is Nathan Nunn's (2008) dataset on the African slave trade between the years A.D. 1400 and 1900. Nunn constructed estimates of the total number of slaves extracted from each African country for the four slave trades during this period (Indian Ocean, Red Sea, trans-Saharan, and transatlantic). These estimates were constructed by combining historical data on slaves' ethnicities with shipping data from multiple ports and regions of Africa. Ethnicity data came from records on 80,656 slaves with 229 ethnic designations from 54 separate samples. Shipping data came from different sources for each of the four major slave trades, including data from Austen (1979, 1988, 1992) on the Indian Ocean, Red Sea, and trans-Saharan trades and the *Trans-Atlantic Slave Trade Database* built by Eltis et al. (1999).[11] Combining these data based on ethnicity produces slave extraction data for 52 African countries.

The second dataset is from the Doing Business Project (DBP) from the World Bank. The DBP database provides measurements for 183 countries on how ten elements impact private firms: *starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts,* and *resolving insolvency*. Many of these measurements are based off of published research, including *getting credit* (Djankov, McLiesh, and Shleifer 2007), *starting a business* (Djankov et al. 2002), and *protecting investors* (Djankov et al. 2008). The DBP data cover 50 countries with slave extraction data.

The third dataset is the World Bank Enterprise Survey (WES), conducted between 2006-2010. The surveys cover over 100,000 businesses in more than 120 countries, asking owners and managers to provide information and opinions on productivity, business practices, and business obstacles. The WES covers 38 countries in Africa for which we have historical data on slave

[11] See Nunn (2008) for a detailed description of the sourcing and building of this database.

extraction. The majority of the missing countries are in North Africa, where slave extraction was relatively low. Others, including Zimbabwe, Equatorial Guinea, and Sudan, also had low slave extraction.

Table 1a provides country-level summary statistics for the logged number of extracted slaves, per-capita GDP in 2009, and the key control variables that we will use in our empirical models. These statistics are presented for both the sample of countries covered by the DBP and the sample in the WES datasets, since the WES data covers only 38 countries. The first set of control variables represents country-level geographic and environmental characteristics that might influence economic development or health, and include longitude, distance from the equator, lowest monthly rainfall, maximum humidity, low temperature, coastline length (logged), and a dummy indicating the nation is an island.[12] We include dummy variables for important cultural factors that may also influence trust, institutions, or access to finance, including the percentage of Islam adherence and a dummy for French legal origins, which have the worst protection for investors (La Porta et al. 1997).[13] We include controls for natural resource wealth, using the average per capita production of gold, oil, and diamonds. Furthermore we present the minimum distance to the primary slave markets for the four slave trades, which will serve as instrumental variables later in the paper.

Table 1b presents country-level statistics for the twelve variables from the Doing Business Project. These represent measures of each of the important obstacles to operational effectiveness as determined by the World Bank. The World Bank often measures a single concept in multiple ways. For instance, they might ask how many procedures are necessary to start a business as well as how large licensing costs are relative to per capital GDP. Where possible, we chose to use cost measures rather than other indicators such as the number of procedures or number of days waiting for an application to be processed.[14] We use cost measures because they are the most

[12] See Nunn (2009) or Nunn and Puga (2012) for a discussion of the relationship between geography and economic development.
[13] See La Porta et al (1997, 1998, 2000) for a discussion of the impact of legal origins on finance and development.
[14] For a detailed description, see http://doingbusiness.org.

ubiquitous in the DBP survey, making the comparison of business obstacles as transparent as possible.[15]

Table 2a presents summary statistics for the 15,276 firm responses from the WES for countries with slave extraction data. The survey provides key information on firm characteristics, including ownership, organizational structure, industry sector, age, and size. Firm size is defined in the WES by three categories: less than 20 employees, 21 to 99 employees, and 100 or more employees. We present the 14 sectors in which the firms are categorized, with retail and wholesale trade, manufacturing, and food as the most common.

Table 2b presents self-reported financial practices for each firm, including the use of checking accounts, formal lines of credits, sales paid on delivery (i.e. lack of trade credit), and four mutually exclusive and exhaustive sources for working capital: internal funds, bank loans, supply chain credit, and other sources. Internal financing is the dominant form of finance, with informal supply chain credit and formal loans being substantially less common. We present self-reported access to finance as an obstacle to business, which is part of a larger set of 15 potential business obstacles subjectively measured on a five-point scale between 0 and 4. Based on the five-point scale in the WES, we define access to finance as an obstacle equal to one if it is reported as a minor (2), moderate (3), major (3) or severe (4) obstacle.[16] Approximately 74 percent of firms report access to finance as an obstacle.[17] We also present whether the firm applied for or needed a loan, as well the self-reported largest obstacles to accessing a loan: procedures too cumbersome, interest rates too high, too much collateral required, loan too small, informal payment (bribe) required, or anticipated rejection.

[15] Our results from the Doing Business Project survey are very similar to what we find later using the World Enterprise Survey.

[16] Zero represents no obstacle, 1 is a minor obstacle, 2 is a moderate obstacle, 3 is a major obstacle, 4 is a very severe obstacle.

[17] We present the summary statistics for the other obstacles in Appendix Table A1. Obstacles such as electricity, informal competition, taxes, political stability, and corruption are also reported as major problems. Courts and business licensing are perceived to be relatively less common problems.

3. Empirical Analysis

A. The Slave Trade and Development Constraints

Given the strong relationship between slave extraction and economic development in Nunn (2008),[18] we first seek to understand which economic mechanisms might be driving this relationship. Economic development is known to be inhibited by a number of factors, including politics, weak institutions, courts, government corruption, education, and bureaucracy. While each of these might play some role in the heterogeneous development observed in Africa, we wish to better understand which might link the historical slave trade with recent development constraints. To do this, we examine the relationship of the ten country-level DBP variables presented in Table 1b with both per capita GDP and the number of slaves extracted. The goal of this analysis is understand which of these factors is related to both the historical slave extraction and the modern lack of economic development associated with it.

We first explore the simple relationships between each DBP variable and both the logged number of slaves extracted (normalized by geographic area) and per capita GDP from the year 2009.[19] Figures 1c and 1d present country-level values for two of these variables: depth of credit information index and the cost of enforcing contracts. Depth of credit information is based on Djankov et al. (2007) and proxies for the credit environment in each country. We present the cost of enforcing contracts as an example of another country-level characteristic known to impact development. This measure is based on Djankov et al. (2003) and represents the efficiency of the judicial system in resolving commercial disputes. We present the relationship between the depth of credit information index and both GDP and slave extraction in Figure 2, with fitted linear models and 95 percent confidence intervals. GDP is positively related to credit information, with 19% of the variance explained. Slave extraction is negatively associated with credit information,

[18] Since we rely heavily on Nunn (2008) to establish the economic importance of the historical slave trade, we first replicate his results using the subset of 38 countries for which we have data from the World Bank Enterprise Survey. Per capita GDP and area-adjusted slave extraction for these countries are presented in Figures 1a and 1b. Figure 1a presents a map of Africa with darker colors representing higher levels of GDP. Figure 1b presents the magnitude of slave extraction by country, with darker countries representing higher levels of slave extraction. We implement both his OLS and instrumental variable models. These results are presented and explained in Appendix Table A2. Despite fewer country observations, we find nearly identical results, which reduces concerns that our smaller subsample constrained by the WES might be substantively different. For our subsample of countries, slave extraction levels are highly predictive of economic development over the 20th century.

[19] This is the last year the World Bank has data for all of the countries in our sample.

with 14% of the variance explained. In contrast, Figure 2 also presents the relationship between the cost of enforcing contracts and both GDP and slave extraction. While the cost of enforcing contracts is negatively associated with GDP, and explains 25% of the variance, there is no relationship with historical slave extraction. Contract enforcement costs cannot explain the relationship between slave extraction and GDP.

In Figure 3 we present the adjusted R-squared values from each set of DBP variable regressions. Points on the far right of the graph represent strong relationships between GDP and the specific business environment obstacles. Points that are high on the vertical axis represent strong relationships between slave extraction and the business environment obstacles. GDP is correlated with many of the business environment obstacles, including the depth of credit information index, the cost of starting a business, the cost of obtaining construction permits, the cost of enforcing a contract, the cost of resolving insolvency, and the cost of establishing an electrical connection.[20] Yet slave extraction is significantly correlated with only one obstacle---the depth of credit information index. The credit information environment is the only business environment characteristic associated with both historical slave extraction and modern day GDP.

