The effect of slave trade on contemporary financial development within Nigeria

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Abstract

The thesis shows that current differences in financial development within Nigeria are unrelated to slave trade. Combining contemporary survey data with data on slave extraction intensity within Nigeria, I find no relationship between the severity of slave trade and contemporary financial development on an individual level and an enterprise level.

Table of Contents

Introduction

Since the seminal paper of King and Levine (1993), economics and finance research has extensively examined the nexus between finance and socio-economic development. The general consensus is that financial development spurs economic growth, socio-economic welfare and the reduction of poverty[1]. These causal relationships urged a more profound understanding of financial development and its determinants. The literature initially focused on the question how policy could improve the financial development. Since López de Silanes, La Porta, Shleifer & Vishny (1997; 1998, hereafter LLSV) show that the persistence of colonial effects is an additive determinant of contemporary level of financial development, is the role of historical factors in the financial development subject to research. The persistence of historical factors is likely to be rooted in major historical events. LLSV and Acemoglu, Robinson and Johnson (2001, hereafter ARJ) find an impact of colonization on contemporary financial development. In two recent studies, Nunn (2008) and Nunn and Wantchekon (2011) examine the long term impacts of the slave trade. Nunn finds a significant negative long term effect of slave trade on economic development. In a consecutive paper Nunn and Wantchekon find significant results indicating that individuals that belong to an ethnic group that was heavily targeted by slave traders exhibit lower levels of trust. They argue that since slaves were often taken, kidnapped or tricked into slavery by individuals close to them, a culture of mistrust aroused and persisted up until the present time. They claim that the persistence of a culture of mistrust might be a channel through which the findings of Nunn (2008) can be explained.

To my knowledge is the long term impact of slave trade on financial development not extensively examined since I am aware of only one paper that covers this subject; Pierce and Snyder (forthcoming). In a cross country that covers Africa they find a positive relationship between historical slave trade and the access to finance of firms. I aim to contribute to this young field of research by examining whether current heterogeneity in financial development of individuals and entrepreneurs within Nigeria can be traced back to the intensity of the extraction of slaves. The literature on the persistence of historical effects identifies two likely channels through which persistence might occur; institutions and trust. Nunn (2005) argues that slave trade had a detrimental effect on the quality of institutions that persisted, and institutional development is known to be positively related to financial development (amongst others: LLSV,

[1] see Levine (2005) for a detailed review

1998; Demirgüç-kunt and Maksimovic, 1998; AJR, 2001; Beck, Demirgüç-kunt and Levine, 2003a; Rajan and Zingales, 2003). The channel of trust builds on combining the work of Nunn and Watchekon (2011) and Guiso, Sapineza and Zingales (2004a, hereafter GSZ). Nunn and Wantchekon establish an adverse relationship between slave trade and contemporary levels of trust and GSZ show a positive relationship between trust and financial development. Both channels indicate a negative relationship between slave trade and contemporary financial development, therefore the hypothesis is that the intensity of the slave extraction has a negative causal effect on the contemporary local financial development.

To test the hypothesis, I use survey data from the 2010 general household survey in Nigeria to examine whether entrepreneurs and individuals that inhabit a district that was heavily targeted by slave trade are financially less developed. Financial development is measured by two continuous variables and several dichotomous variables that focus on the access to finance and financial activity, for instance whether the individual owns a bank account. With the use of probit and OLS regressions I find that individuals and entrepreneurs that inhabit heavily targeted districts are no more or less financially developed. I check for robustness with the use of various measures of financial development and with the use of alternative estimation methods. The hypothesis excludes reverse causality since the present day outcomes are unable to influence historical events, however the effect might be influenced by an omitted variable. An possible alternative explanation might be that an area that provided more slaves was initially financially more developed compared to other regions and that the difference persisted. Alternatively, other historical or geographical factors might influence the intensity of slave trade and have an impact on the contemporary development. To address the issue of the omitted variable problem I use an instrumental variable approach, with average regional height as instrument. The instrumental variable outcomes are identical to the probit and OLS estimates.

Section I reviews the literature on historical determinants of financial development. In section II the analysis begins with the historical background and the conceptual framework. The literature that covers the effects of slave trade and persistence of historical factors is discussed. In Section III the data and the data sources are described and limitations of the dataset are discussed. In Section IV the estimated models are described and in Section V the results are reported. In Section VI I pursue the instrumental variable approach. Section VII concludes.