We more formally test this using pairs of regressions with extensive country-level controls. The baseline specifications are:

$$(1)\ \ y_k = \beta_0 + \beta_1 \ln\left(\text{extract}_k / area_k\right) + \boldsymbol{C}_k'\delta + \boldsymbol{X}_k'\gamma + \varepsilon_k$$

and

$$(2)\ \ y_k = \beta_0 + \beta_1 \ln\left(\text{GDP}_k\right) + \boldsymbol{C}_k'\delta + \boldsymbol{X}_k'\gamma + \varepsilon_k$$

where y_k represents the DBP variable for country k, $\ln\left(\text{extract}_k / area_k\right)$ is the natural log of the number of slaves extracted from country k between 1400 and 1900 normalized by land area, and $\ln\left(\text{GDP}_k\right)$ is the 2009 GDP for country k. $\mathbf{C}_k$ is a vector of dummy variables representing the European colonizer prior to independence, while $\mathbf{X}_k$ is a vector of geographic, climate, and cultural control variables. Coefficients for the slave extraction and GDP models are presented in Table A3, both with and without control variables, with standard errors clustered at the country level in parentheses. Consistent with Figure 3, only the credit information index is significantly correlated with both slave extraction and GDP. The only exception to this is higher deposits

[20] The majority of these costs are driven by deposit size.

necessary to get electricity, which also reflects reduced access to credit in high slave extraction countries.

We present a more detailed examination of the relationship between slave extraction and the depth of financial information index in Table 3. Column (1) presents the uncontrolled model, while columns (2) and (3) add control variables. Historical slave extraction consistently predicts present day depth of credit information. Columns (4) – (6) implement the instrumental variables approach from Nunn (2008) to deal with the potential endogeneity of slave extraction. The principal endogeneity concern is that the people historically living within current national boundaries may have endogenously selected into the slave trade based on pre-existing culture, and that those countries that these persistent cultural differences also impact modern access to finance. While Nunn's (2008) historical evidence that wealthy countries selected into the slave trade seems counter to this, we implement his instrumental variable model using the distance from each African country to the geographic location of each of the four major slave trades.[21] For these instruments to be valid, they must be correlated with slave extraction but uncorrelated with other country characteristics. The instruments must also be determinant of slave extraction, and not the opposite. Historical analysis shows that local natural resources determined local demand for slaves, including pearl diving in the Red Sea, salt mines in the Middle East, precious metals in South America, and agricultural plantations in the Caribbean and North America.[22]

Because our instruments are weak, with only 50 observations (3<F-stats<5), we implement Moreira's (2003) conditional likelihood correction of confidence intervals (Andrews, Moreira, and Stock 2006). This correction provides the set of parameter estimates that cannot be rejected at the 95% confidence level.[23] We present the second stage results for the IV models in columns (4) – (6) of Table 3, with 95% confidence intervals. The IV models are generally consistent with the base OLS models, finding a negative relationship between slave extraction and credit information. Importantly, in column (6) we cannot estimate confidence intervals using the

[21] See Nunn (2008) for details on these calculations.
[22] See Nunn and Wantchekon (2011) for a detailed examination of the exclusion restriction for these instruments.
[23] The actual value of parameter estimates is ambiguous in this case, so we use the limited information maximum likelihood point estimate from Moriera's (2003) Stata code. See Murray (2006) for a comprehensive explanation of this problem and the various approaches to solving the problem.

Moreira (2003) approach. With 50 observations, 17 controls, and weak instruments, it is not surprising that the standard errors do not converge.

B. Firm-Level Obstacles to Finance

We next use the WES data from 37 countries to examine whether firms in high slave extraction countries report difficulties accessing external finance.[24] We explore these relationships in more depth using a series of linear probability models, where the dichotomous self-report of access to finance as a business obstacle is regressed on the logged number of extracted slaves (normalized by geographic area) and a series of country- and firm-level controls. The baseline specification is:

$$(3)\ y_{ikt} = \beta_0 + \beta_1 \ln(\text{extract}_k/area_k) + \boldsymbol{C}_k'\delta + \boldsymbol{X}_k'\gamma + \boldsymbol{Z}_{it}'\lambda + \varepsilon_{ik}.$$

where y_{ikt} is a dummy variable indicating that respondent i in country k in year t views the business obstacle as a major or severe obstacle, and $\ln(\text{extract}_k/area_k)$ is the natural log of the number of slaves extracted from country k between 1400 and 1900 normalized by land area. $\mathbf{C}_k$ is a vector of dummy variables representing the European colonizer prior to independence, while $\mathbf{X}_k$ is a vector of geographic, climate, and cultural control variables. $\mathbf{Z}_i$ is a vector of industry sector dummies interacted with each of the three firm size dummies as well as a linear term for firm age.

Coefficients for the area-adjusted slave extraction are presented in Table 4, with standard errors clustered at the country level in parentheses. The first column reports estimates without any control variables, while the second column adds the industry and firm-size controls. The third columns add colonizer controls, while the fourth column presents the fully-controlled model. Column (5) collapses the data to the country level, and reruns the fully-controlled model. In each model, country-level slave extraction is positively related to managers reporting access to finance as an obstacle.[25] Columns (6) – (8) repeat the instrumental variables models using the Moreira (2003) weak instrument correction, and continue to report a positive relationship between slave extraction and the obstacle of accessing finance.

[24] There are no data for self-reported access to finance from Nigeria.

[25] Because we are concerned that our dichotomous dependent variables were strategically constructed from the survey's five-point scale, we use alternative cutoffs for finance as a business obstacle. One model defines the obstacle dummies as equal to one only if the respondent labeled the obstacle as severe (4). Another defines an obstacle as minor or greater (1-4). Both models produce positive and statistically significant coefficients for slave extraction.

In contrast, models predicting nine other self-reported business obstacles in the WES survey (access to electricity, access to transportation, land access, informal sector competition, courts, tax rates, business licensing, political stability, and corruption) found no significant relationship with slave extraction, and are reported in the Appendix Table A3. As in the DBP data, the link between the historical slave trade and access to finance is exceptional.

C. Access to Formal and Informal Credit

The results from Table 4 suggest that slave extraction had a major long-term impact on economic development by reducing access to finance. To further investigate this hypothesized link, we next investigate specific financial channels that might be affected by this history. More specifically, we want to understand if the impact of the slave trade on finance was through both formal and informal financial channels.

To do so, we repeat our OLS models from Table 4 using self-reported financial practices as our dependent variables. Table 5 reports the coefficients and standard errors for slave extraction in each regression, with columns representing levels of control variables and rows representing different dependent variables.[26] The first two rows use dichotomous dependent variables indicating formal institutional credit sources: checking accounts and bank lines of credit. Rows 1 and 2 show that firms in countries with high slave extraction are much less likely to have formal checking accounts or formal lines of credit. Row 3 suggests that the percentage of sales paid on delivery, which reflects a lack of trade credit, is higher in high slave extraction countries, although the statistical significance is not robust to all specifications.

Rows 4-7 examines the percentage of working capital from four mutually exclusive and exhaustive sources: internal funds, bank loans, supply chain credit, and other sources. Firms in high slave extraction countries are more likely to rely on internal funds (row 4), and less likely to rely on bank loans (row 5), consistent with our earlier results. Furthermore, in the absence of the formal credit such as bank loans, they appear to be less likely to have access to informal credit through either supply chain credit (row 6) or family or friends (row 7), which is significant

[26] The results in Table 5 are robust to testing using a seemingly unrelated regressions approach. Results are available upon request.

because informal credit such as supplier credit is believed to substitute for formal credit (Meltzer 1960; Fisman and Love 2003).

The results from these seven models strongly support the hypothesis that slave extraction had a long-term impact on access to multiple channels of finance. Firms in high slave extraction countries are far more likely to rely on internal cash for investment, since they appear to have less access to a myriad of channels for credit. This reduced access includes credit through both financial institutions (i.e., loans, lines of credit, checking accounts) and trade relationships (i.e. supplier and customer credit).

D. Reasons for Finance Obstacles

Our previous regressions have identified that historical slave extraction is strongly linked to access to financing obstacles, which are known to severely restrict economic development. While these results are consistent with a story that the supply of financing is restricted by cultural factors such as mistrust, it is possible that the lower use of financing reflects reduced demand due to lack of economic development in these countries (Bigsten et al. 2003). We next show that the use of credit is restricted by the supply of credit, not demand for credit.

We first repeat our OLS models from Tables 4 and 5, regressing a dummy variable indicating whether a firm purchased an asset in the previous year on area-adjusted country-level slave extraction and our full set of control variables. While we find no consistently significant relationship in row 1 of Table 6, in row 2 we find that conditional on purchasing an asset, it is much more likely that it was purchased using internal capital. If the constraints were solely driven by the demand side, we would not expect this result.

We then regress a dummy variable indicating whether the firm applied for credit in the previous year on area-adjusted country-level slave extraction and our full set of control variables. The results for these regressions, presented in row 3 of Table 6, show lower levels of credit applications in countries with high slave extraction. To test whether this lower credit application frequency reflects decreased demand, we next examine the self-reported reasons for those firms who chose not to apply for a loan. It is important to note that because firms were asked to choose only the most important reason, *these answers are mutually exclusive*. Row 4 shows that the same high-extraction countries with low credit usage are less likely to report no need for loans, which

suggests that the decreased number of applications is not due to lower demand, but rather to expectations of higher loan costs or lower expectation of application success. This conclusion is further supported by the fact that among firms that did not list access to finance as difficult (see Table 2b), 65% reported no need for a loan, compared to 32% of those reporting finance as a business obstacle. Similarly, 86% of the very large companies (over 500 employees) without loans reported no need for a loan, compared with 39% of smaller firms.

To examine which supply-side factors might be limiting access to credit, we restrict our sample to the 11,596 respondents who indicated they did not apply and examined the self-reported primary reason for this. We examined several reasons for not applying: if applications were too cumbersome, if loan interest rates were too expensive, if loans required excessive collateral, if loans were too small, if loans required informal payments (i.e. bribing bank officers), or if the firm never applied because it anticipated rejection. Each was represented by a dummy variable indicating whether it was the primary reason for not having a loan, which was then regressed on slave extraction and our full set of controls

We present these regressions in rows 5-10 of Table 6. Row 5 shows that loan applications in high slave extraction countries are perceived to be too cumbersome, while row 6 shows too much collateral in such countries was needed to secure the loan. Row 7 indicates that loans that were offered in high slave extraction countries were too small. While row 8 indicates no relationship between slave extraction countries and the formal interest rates or prices of loans, row 9 indicates a strong relationship between slave extraction and the need to bribe bank officers. Row 10 indicates that managers in high slave extraction countries had no higher expectation of rejection.

These results suggest that supply-side factors are raising the cost of accessing credit. These costs do not appear to be primarily from higher interest rates, however, but are instead due to two factors. First, banks appear to require more extensive information and collateral in order to approve the loan, and even then offer insufficient funds. Second, accessing bank credit requires bribing corrupt loan officers. Thus, while concern over government corruption as an obstacle to

doing business may not be higher in high slave extraction countries (see Table A4),[27] corruption within banks appears to be driving up the costs of credit in ways that impede financing and growth. These results are consistent with a broad literature suggesting corruption inhibits economic development (Fisman 2001; Olken 2007; Reinikka and Svensson 2004), but show that corruption is not limited to government functions.

E. Sector-Specific Effects Within Countries

All of our previous regressions have identified the impact of the slave trade of access to finance at the country level. These results could be explained either by persistent country-level cultural aspects directly impacted by the slave trade, or alternatively by institutional differences that developed in response to heterogeneous extraction levels. In order to disentangle these possible mechanisms, we examine within-country differences in the slave trade-finance relationship using the approach from Rajan and Zingales (1998).

In this approach, we first identify sector-level and firm size effects on specific financial channels in the most frictionless financial market in Africa: South Africa. We do so by regressing the WES access to finance variables on interactions between the sectors listed in Table 2a and a dummy for firm size.[28]

$$(4)\quad y_{ikt} = \beta + \boldsymbol{Z}_{it}'\lambda + \varepsilon_{ik}.$$

where y_{ikt} is a variable indicated in Table A5. $\mathbf{Z}_i$ is a vector of industry sector dummies interacted with each of the three firm size dummies as well as a linear term for firm age. The observations and adjusted r-squared values are listed in Table A-5. Of the many access to finance variables used in earlier regressions, only trade credit is significantly explained by sector and size factors. Consequently, we use percentage paid with sales credit to estimate industry-specific effects of the slave trade across Africa.

Following Rajan and Zingales (1998), we regress individual sales credit responses across Africa on country-level slave extraction levels and the predicted values from the sales credit

[27] The advantage of using the self-reported measures is that they are comparable across different obstacles to business. Tests of significance can be conducted by looking at the overlapping confidence intervals. In general we find strong to suggestive results for differences between finance and the other obstacles with the exception of access to electricity and political instability, the latter of which is very imprecisely estimated.

[28] South Africa has the lowest reported level of access to finance as a business obstacle in the WES data, as well as the top ranking in "getting credit" and "protecting investors" in the Doing Business Project. Furthermore, its size provides sufficient observations in the WES data to estimate sector-specific effects in access to finance.

regression in Table A-5. Column 1 in Table 7 presents the basic model without interaction, while columns 2-4 present models that interact sector-specific dependence with slave extraction. In column 1 we see that South African sectors where sales credit is more common strongly predict sales credit in other countries. Furthermore, slave extraction has a much stronger negative effect on sales credit access for firms in those sectors that heavily supply this type of financing. Column 5 further adds fixed effects for country and sector/size, and this interaction term remains significantly negative, while column 6 replaces the continuous (log of area-adjusted) slave extraction variable with a dummy for above-median extraction levels. These fixed effect regressions show that even within-country, historical slave extraction appears to more significantly impact the access to finance of those firms that heavily depend on trade credit.

4. Conclusion

In this paper, we have demonstrated that firms play a critical role in tying historically-based culture to economic development. While development may be influenced by a number of factors, access to finance seems to play a unique role as the link between the historical slave trade and economic development. Our historical persistence approach suggests a causal link that between culture and finance that is helpful in interpreting the body of previously-observed correlations.

We are also able to show that the historic slave trade impacts access to finance through both formal and informal channels. Formal channels such as bank loans and lines of credit are inaccessible to the firms that need them. Low use of credit in countries with histories of high slave extraction is a function of supply-based shortages, not a lack of demand. In informal trade channels, neither customers nor suppliers are willing to extend credit, requiring payment-on-delivery that might reduce the frequency of transactions and the magnitude of investment. Consequently, supplier and customer credit does not supplement formal credit shortages in ways that might support critical investment in developing countries. Our ability to implement country fixed-effect models for trade credit shows that even within common institutional settings, industry sectors that depend on informal credit channels are more heavily impacted by the long-term impact of the slave trade than others.

While we cannot specifically observe which cultural mechanisms might link the historical slave trade with access to finance, prior work strongly suggests that mistrust plays a critical role in this link (Nunn 2008; Nunn and Wantchekon 2011). Furthermore, an extensive body of research links trust to historical shocks, finance, and development, providing circumstantial evidence for trust as the mechanism behind the slave trade-finance link. In fact, given the extensive literature detailed earlier, the link between access to finance and both development and trust would not be surprising. A folk critique of the trust and finance literature argues that since trust impacts every transaction (e.g. Arrow 1972; Granovetter 1985), finance is not exceptional. But our finding that it appears to be the only critical link in Africa between a historical shock to culture and GDP emphasizes the importance of finance as a driver of economic growth and exchange, as well as the special role of firms in the development process.