I. Historical Determinants of Financial Development

The historical heterogeneity across countries as a source of decisive determinants of the present financial development is an emerging body of literature. In consecutive papers LLSV (1997; 1998) show the role of legal origin in the development of the financial markets. The theory of LLSV is called and further cited as the Law and Finance theory. In a cross country study on former colonies they find that countries with a British common law origin have the strongest investor- and creditor protection laws and the best enforcement of those laws. On the contrary, the countries with a French civil law origin have the weakest protection and enforcement. They state that, on average, countries with poor investor protection suffer in their financial development. This view is confirmed by Levine (1999) in his empirical work on the effect of the quality of the legal environment on the financial intermediary development. The reasoning behind this argument is that with better protection of the rights, the supply of external finance increases since it is safer for credit suppliers. Pistor, Raiser and Gelfer (2000) confirm the relationship between law and finance for transition economies. However, their most important empirical result is that legal reforms are unable to solve the absence of external finance completely. They argue that law only has a limited effect on external finance, several other factors are crucial as well. Furthermore they find that the effectiveness of the legal institutions have a larger impact compared to the quality of the law in the books.

Critics argue that the effect of legal origin on financial development is subject to endogeneity. Rajan and Zingales (2003) point out that in 1913 the most developed countries had similar levels of financial development, while they were heterogeneous in their legal origins[2]. Rajan and Zingales argue that the political context and support are decisive in the development of the financial sector. This statement is in line with North (1990) since he states that the groups that have power will shape the institutional environment to gain or retain their power. Pagano and Volpin (2001) argue that although investor protection makes the financial market more efficient, legal origin is not the central determinant of the protection of investors. Spamann (2008) and Lele and Siems (2007) argue that the coding and selection of the index variables of law and finance papers is flawed. Spamann undertakes a study to verify the accuracy of the index where he focusses on the accuracy of approximating the quality of law proxy without changing the variable definitions. He claims he achieves more accuracy with the help of local lawyers. He

[2] Britain was the exception since their development was a significant positive outlier

replicates the law and finance regression with the revised index and finds that the results do not hold. The main argument of Lele and Siems is that the diversity within the group of the common law countries makes it a naïve conclusion to claim that a particular origin has a decisive impact on financial development.

ARJ (2001) argue that legal origin is not the proper historical factor; as not whom colonized a country, but rather how a country is colonized is of real importance to the legal legacy. In their cross country study on former colonies they report the effects of population density before colonization and settlers mortality on the behavior of the colonizers. Their hypothesis covers the question whether in colonies with favorable conditions the colonizers made investments on infrastructure and institutions whereas in colonies with a bad settler's climate pure extraction was the strategy of the colonizer. Via the channel of colonize behavior the settlement climate variables influence the property rights and its enforcement, and thereby the financial development. Their reasoning is called the endowment theory.

In a comment Albouy (2012) states that the data on mortality rates is inconsistent, incomparable and is subject to questionable geographic judgments. The major arguments concerning the lack of comparability are the use of multiple data sources for different countries and that the data makes no distinction between mortality rates of soldiers in barracks and the soldiers on campaign, ignoring the major differences in healthiness of lifestyle. Furthermore he argues that the lack of considering pre-existing economic development and settlement of Europeans is in favor of their hypothesis. Countries as Australia, New Zealand and Malta had existing settlements or were economically more developed; this was beneficial to the conditions for the soldiers. With a negative relationship between mortality rates and economic development covering the nineteenth century and a positive relationship between past and current development, a bias in the data is created that is in favor of the hypothesis. The second major argument Albouy makes is that the majority of the data have assigned mortality rates and that the results are highly dependent on these assignments. He states that the benchmarking is flawed since borders are misinterpreted and benchmarks are poorly chosen. In an illustrative example he states that data on mortality rates of Hong Kong are incorrect as the British force spent most time in Beijing, more than thousand kilometers to the north of Hong Kong. Albouy adjusts the dataset of ARJ and replicates the research of ARJ. He finds that the relationship lacks robustness and that the instrumental variable is unreliable.

In response to Albouy's criticism ARJ (2012) argue that he needs to discard 60 per cent of their sample to undermine their results and that his results are largely driven by the positive outlier of Gambia. They state that, however throwing out data is not the reasonable approach, if they limit the effect of outliers in the Albouy dataset it leads to robust results in support of their earlier results. Furthermore they point out that Albouy codes a "campaign" dummy to separate the peacetime from the "campaign" episodes, but that this dummy is inconsistent and inaccurate in multiple cases. They make minor adjustments in encoding the dummy variable and find that no basis remains for the claims Albouy makes. Conclusively, they state that the arguments of Albouy are often unfounded and have only minor consequences for the robustness of the results of their 2001 paper; therefore they claim that the big picture remains intact.