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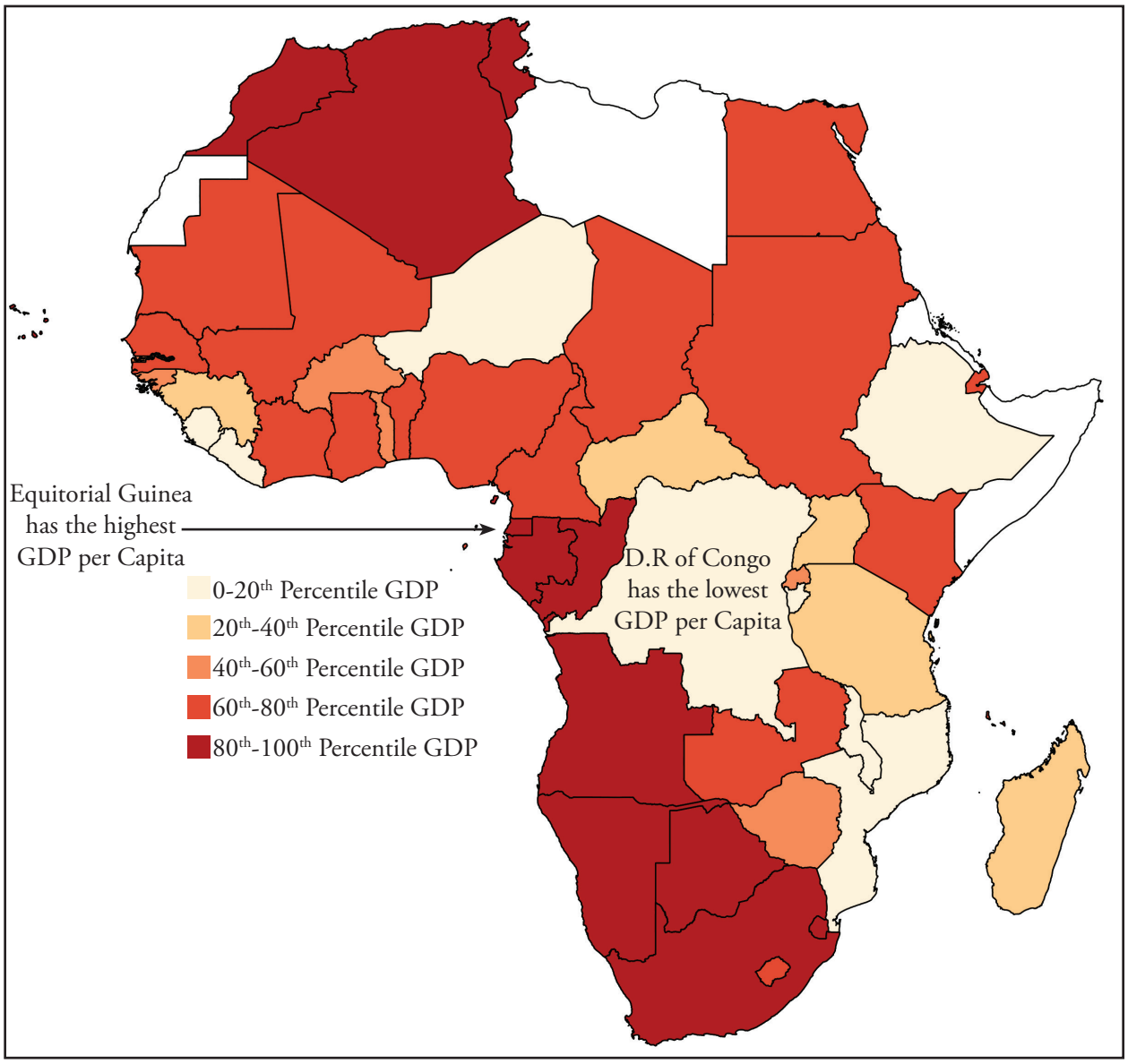
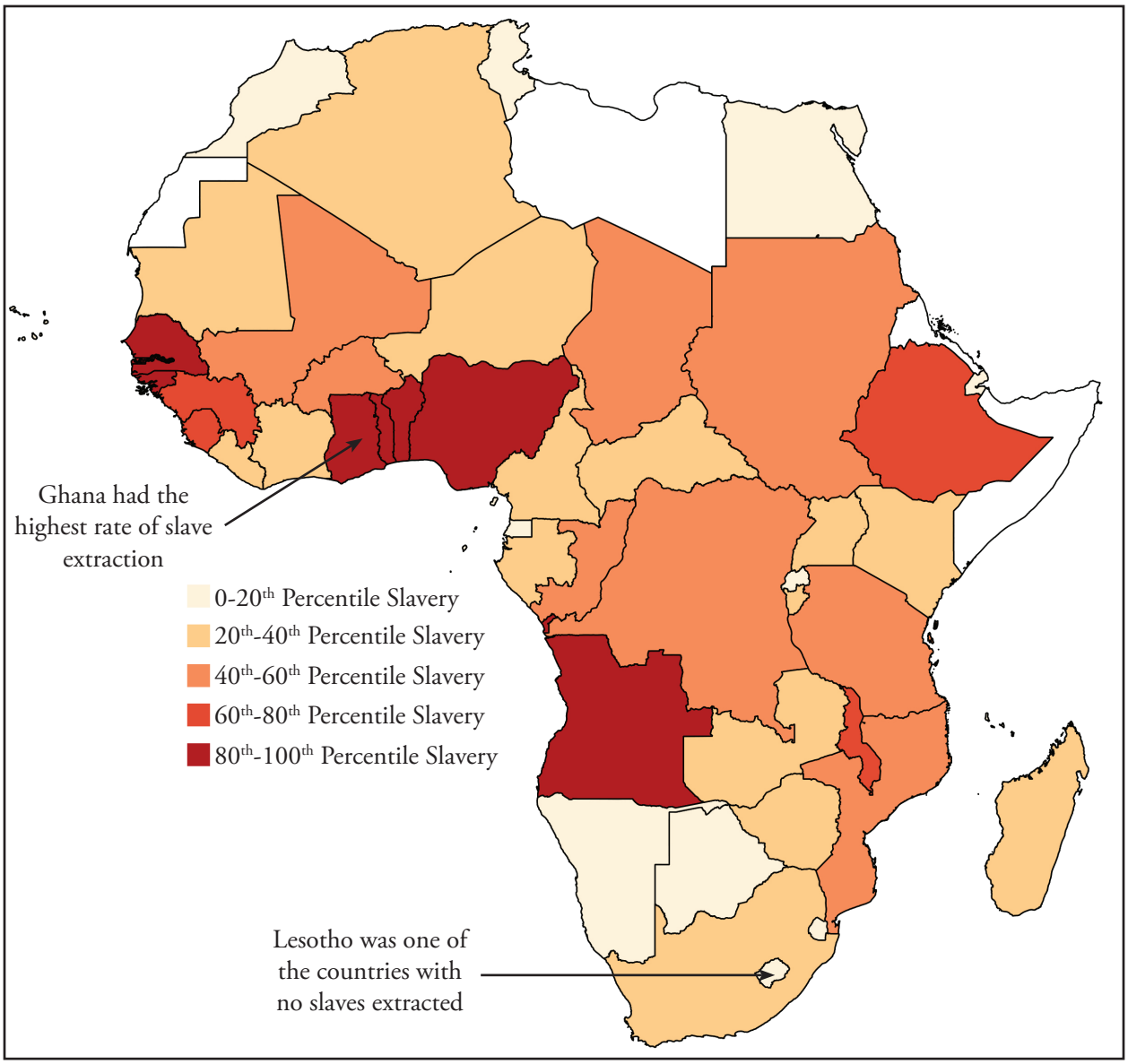
Figure 1a: GDP in Africa



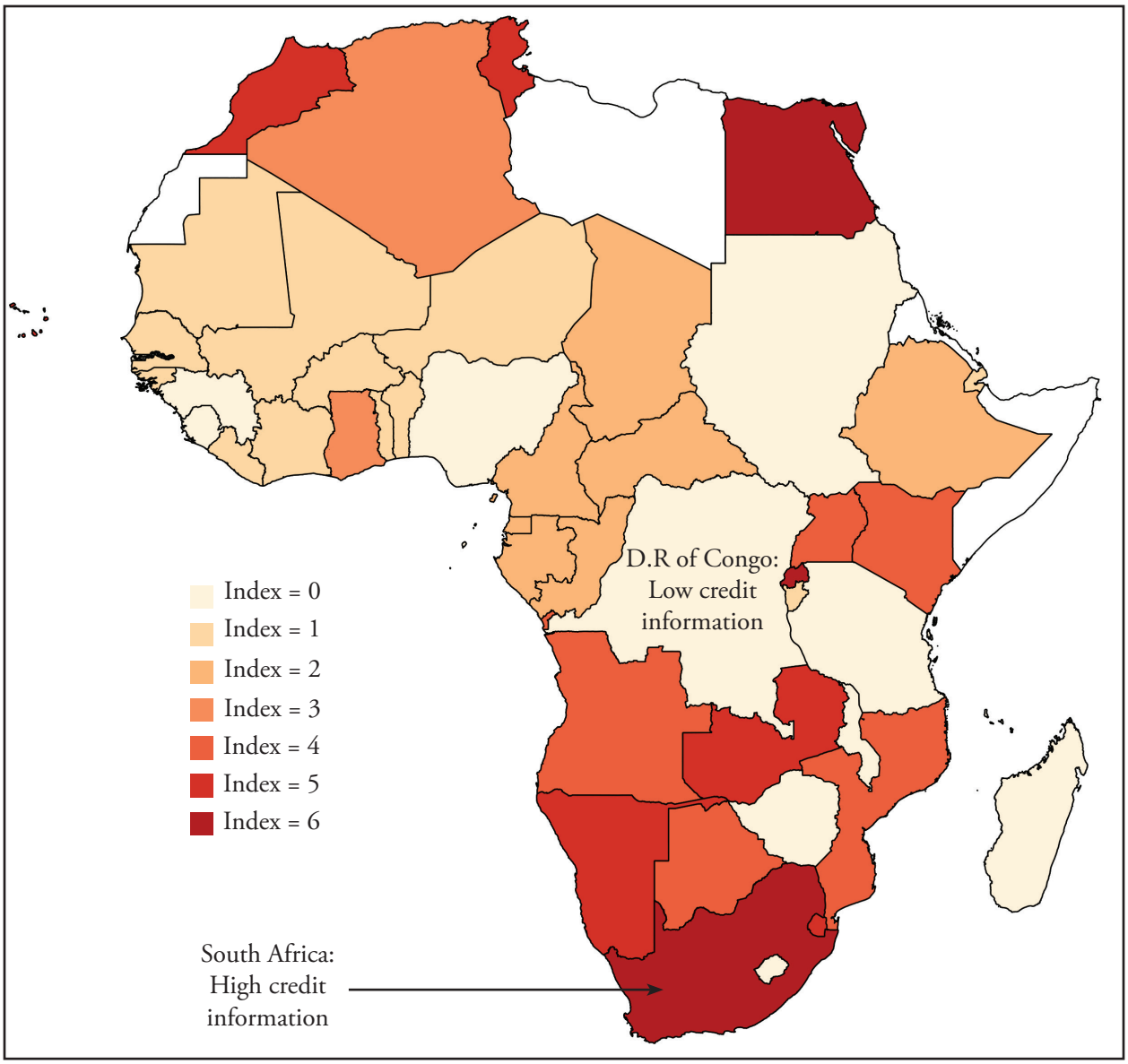
Note: Data comes from Nunn (2008).

Figure 1b: Historical slave extraction per square mile



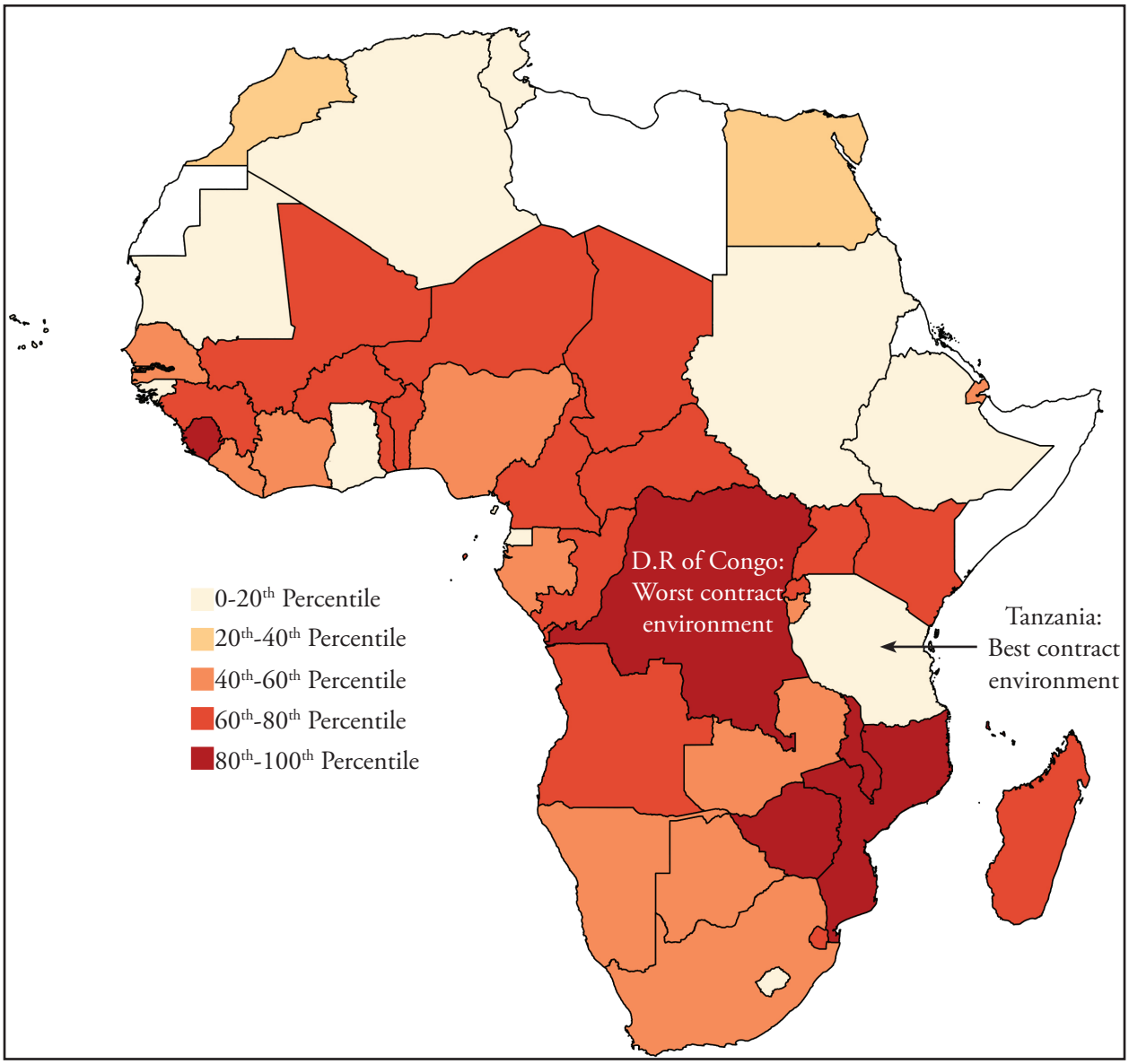
Note: Data comes from 2012 World Bank Doing Business Survey.

Figure 1c: Credit information index



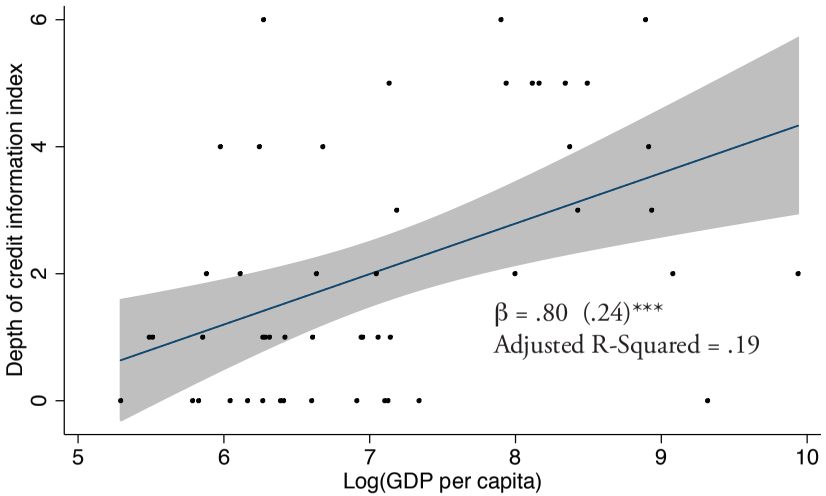
Note: Data comes from 2012 World Bank Doing Business Survey.

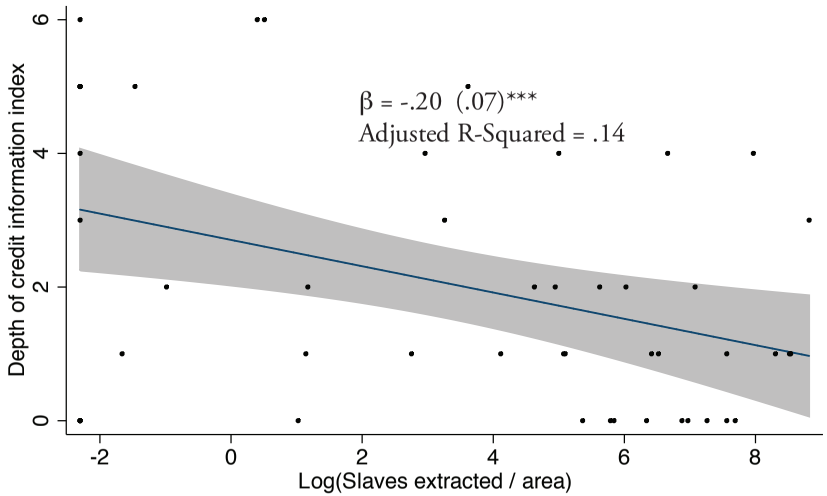
Figure 1d: Cost of enforcing a contract

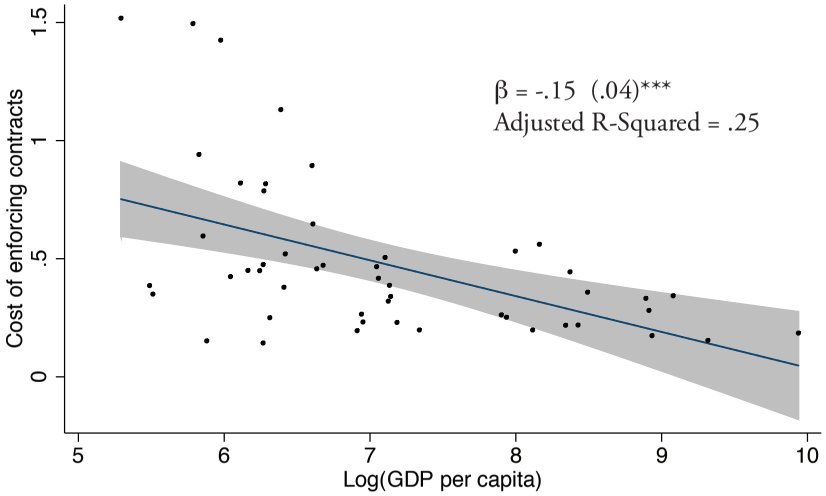


Note: Data comes from 2012 World Bank Doing Business Survey.