In their cross country regression Beck, Demirgüç-kunt and Levine (2003a) incorporate proxies of both the law and finance theory and the endowment theory in a single model in an attempt to investigate which theory explains financial development. Their conclusion is that both theories explain cross country variation in financial development, whereas they find not much evidence for additional explanations.

II. Historical Background and Conceptual Framework

A. Historical Background

The impact of slave trade on the continent of Africa is a subject to research for several decades; however, the body of literature on this subject remains ambiguous about the ultimate impact of slave trade on economic outcomes. The literature on the impact of slave trade on Africa initially focused primarily on the volume of the slave trade and the depopulation effects. Manning (1990) simulates the slave trade and its demographical impact on Africa. He finds that slave trade shaped the present African daily life since Africa may have been depopulated so severely that half of the potential population of 1850 was lost or killed as a result of slave trade. Fage (1975) argues that volume of slave trade was insufficient to affect the population growth and that Africa was not depopulated as a result of slavery.

The literature on the impact of slave trade further expanded with social, political and economic effects. Eltis (1987) states that the scale of the Atlantic slave trade was not sufficient enough to have more than a marginal influence on the historical course of the continent of Africa. A notable remark he makes is that slave trade might have had a substantial influence on

West Africa and western central Africa since the slave extraction was more intensive in those areas. Eltis and Jennings (1988) analyze the economic impact of slave trade on Africa in absolute terms and relative terms, namely per capita. Their conclusion is that neither the absolute value nor the relative value was substantial, thereby making it unlikely that slave trade had an impact on the African society. Northrup (1978) finds that the social-economic effects of slave trade in south-east Nigeria were benign. An opposed view is supported by Amin (1972) since he states that present underdevelopment of Africa finds its roots in the slave trade since it made Africa dependent. This view is confirmed by Rodney (1972), since he shows that slave trade harmed Africa's economy through a loss of skills, technological invention, production capacity and industry. Barry (1972) compared the impact of the export of goods to the export of human capital and finds that the export of goods does not need to have a devastating impact and might, opposed to slave trade, lead to progress. Fage (1969) uses economic reasoning to state that slave trade favored the economic development of Africa since the ability to trade was developed. He states that West-Africa reacted to the demand of slaves with economic reasoning and that this economic reasoning strengthened the economic and political development. Davidson (1980) and Law (1991) conclude that the African society was mainly affected by slave trade through political and economic effects. Davidson explains that the economy of Africa was almost solely based on the selling of slaves during the trade, thereby making it unlikely to remain unaffected in its growth. M'baye (2006) states that the slave trade impaired the economic potential of Africa since it fundamentally affected the process of the transformation from an agrarian production economy to an entrepreneurial economy. He states that the current economic problems find their roots in the economic chaos and social-political instability caused by the slave trade.

Becker (1977) and Inikori (1982; 2003) state that slave trade caused war and led to instable and militarized societies. Inikori and Engerman (1992) find that slave trade led to political fragmentation and the rise of military states that were hostile to capital development. Whatley and Gillezeau (2011) argue that the demand for slaves reallocated the African resources and came with externalities that impeded the development on the long run.

Some critics argue that the slave trade brought prosperity to Africa since it spurred the import of products that were previously absent in the continent or products of superior quality. The contact between Africa and Europe led to import of luxury goods into Africa such as textiles from India and England, copper (Northrup, 1978) and firearms (Inikori, 1977). Klein (1990)

argues that the import goods were primarily bought with money made from selling slaves. Inikori and Engermann (1992) add that only little Africans made substantial money on slave trade.

Although unambiguous, the literature suggests that the extraction of slaves is likely to have more effects than direct depopulation. Deeper rooted cultural, political, economic effects that seem to have a long term effect on present economic outcomes.

B. Conceptual Model

I hypothesize that slave trade has a negative impact on contemporary financial development. A natural question is why I would expect to find evidence in support of the hypothesis. The persistence of an effect rooted in historical events needs a channel through which the effect can persist. I identify two likely channels through which persistence of effects of slave trade can occur; cultural transmission of trust and institutional development. Both channels indicate a negative relationship between slave trade and contemporary financial development.