Figure 2: Regressions contrasting cost of contracting and financial information







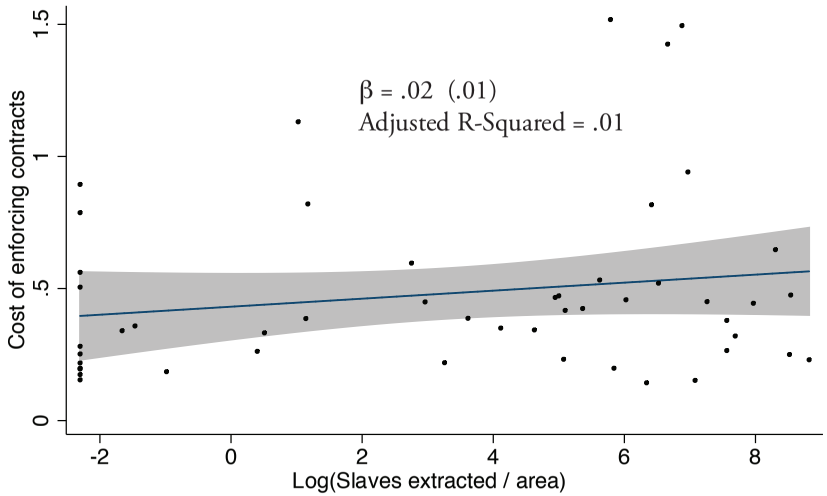


Figure 3: Financial information linked to GDP and slave extraction

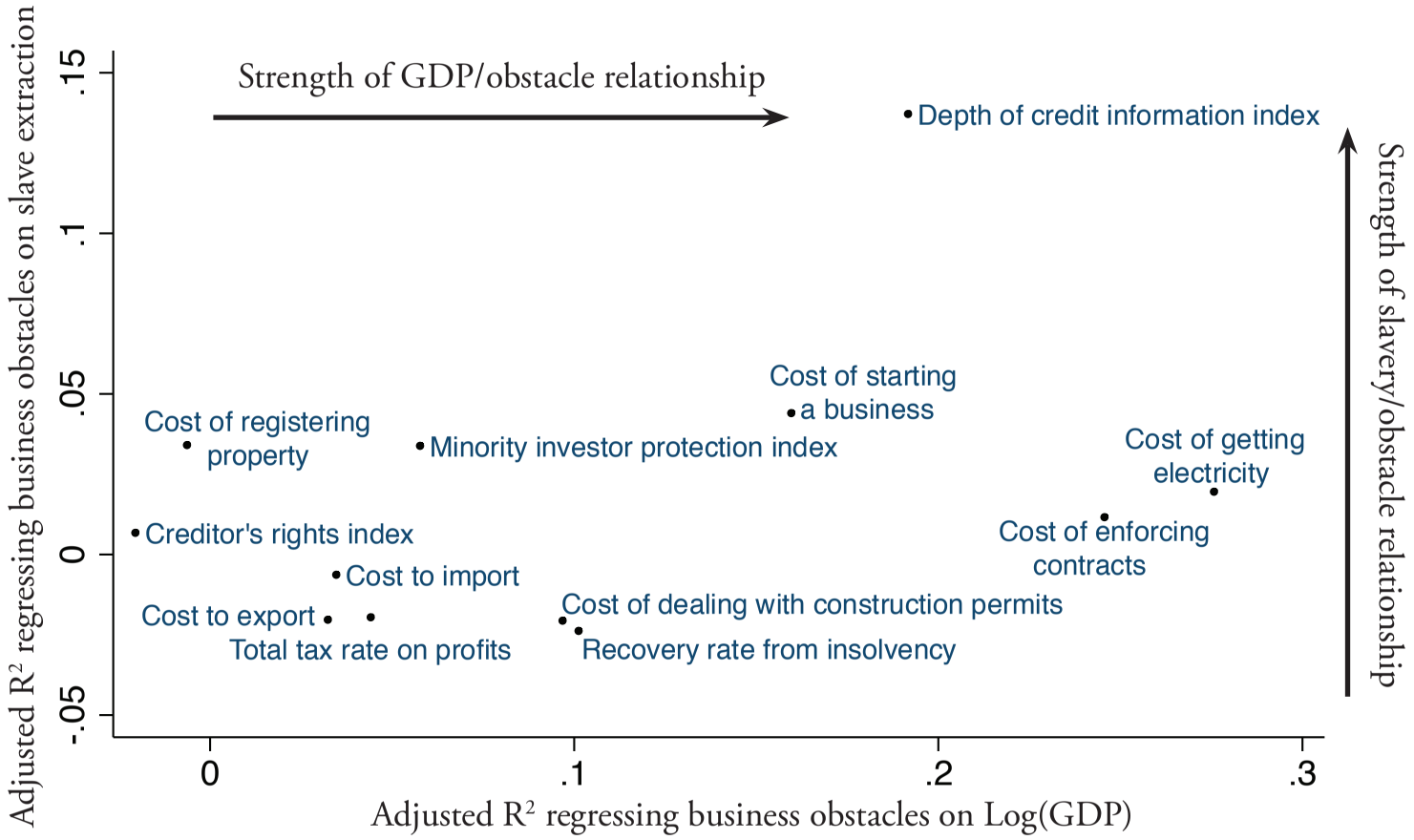


Table 1a: Country summary statistics

	Doing Business Sample		WES Sample	
Variables	Mean	SD	Mean	SD
Log(Slave extraction / area)	3.26	3.89	4.38	3.68
World Bank GDP in 2009	2424.14	3647.68	1824.24	2363.97
Longitude	16.70	20.21	13.94	20.37
Absolute value of latitude	13.55	9.86	12.38	8.02
Lowest month rainfall(mm)	8.87	16.06	8.16	11.77
Maximum humidity	71.67	11.95	72.58	10.79
Average low tempeture	8.75	7.49	8.82	7.30
Log(Coastline area in 1,000s of km)	-0.24	3.24	-0.78	3.05
Island dummy	0.10	0.30	0.05	0.23
Percent Islamic	35.32	39.08	25.79	31.58
French legal origins	0.65	0.48	0.61	0.50
North Africa dummy	0.10	0.30	0.00	0.00
Former communist country	0.10	0.30	0.13	0.34
Log(Average gold production per capita)	-7.48	5.66	-6.31	5.39
Log(Average oil production per capita)	-6.71	4.03	-7.27	3.60
Log(Average diamond production per capita)	-5.49	2.40	-5.14	2.60
British colony	0.35	0.48	0.37	0.49
French colony	0.40	0.50	0.37	0.49
Portugal colony	.10	.30	.10	.30
Belgium colony	.05	.24	.08	.27
Other colonizer	.10	.30	.08	.27
Minimum Atlantic Ocean distance (1000's of kms)	7.38	3.28	6.59	2.69
Minimum Indian Ocean distance (1000's of kms)	6.93	4.24	6.69	3.64
Minimum Saharan distance (1000's of kms)	3.51	1.57	3.87	1.36
Minimum Red Sea distance (1000's of kms)	3.45	1.47	3.80	1.356
Observations	52	52	38	38

Table 1b: Country summary statistics

Variables	Doing Business Sample		WES Sample	
	Mean	SD	Mean	SD
Cost of starting a business (% of avg yearly income)	0.78	0.91	0.79	0.97
Cost of dealing with construction permits (% of avg yearly income)	8.00	13.04	7.88	11.42
Cost of enforcing a contract (% of claim)	0.48	0.34	0.50	0.34
Cost of getting electricity (% of avg yearly income)	51.93	66.90	57.42	73.19
Cost of registering property (% of property value)	0.09	0.05	0.10	0.05
Recovery rate from insolvency (Cents on the dollar)	0.22	0.14	0.21	0.12
Cost to export (US $ per container)	1855	1153	1940	1051
Cost to import (US $ per container)	2367	1704	2524	1690
Depth of credit information index	2.06	1.98	2.08	1.92
Creditor's legal rights index	5.52	2.19	6.00	2.08
Total tax rate as a percentage of profits	0.18	0.11	0.19	0.11
Minority investor protection index	4.52	1.30	4.58	1.36
Observations	50	50	38	38

Note: In the Doing Business sample there are only 50 total observations for the World Bank's GDP estimate in 2009. Libya and Somalia are missing. There are also only 44 total observations for resolving insolvency.