Nunn and Wantchekon (2011) find that individuals belonging to an ethnic group that was heavily targeted by slave trade exhibit lower levels of trust towards relatives, coethnics, neighbors and the local government in the present. They claim that since the enslavement of others was a way to protect one's own life (D'Almada, 1984; Mahadi, 1992), a culture of mistrust was established that persisted. Through several robustness checks they argue that alternative explanations are unlikely to explain the difference in trust among ethnicities.

GSZ (2004a) examine the relationship between social capital and financial development within Italy. They argue that financial contracts are not merely based on the enforceability of the contracts, but that trust lies at the basis of entering a financial agreement. They find that in areas with high levels of social trust firms have greater access to credit and households invest more in stocks, use less informal credit, have greater access to institutional credit, make more use of checks and save less in the form of cash. Their findings show that social trust plays an important role in the level of financial development within Italy. The question concerning whether these results are generalizable is raised by the authors, but remained unanswered. The paper contains a suggestive analysis of the interaction between legal enforcement and trust, which indicates that the role of trust is less important in areas inhibited by more educated people or with a more efficient court system. Hence, trust is likely to be more of importance to the financial

development in less developed areas. The work of Nunn and Wantchekon (2011) and GSZ (2004a) combined indicates that trust might be a channel through which slave trade adversely affects the financial development in a less developed country. The reasoning behind the channel is that trust affects financial activities where agents need to rely on the future actions of their counter partners, such as the repayment of a loan. Trust can contribute to reducing this problem of asymmetric information, in particular in developing countries, by complementing to screening and monitoring. Hereby the cost of capital is lowered and investment is spurred (Zak and Knack, 2001).

The literature shows that trust is likely to affect financial development through both formal and informal financial sector. Putnam (1993) and Beck et al. (2005a; 2005b) suggest that trust has a positive impact on reducing the financial obstacles by the development of stronger institutions. Honohan and Beck (2007) show that lower trust levels explain a substantial part of the sub-Saharan low levels of informal credit.

The persistence of slave trade effects through the institutional channel is confirmed by Klein (2001) as he examines the persistence of judicial institutions. In a previous paper Klein (1990) states that the demand for slaves resulted in the rise and shaping of institutions. Nunn (2005) finds a detrimental impact of slave trade on the formation of domestic institutions. He argues that this is the channel through which slave trade affects the contemporary economic performance. Lovejoy (1983) adds that the slave trade resulted in immense disruption of the political society and left Africa disorganized. Nunn (2008) confirms this view and adds that slave trade led to corruption and thereby eroding the institutions. Whatley and Gillezeau (2011) use institutions as persistence channel in their theoretical model on the fundamental effects of slave trade on the structure of the African society and economy. The rise of new institutions and the negative impact on the existing institutions indicate an institutional persistence of negative effects of the slave trade. On the contrary, Fage (1969; 1982) argues that the social, political and economic institutions remain unaffected by the slave trade, thereby denying institutions as persistence channel.

In a cross country study Beck et al. (2006) state that higher institutional development is associated with lower financing obstacles. They argue that it is hard to separate the financial development of a country from its underlying institutional development. Their results are in support of the general consensus that institutional development and financial development are

positively linked (amongst others: Bencivenga and Smith, 1992; LLSV, 1997; 1998; Haber, 1991; 1997). The persistence of negative effects through institutions and the positive relationship between institutional development and financial development indicate a possible negative relationship between slave trade and financial development.

Pierce and Snyder (forthcoming) examine a subject close to the subject of this paper in their work on the linkage between slave trade in Africa and the present economic and business environment. Their preliminary findings show that the slave trade in Africa is strongly negatively linked to the present day of firm access to finance. Other factors of the business environment are correlated to economic growth; however few of them are significantly linked to slave trade. This finding indicates that access to finance might be the only business obstacle that a firm faces that is affected by the slave trade. They conclude that slave trade and access to finance have a first order relationship in explaining cross country variation in economic performance, even with considering other firm transactions that are influenced by culture; such as contract enforcement. The presence of slave trade not only erodes the access to finance, but it also reduces the supply of trade credit from suppliers and customers. This finding contradicts the common assumption that informal credit often acts as a substitute to inaccessible formal credit (Meltzer, 1960; Fisman and Love, 2003). The finding that slave trade has an impact on access to finance through both informal as formal channels is particularly important since many individuals and enterprises in undeveloped countries rely on informal finance (Beck, Demirgüç-Kunt and Soledad Martinez Peria, 2007; Beck, Demirgüç-Kunt and Maksimovic, 2008). Unfortunately, Pierce and Snyder are unable to identify the linking mechanisms between slave trade and access to finance. They suggest that trust might be the link between slave trade and financial development.

III. Data Sources and Description

A. Data Sources

The individual-level data, the entrepreneur-level data, the household-level data and the enterprise-level data are obtained from the 2010 General household survey conducted jointly by the National Bureau of Statistics of Nigeria and the World Bank. The survey covers 5,000 households selected with a two stage stratified sampling method representative for the within Nigeria variation. The survey provides a potential sample of 27,593 individuals. Within this sample 5,244 inhabit a local government area (LGA) that is also covered by the slave trade data

and are included in the sample. Due to incomplete surveys is the sample further reduced for the estimations with the ownership of a bank account and the turn down of a credit application as dependent variable to respectively 5,159 and 5,150. The data covers a potential sample of 4,447 enterprises. Within this sample 1,661 entrepreneurs inhabit a LGA covered by the slave trade data. Since several firm characteristic controls are obtained from the survey and the micro data suffers from missing observations the sample is further reduced.

The slave trade data of Nigeria is obtained from Nunn and Wantchekon (2011), based on previous work of Nunn (2008). Nunn uses data from shipping records and various historical documents to build a dataset that comprises over 100,000 exported slaves. His dataset is sorted by country, whereas the data of Nunn and Wantchekon specifies four geographical lawyers; country, region, district and town. The definition of districts is equal to present LGAs, a subdivision of a state that can be compared to counties. However, since their data is sorted on ethnicity and the General household survey lacks an ethnicity question, is the data transformed to LGA level data. The LGA sorted slave trade data is an average of slave trade within a LGA calculated with the use of several variables from the Nunn and Wantchekon dataset. The relative share of each ethnic group within a district is multiplied with the average slave trade of that ethnicity. The result is summed with the result of the multiplication of the relative population share of all other ethnicities in the district, one minus the relative share of the ethnicity mentioned above, with the districts average slave trade of 'other ethnicities'. This results in a total number of slaves extracted in a district. However, since the ethnicity's slave trade number in a particular district is assumed to be equal to the average slave trade of that ethnicity multiple outcomes are possible for the total number of slave trades in a district with multiple ethnic groups. In several districts there is data on multiple ethnic groups; therefore the unique results of the above described summation per district are averaged to obtain the average slave trade data at a district level. The slave trade data is merged with survey data on the LGAs, in total the dataset contains 131 LGAs in 31 states.

Financial development is measured at an individual level and at an enterprise level with the use of multiple questions used from the general household survey. At the individual level every individual member of the household that is fifteen years of age or above answered questions on credit and savings. The first question is a dichotomous variable that covers whether an individual has made use of informal credit the past six months. Informal credit is defined as credit from

informal groups as well as borrowing from friends and relatives; this is a similar definition as used in Ayyagari, Demirgüç-Kunt and Maksimovic (2010). The second measure is a dichotomous variable that covers whether the individual tried to obtain a loan but was unable to do so or was turned down in the past six months. These two measures gauge the availability of finance. A turndown on a credit application indicates a limited access to finance and the informal finance sector arises since formal finance is too expensive or unavailable (GSZ, 2004a). The use of these binominal measures are in line with Honohan (2006), since he argues that the relevant question for households in low income countries is whether they have access to finance at all, not how much financial assets they possess. The third measure is a dichotomous variable whether the individual owns a bank account. This measure indicates whether an individual joined the financial sector or retains cash in an old sock (GSZ, 2004a). The theoretical literature indicates that financial institutions arise as a result of market frictions; information asymmetry and undiversifiable risk. The financial institutions overcome these frictions since they collect and analyze information and pool risk. The financial institutions mobilize savings and achieve a more efficient allocation of resources. Therefore is joining the financial sector beneficial to the individual, however joining the sector often requires some fee in order to join (Greenwood and Jovanovic, 1990). This barrier logically affects the size of the regional financial intermediary sector. The size of the financial intermediary sector, often called the financial depth, and the access to finance are useful indicators for the financial development (Čihák et al.,2012).