Table 2a: Firm summary statistics (WES)

Variables	Observations	Mean	Standard Deviation	Max	Min
Less than 20 employees	15276	0.645	0.479	0	1
21 to 99 employees	15276	0.260	0.439	0	1
100 or more employees	15276	0.095	0.293	0	1
Firm age	15100	13.28	12.80	0	190
Sector: Textiles	15276	0.012	0.110	0	1
Sector: Leather	15276	0.001	0.028	0	1
Sector: Garments	15276	0.085	0.279	0	1
Sector: Food	15276	0.125	0.330	0	1
Sector: Metals and machines	15276	0.048	0.214	0	1
Sector: Electronics	15276	0.004	0.066	0	1
Sector: Chemicals and pharmaceuticals	15276	0.024	0.152	0	1
Sector: Wood and furniture	15276	0.016	0.126	0	1
Sector: Non-metallic and plastic materials	15276	0.020	0.140	0	1
Sector: Other manufacturing	15276	0.161	0.367	0	1
Sector: Retail and wholesale trade	15276	0.265	0.441	0	1
Sector: Hotels and restaurants	15276	0.060	0.237	0	1
Sector: Other services	15276	0.125	0.330	0	1
Sector: Other (transportation, construction, etc.)	15276	0.055	0.228	0	1

Table 2b: Firm summary statistics (WES)

Variables	Observations	Mean	Standard Deviation	Max	Min
Self-reported: Access to finance is difficult	13238	0.738	0.440	0	1
Checking account	13274	0.859	0.348	0	1
Line of credit	15141	0.202	0.402	0	1
% of working capital from internal funds	15088	0.728	0.297	0	1
% of working capital from bank loan	15088	0.067	0.179	0	1
% of working capital from supply chain credit	15088	0.160	0.215	0	1
% of working capital from other sources	15088	0.045	0.147	0	1
% of sales paid with credit	14932	.278	.350	0	0
% of sales paid on delivery	14933	.506	.400	0	0
% of sales paid in advance	14935	.215	.314	0	1
Asset purchased last year	15201	.468	.499	0	1
% of asset purchased with retained earnings	7007	.788	.351	0	1
Applied for any loan last year	15079	0.216	0.412	0	1
Self-reported: No need for a loan last year	11707	0.392	0.488	0	1
Self-reported: Loan procedures too cumbersome	11707	0.179	0.383	0	1
Self-reported: Interest rates too high	11707	0.178	0.383	0	1
Self-reported: Too much collateral needed	11707	0.111	0.314	0	1
Self-reported: Loan too small	11707	0.022	0.145	0	1
Self-reported: Informal payment required	11707	0.058	0.234	0	1
Self-reported: Anticipated rejection	11707	0.060	0.238	0	1

Note: Self-reported access to finance question not asked in Nigeria. 1 indicates finance is either a minor, moderate, major, or severe obstacle. 0 indicates finance is not an obstacle. Other sources of working capital can include family, friends, and non-bank financial institutions. % of asset purchased with retained earnings is conditional on purchasing an asset. Self-reported data on reasons for not seeking a loan in the prior year are conditional on not receiving a loan.

Table 3: Historical slave extraction and present day depth of financial information

	Dependent variable: Depth of financial information					
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave extraction / area)	-.197 (.072)***	-.193 (.077)**	-.223 (.101)**	-.327 [-.722,-.056]	-.261 [-.615,.026]	-.224 [-∞,∞]
Colonizer Effects		Yes	Yes		Yes	Yes
Geographic Controls			Yes			Yes
Natural Resource Controls			Yes			Yes
Political and Culture Controls			Yes			Yes
Instrumental variables				Yes	Yes	Yes
Unit of analysis	Country	Country	Country	Country	Country	Country
Clusters	50	50	50	50	50	50
Observations	50	50	50	50	50	50

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain robust standard errors. Specifications 4-6 report the Moriera conditional likelihood ratio intervals for the 95% confidence level for instrumental variables with weak instruments. The f-statistic on the first stage regressions are consistently less than 10, which implies we have a weak instruments problem. We use the Moriera (2003) conditional likelihood ratio test that provides a set of parameter estimates that would not be rejected at the 95th percentile confidence level. The actual value of the parameter estimate is ambiguous in this case, so we use limited information maximum likelihood point estimate from Moriera (2003) Stata code. See Murray (2006) for a comprehensive explanation of this problem and the various approaches to solving it.

Table 4: Historical slave extraction and present day self-reported access to finance obstacle

	Dependent variable: Self-reported access to finance as obstacle							
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(Slave extraction / area)	.025 (.008)***	.024 (.007)***	.017 (.007)**	.028 (.007)***	.030 (.008)***	.047 [.022,.110]	.040 [.011,.159]	.009 [-∞,∞]
Sector * firm size effects		Yes	Yes	Yes				
Firm age controls		Yes	Yes	Yes				
Colonizer effects			Yes	Yes	Yes		Yes	Yes
Geographic controls				Yes	Yes			Yes
Natural resource controls				Yes	Yes			Yes
Political and culture controls				Yes	Yes			Yes
Instrumental variables						Yes	Yes	Yes
Unit of analysis	Firm	Firm	Firm	Firm	Country	Country	Country	Country
Clusters	37	37	37	37	37	37	37	37
Observations	13238	13238	13238	13238	37	37	37	37

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain standard errors clustered at the country level (Self-reported access to finance question not asked in Nigeria). Specifications 6-8 report the Moriera conditional likelihood ratio intervals for the 95% confidence level for instrumental variables with weak instruments. The f-statistic on the first stage regressions are consistently less than 10, which implies we have a weak instruments problem. We use the Moriera (2003) conditional likelihood ratio test that provides a set of parameter estimates that would not be rejected at the 95% percentile confidence level. The actual value of the parameter estimate is ambiguous in this case, so we use limited information maximum likelihood point estimate from Moriera (2003) stata code. See Murray (2006) for a comprehensive explanation of this problem and the various approaches to solving it.

Table 5: Impact of slave trade on firm financing

Dependent Variable	Independent variable: Log(Slave extraction / area)			
	(1)	(2)	(3)	(4)
Checking account	-.016 (.004)***	-.014 (.003)***	-.013 (.003)***	-.015 (.007)**
Line of credit	-.025 (.005)***	-.021 (.004)***	-.021 (.005)***	-.025 (.009)***
Sales paid on delivery (% of total sales)	.012 (.006)**	.008 (.005)	.007 (.004)**	.004 (.008)
% of working capital from internal funds	.012 (.003)***	.010 (.003)***	.008 (.003)***	.023 (.006)***
% of working capital from bank loan	-.008 (.003)***	-.007 (.003)**	-.008 (.003)***	-.008 (.004)*
% of working capital from supply chain credit	-.003 (.005)	-.003 (.004)	.001 (.003)	-.009 (.005)*
% of working capital from other sources	-.001 (.001)	-.001 (.001)	-.001 (.001)	-.006 (.002)**
Sector * firm size effects		Yes	Yes	Yes
Firm age controls		Yes	Yes	Yes
Colonizer effects			Yes	Yes
Geographic controls				Yes
Natural resource controls				Yes
Political and culture controls				Yes

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Standard errors are clustered at the country level (38 clusters). See Table 2b for the number of observations.

Table 6: Reasons for not applying for a loan

Dependent Variable	Independent variable: Log(Slave extraction / area)			
	(1)	(2)	(3)	(4)
Asset purchased last year	-.010 (.003)***	-.007 (.004)*	-.004 (.004)	.001 (.005)
% of asset purchased with retained earnings	.022 (.004)***	.020 (.004)***	.020 (.004)***	.013 (.005)**
Applied for any loan last year	-.007 (.004)*	-.004 (.004)	-.006 (.004)*	-.014 (.007)**
Self-reported: No need for a loan last year	-.044 (.005)***	-.039 (.005)***	-.036 (.003)***	-.035 (.005)***
Self-reported: Loan procedures too cumbersome	.018 (.002)***	.017 (.002)***	.014 (.002)***	.017 (.006)***
Self-reported: Interest rates too high	.009 (.003)***	.008 (.003)**	.007 (.003)**	-.002 (.004)
Self-reported: Too much collateral needed	.010 (.003)***	.009 (.002)***	.010 (.002)***	.012 (.004)***
Self-reported: Loan too small	.002 (.001)**	.002 (.001)**	.001 (.001)*	.002 (.001)***
Self-reported: Informal payment required	.006 (.001)***	.005 (.001)***	.005 (.001)***	.009 (.002)***
Self-reported: Anticipated rejection	-.001 (.002)	-.001 (.002)	-.001 (.002)	-.006 (.003)*
Sector * firm size effects		Yes	Yes	Yes
Firm age controls		Yes	Yes	Yes
Colonizer effects			Yes	Yes
Geographic controls				Yes
Natural resource controls				Yes
Political and culture controls				Yes

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Standard errors are clustered at the country level (38 clusters). See Table 2b for the number of observations.

Table 7: Using the effects of sector & firm size on sales credit provision in South Africa to predict within-country sales credit provision

Independent variables	Dependent variable: % of sales paid with credit					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Slave extraction / area)	-.020 (.005)***	-.009 (.005)*	-.011 (.005)**	-.014 (.006)**	Absorbed	Absorbed
Predicted sector / firm size effect on sales credit	.295 (.062)***	.415 (.061)***	.414 (.057)***	.412 (.057)***	Absorbed	Absorbed
Log(Slaves exported) * Predicted sector / firm size effect on sales credit		-.024 (.010)**	-.023 (.010)**	-.030 (.009)***	-.020 (.007)***	
Above median slave exports * Predicted sector / firm size effect on sales credit						-.241 (.062)***
Sector * firm size effects					Yes	Yes
Firm age controls					Yes	Yes
Colonizer effects			Yes	Yes	Absorbed	Absorbed
Geographic controls				Yes	Absorbed	Absorbed
Natural resource controls				Yes	Absorbed	Absorbed
Political and culture controls				Yes	Absorbed	Absorbed
Country fixed effects					Yes	Yes
Clusters	37	37	37	37	37	37
Observations	13,835	13,835	13,835	13,835	13,835	13,835

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Standard errors are clustered at the country level (37 clusters). We use a regression within South Africa to predict sector / firm size effects on sales credit extension in the most frictionless large economy in Africa. We then extend the predictions from the within South Africa regression to the other 37 countries to create "Predicted sector / firm size effect on sales credit".