At the enterprise level financial development is measured with the use of questions concerning the financing of the enterprise. The first measure captures whether the entrepreneur tried to obtain credit to use for the business operations. This measure is a proxy of the supply of credit in the local financial sector and resembles a measure used in GSZ (2004b). The other measures are natural log values of the amounts borrowed and interest paid. These measures are continuous variable proxies of the regional credit supply. Additional to the relative share of enterprises that borrow does this measure capture the size of those loans. The size of the loans are likely to be larger if the financial sector is more efficient since a more efficient institution is better able to overcome the information asymmetry problem and provide the optimal debt contract (Beck, 2002). A less efficient financial institution will provide a debt contract with less favorable conditions compared to the optimal debt contract. Furthermore is the main source of capital analyzed in relationship to the slave trade intensity of the LGA where the enterprise is

seated. Reliance on informal credit, development aid and remittances indicate a reliance on alternative external finance. This alternative finance is unrelated to potential profitability, but purely the luck of knowing the right people. It indicates that there is no finance available from the formal financial sector or that it is too expensive. The use of alternative finance is associated with poor financial development (Fisman and Love, 2003; Ge and Qiu, 2007).

The data for district controls are obtained from several sources. The paper of Nunn and Wantchekon (2011) is the source of the data on ethnic fractionalization of the LGA, they use the method described in Easterly and Levine (1997). Data on population density, the size in square kilometers and the relative share of male inhabitants are calculated with the use of figures of the 2010 population distribution report written by the national population commission based on the 2006 population and housing census. The answers to an ordinal question on perceived corruption of the local council in the 2005 Afrobarometer surveys are averaged by LGA and used as a proxy of corruption in the LGA. Data on irradiation is derived from a solar map provided by GeoSUN Africa, a spin-off company of the research Centre on sustainable energy of the Stellenbosch University, South-Africa. The ordinal data on elevation is extracted from a map of the oxford cartographers. Ordinal data on unemployment and the relative share of inhabitants that need travel over one hour for water are extracted from The Nigerian Local Government Area Geodemographic Classification System and Profiler (NIGECS). The values of those ordinal variables range from 1 to 10, with low values indicate low levels of unemployment and a low incidence of inhabitants that need to travel over an hour for water and high values indicating high levels of those variables. The indicator variable that equals one if the LGA borders with a neighboring country and the distance to the coast from the centroid of the LGA are estimated.

B. Data Description

The slave extraction is standardized by square kilometer. The values range from 0, which stands for no slave extraction, to approximately 14, equal to the extraction of 14 people per square kilometer. The average number of slaves extracted is 4.53 and the median is 1.91, a difference caused by a few extreme positive outliers. The extreme outliers are also reflected in the standard error of 4.71; a number larger than the mean. To put the numbers above in perspective, the median of square kilometers of Nigerian LGA's is 641; hence in a median LGA that suffered from median slave extraction 1,224 slaves were extracted.

The micro data reveals that 973 individuals own a bank account, 513 individuals were turned down when they applied for credit and 816 individuals recorded to use informal credit. The numbers suggest low financial activity of individuals, since only 1,766 individuals of the total sample of 5,144 answered positively to one of the dichotomous questions. The use of informal credit is significantly positively correlated to the turn down of a credit application. This is logical, since reliance on informal finance is considered a result of constrained formal finance access (amongst others: Okurut, Schoombee and Van der Berg, 2005). The other pairwise correlations between the measures of financial development are insignificant.

The entrepreneurial financial development is focused on access to finance. Financial development is measured with both dichotomous variables and continuous variables. The survey question on the use of credit for the operation of the business is answered positively 109 times. Questions on the amount borrowed and the interest paid were answered respectively 108 times and 1,035 times, with 154 values being non-zero. The entrepreneurs were asked to write the three predominant sources of startup down, in order of importance. The data shows that 1652 of the 1661 of the entrepreneurs report financial support from friends or relatives as a major source of startup capital while on the other hand loans from formal financial institutions are very rare. Household savings are also major capital source since it is reported 832 times. Household savings, support from friends and relatives and remittances from abroad together account for 90 per cent of the credit sources. These descriptive statistics suggest that a starting an enterprise is only possible if the entrepreneur has savings him/herself or when the entrepreneur gets help within the informal sector, and primarily from family and friends, both in and outside Nigeria. This is in accordance with Greenwood and Jovanovic (1990) who state that the poor need some savings or financial help to enter the financial sector and obtain a chance to get out of poverty. The full descriptive statistics, on an individual level, on an enterprise level and on a LGA level are reported in the appendix.

The data suffers from several drawbacks. The main drawback is a result of the conversion to regional data; since the slave trade took place centuries ago the relationship between slave trade and contemporary regional financial development might be influenced by migration in the intermediate time. Since Nunn and Wantchekon (2011) point out that some ethnic groups were more likely to be targeted by slave trade, it is possible that migration changed the ethnic composition of a region and thereby exhibited an influence on the effect on financial

development. The effect of regional slave trade on financial development might be diluted or misrepresented. Therefore the results are under the assumption that there is persistence in family location, a similar assumption that Nunn and Wantchekon use in their falsification test. Furthermore contains the slave trade data absolute figures, since there is no data on population during the slave trade era. Therefore the data is unable to account for regional differences in population size at the time of slave trade and thereby the regional demographic impact of the slave trade. It is very likely that the initial relative demographical impact is an important determinant of the persistence to a long term effect, since a persistent long term impact is likely to be rooted in a substantial initial impact. Furthermore the data only allows for a purely cross-sectional approach, whereas panel data could reveal more insights in the channels through which an effect might be driven. Panel data is likely to improve the accuracy of the parameter inferences, since it contains more variation and more degrees of freedom. The size of the dataset is another drawback; the enterprise level data consists of a limited amount of enterprises while the number of controls are extensive, more degrees of freedom would be preferable. Furthermore, a substantial larger dataset might enable the use the measures of financial development that I was unable to use due to incomplete survey results. The use of micro data has the disadvantage that the data is often full of gaps since the surveys are only partly completed, thereby decreasing the size of the dataset. The effect of the decreasing sample is reinforced by the fact that a probit regression requires more observations compared to OLS since it needs to maximize log likelihood.

IV. Estimates

I examine the relationship between slave trade and financial development within a single country, a similar approach to GSZ (2004a). Mankiw, Phelps and Romer (1995) point out that financial development is affected by numerous factors, which makes it hard to control for all of them in a cross country regression. They advise a within country examination, an approach that naturally controls for many cross country differences that might affect the relationship. For instance natural culture is hard to control for, but is known to influence household finance (Breuer and Salzmann, 2012).

I begin with the estimation of the relationship between slave trade and the different measures of financial development of individuals. The baseline equation estimated is:

$$(1)\ FD_{i,d} = \alpha_s + \beta Slavetrade_d + X'_{i,d} + Controls_d + \varepsilon_{i,d}$$

where i indexes individuals and d indexes districts (LGAs). The dependent variable $FD_{i,d}$ denotes one of the measures of financial development, with variation across individuals. α_s denotes the fixed effects at state level, to capture the explanatory power of state-specific variation. $Slavetrade_d$ is the historical number of slaves extracted in the LGA inhabited by the individual. The coefficient of interest is β, denoting the relationship between slave trade at the LGA level inhabited by the individual and the current financial development of the individual.

The equation is estimated with the use of a probit model since the dependent variables are binominal. Financial development is defined as higher levels of positive measures or lower levels of negative measures. In accordance with the expectation that slave trade has a negative impact on financial development it logically follows that the coefficient of slave trade is likely to be positive for rejection of credit applications and negative for the ownership of a bank account. The interpretation of informal finance is a bit harder; to consider lower levels of informal finance as financially developed the assumption that formal finance and informal finance are substitutes is required. In their paper Snyder and Pierce (forthcoming) find results that contradict this assumption for Africa. Their finding is in line with the literature that emphasizes the essential role of informal finance for the continent of Africa (Miracle, Miracle and Cohen, 1980; Biggs et al., 2002). Therefore might it very well be that the use of informal finance to gauge the level of financial development is dependent on the social-economic development. Considering that Nigeria is a developing country, the coefficient of informal finance is expected to be negative.

The vector $X'_{i,d}$ indexes a set of individual controls, which include the age of the respondent, the age squared, an indicator of gender, an indicator of inhabiting rural versus urban areas, a variable that represents the quality of education succeeded, an indicator variable that equals one if one of the parents have completed their secondary school education, an indicator variable that equals one if the respondent received money from relatives or friends outside Nigeria, an indicator variable of unemployment, entrepreneurship, literacy, being a student, head of household, a standardized income variable, a squared income variable, daily time spent to collect water, two asset dummies and two religion dummies.

Age, age squared and gender are controlled for to exclude the influence of individual specific characteristics. Education (Berthelemy and Varoudakis, 2012) and religion (amongst others: Stulz and Williamson, 2003; Pascali, 2012) are proven drivers of heterogeneity in