Table A1: Firm summary statistics (WES)

Variables	Observations	Mean	Standard Deviation	Mean	Standard Deviation
Self-reported: Access to finance is difficult	13238	0.738	0.440	0.215	0.411
Self-reported: Access to electricity is an obstacle	15240	0.817	0.387	0.287	0.453
Self-reported: Transportation is an obstacle	15188	0.657	0.475	0.090	0.286
Self-reported: Informal competition is an obstacle	15135	0.690	0.462	0.157	0.364
Self-reported: Access to land is an obstacle	15090	0.543	0.498	0.080	0.272
Self-reported: The courts are an obstacle	12881	0.416	0.493	0.048	0.214
Self-reported: Tax rates are an obstacle	15052	0.733	0.442	0.118	0.322
Self-reported: Obtaining business license is an obstacle	14953	0.552	0.497	0.049	0.216
Self-reported: Political instability is an obstacle	14973	0.480	0.500	0.113	0.316
Self-reported: Corruption is an obstacle	14993	0.634	0.482	0.161	0.367
1 = Minor, Moderate, Major, or Severe obstacle		Yes	Yes		
1= Severe obstacle				Yes	Yes

Note: Self-reported access to finance question not asked in Nigeria. 1 indicates finance is either a minor, moderate, major, or severe obstacle. 0 indicates finance is not an obstacle. Other sources of working capital can include family, friends, and non-bank financial institutions. Self-reported data on reasons for not seeking a loan in the prior year are conditional on not receiving a loan.

Table A2: Replicating Nunn (2008)

	Dependent variable: Log (Maddison GDP in 2000)							
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(Slave extraction / area)	-.118 (.026)***	-.076 (.027)***	-.103 (.029)***	-.128 (.031)***	-.248 [-.515,-.139]	-.223 [-.415,-.135]	-.371 [-∞,∞]	-.244 [-.759,-.095]
Sector * firm size effects & firm age controls		Yes	Yes	Yes				
Colonizer effects			Yes	Yes	Yes		Yes	Yes
Geographic controls				Yes	Yes			Yes
Natural resource controls				Yes	Yes			Yes
Political and culture controls				Yes	Yes			Yes
Instrumental variables						Yes	Yes	Yes
Observations	52	52	52	42	52	52	52	42

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Parentheses contain robust standard errors. Specifications 6-8 report the Moriera conditional likelihood ratio intervals for the 95% confidence level for instrumental variables with weak instruments. The f-statistic on the first stage regressions are consistently less than 10, which implies we have a weak instruments problem. We use the Moriera (2003) conditional likelihood ratio test that provides a set of parameter estimates that would not be rejected at the 95% percentile confidence level. The actual value of the parameter estimate is ambiguous in this case, so we use limited information maximum likelihood point estimate from Moriera (2003) Stata code. See Murray (2006) for a comprehensive explanation of this problem and the various approaches to solving the problem. Columns (4) & (8) exclude North Africa and islands.

Table A3: Comparision of slave trade vs GDP parameters

Dependent Variable	Independent variable: Log(GDP 2009)			Independent variable: Log(Slave extraction / area)		
	(1)	(2)	(3)	(4)	(5)	(6)
Depth of credit information index	.705 (.244)***	.877 (.257)***	1.222 (.389)***	-.197 (.072)***	-.193 (.077)**	-.223 (.101)**
Cost of starting a business (% of avg yearly income)	-.338 (.141)**	-.253 (.086)***	-.413 (.215)*	.058 (.026)**	.067 (.030)**	.082 (.066)
Cost of dealing with construction permits (% of avg yearly income)	-3.89 (1.12)***	-3.31 (1.11)***	-2.64 (2.03)	.046 (.336)	.121 (.332)	.059 (.758)
Cost of enforcing a contract (% of claim)	-.152 (.039)***	-.133 (.038)***	-.208 (.070)***	.015 (.011)	.017 (.011)	.026 (.017)
Cost of getting electricity (% of avg yearly income)	-31.7 (9.1)***	-20.7 (4.0)***	-27.7 (10.7)**	3.35 (1.76)*	4.42 (1.43)***	6.33 (3.26)*
Cost of registering property (% of property value)	-.005 (.005)	-.007 (.005)	-.012 (.009)	.003 (.002)*	.003 (.002)	.000 (.002)
Recovery rate from insolvency (Cents on the dollar)	-.048 (.016)***	-.040 (.018)**	-.033 (.035)	.000 (.005)	.001 (.005)	-.004 (.009)
Cost to export (US $ per container)	-231 (118)*	-152 (130)	29 (120)	6.4 (36.3)	13.9 (35.6)	-13.4 (51.8)
Cost to import (US $ per container)	-349 (163)**	-215 (177)	17 (198)	51 (53)	63 (48)	24 (76)
Creditor's legal rights index	-.034 (.257)	-.138 (.204)	.352 (.380)	.091 (.076)	.108 (.061)*	.019 (.061)
Total tax rate as a percentage of profits	-.024 (.016)*	-.009 (.010)	-.032 (.022)	.001 (.003)	.002 (.003)	.009 (.006)
Minority investor protection index	.316 (.188)*	.395 (.171)**	.124 (.225)	-.076 (.049)	-.067 (.048)	.068 (.073)
Colonizer effects		Yes	Yes		Yes	Yes
Geographic controls			Yes			Yes
Natural resource controls			Yes			Yes
Political and culture controls			Yes			Yes

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Robust standard errors in parentheses (see Table 1B for number of observations)

Table A4: Self-Reported obstacles regressions

Dependent Variable	Independent variable: Log(Slave extraction / area)				
	(1)	(2)	(3)	(4)	(5)
Self-reported: Access to finance is an obstacle	.025 (.008)***	.024 (.007)***	.017 (.007)**	.028 (.007)***	.029 (.006)***
Self-reported: Access to electricity is an obstacle	.028 (.007)***	.028 (.007)***	.027 (.006)***	.015 (.007)**	.018 (.013)
Self-reported: Transportation is an obstacle	.023 (.008)***	.027 (.008)***	.024 (.008)***	.013 (.007)*	-.006 (.004)
Self-reported: Informal competition is an obstacle	.016 (.007)**	.016 (.006)**	.011 (.007)	.011 (.009)	-.010 (.009)
Self-reported: Access to land is an obstacle	.016 (.008)*	.015 (.007)*	.010 (.008)	.022 (.010)**	.001 (.004)
Self-reported: The courts are an obstacle	.014 (.009)	.017 (.009)*	.006 (.009)	.017 (.019)	.001 (.003)
Self-reported: Tax rates are an obstacle	.016 (.010)	.017 (.009)*	.015 (.009)*	.010 (.010)	-.001 (.004)
Self-reported: Obtaining business license is an obstacle	.015 (.010)	.015 (.009)	.010 (.009)	.005 (.015)	-.004 (.003)
Self-reported: Political instability is an obstacle	.018 (.011)	.019 (.011)*	.014 (.012)	.044 (.027)	.025 (.014)*
Self-reported: Corruption is an obstacle	.007 (.007)	.010 (.006)	.003 (.007)	.007 (.018)	.000 (.009)
Sector * Firm size effects & firm age controls		Yes	Yes	Yes	Yes
Colonizer effects			Yes	Yes	Yes
Geographic controls				Yes	Yes
Natural resource controls				Yes	Yes
Political and culture controls				Yes	Yes
Degree of obstacle	All	All	All	All	Severe Only

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% confidence levels, respectively. Standard errors are clustered at the country level (38 clusters, except for the self-reported access to finance which has 37 clusters).

Table A5: Predicting firm financial variables using sector / firm size effects within South Africa.

Variables	Observations	R^2	Adjusted R^2
Self-reported: Access to finance is difficult	937	.106	.071
Checking account	937	.031	-.007
Line of credit	937	.070	.034
% of working capital from internal funds	937	.083	.047
% of working capital from bank loan	937	.062	.025
% of working capital from supply chain credit	937	.095	.059
% of working capital from other sources	937	.049	.012
% of sales paid with credit	***937***	***.246***	***.217***
% of sales paid on delivery	937	.238	.208
% of sales paid in advance	937	.085	.050
Asset purchased last year	937	.135	.102
% of asset purchased with retained earnings	403	.133	.058
Applied for any loan last year	937	.064	.028
Self-reported: No need for a loan last year	732	.155	.112
Self-reported: Loan procedures too cumbersome	732	.074	.027
Self-reported: Interest rates too high	732	.036	-.012
Self-reported: Too much collateral needed	732	.131	.087
Self-reported: Loan too small	732	.026	-.023
Self-reported: Informal payment required	732	.056	.009
Self-reported: Anticipated rejection	732	.056	.009

Note: Regressions only performed within South Africa. Specification follows equation (4).