financial development. The education of parents is related to the intelligence of the individuals as shown in Sidhu, Malhi and Jerath (2010) in their examination of low income families in India. This proxy is included to capture natural intelligence of people, since intelligent individuals might be unable to attend school. The difference between urban and rural areas might affect the local financial development, Claessens (2006) reasons that the access to finance in rural areas is logical to be lower since it is more costly to provide financial services. Carpenter and Jensen (2002) show that literacy has a significant influence on the choice on the individual level between formal and informal credit. GSW (2004) argue that controlling for wealth is essential, their model also controls for income and its square value. Since critics state that self-reported income in less developed countries can be unreliable, the ownership of certain assets is used as more reliable proxies. Morris, Carletto, Hoddinott and Christiaensen (2000) investigate the validity of those proxies and find that it is feasible to use asset proxies, such as radios and refrigerators. Therefore also dummy variable of ownership of a radio and a refrigerator are included. In addition, these assets are a proxy for collateral since Banerjee and Duflo (2010) state that people with few assets scarcely lend from formal financial institutions. Furthermore are the yearly expenditures included as proxy of wealth. Time spent to collect water is a proxy of wealth as used in, amongst others, Sullivan, Meigh and Giacomello (2003). Entrepreneurs are likely to be more financially developed as they need to finance their entrepreneurship (Banerjee and Newman, 1993). A student dummy is included to exclude the possibility that students are considered as unemployed. Since the model test the financial development at an individual level a household head dummy is included since the head of the household is arguably of importance on the decisions made within a household. A dummy variable of remittances is included since Giuliano and Ruiz-Arranz (2009) show that remittances provide an alternative way to fulfill finance needs in financially underdeveloped areas.

$Controls_d$ represents an variable indicating the ethnic fractionalization of the LGA, the distance to the sea from the centroid of the district, an indicator variable which equals one if the LGA borders with a neighboring country, a proxy of the corruption of the local government, a variable that represents the population density, the relative share of males, size in square kilometers and ordinal variables covering irradiation, meters above the sea-level, unemployment at the LGA level, the relative share of LGA inhabitants that needs to travel more than one hour to the closest drinking water.

Ethnic fractionalization is correlated with poor financial development (Easterly and Levine, 1997). The relative share of inhabitants that needs to travel over an hour for water is a proxy of the socio-economic status. The LGA unemployment is a proxy for the contemporary state of the LGA economy, the use of this proxy is previously used in Chevalier (1995b). The economic state is likely to have an impact on finance, an idea that that is similar to the basis reasoning in Bernanke and Gertler (1989). Several geographical controls are included since Fenske (2010) identifies geographical controls as one of the deeper underlying causes of Africa's economic state. Irradiation is used as proxy of soil fertility, since Barrios et al. (2010) find a major impact of rainfall, through the soil fertility, on economic outcomes in Africa. I am unable to control for rainfall, since rainfall data is unavailable at a LGA level, however any possible specific influence of rainfall is likely to be filtered out by the state fixed effects. Furthermore is regional elevation included since LGAs at lower altitudes are likely to be more fertile areas since they are located in the vicinity of rivers or lakes. A dummy that covers LGAs that border a neighboring country is used to filter out any possible effects of specific migration, economic activities, politics and culture in bordering areas (Anderson and O'Dowd, 1999). Furthermore the distance to the coast is used as control since Herger, Hodler and Lobsinger (2008) find a positive relationship between financial development and latitude and Miller (1996) links distance to the coast positively to slave extraction. In contrast to Gallup and Sachs (2001) the model does not control for the prevalence of malaria since malaria is a risk for 97%[3] of the Nigerian population. Although Gallup and Sachs estimate that the prevention of malaria could have a substantial positive economic impact, the model does not control for malaria prevention since the LGA-level data from NIGECS show that different ways of malaria prevention are favored in different regions. Therefore the inclusion of a particular proxy of malaria prevention could lead to an inaccurate and misleading picture.

The baseline estimation of the relationship of the various measures of financial development at the enterprise-level and slave trade is:

$$(2)\ FD_{j,d} = \alpha_d + \beta * Slavetrade_d + Controls_j + Controls_d + Controls_e + \varepsilon_{i,d,e}$$

where j indexes the enterprise and d indexes districts (LGAs). The dependent variable $FD_{j,d}$ denotes one of the measures of financial development, with variation across enterprises. α_s

[3] According to the Nigeria Malaria Fact Sheet published in 2011 by the United States Embassy in Nigeria

denotes the fixed effects at state level, to capture the explanatory power of state-specific variation. $Slavetrade_d$ is the historical number of slaves extracted in the LGA were the entrepreneur lives. The coefficient of interest is β, denoting the relationship between slave trade at the LGA level inhabited by the entrepreneur and the current financial development of the entrepreneur. The equation is estimated with the use of a probit model and an OLS model. Similar to equation (1) the relationship between slave trade and financial development is expected to be negative.

$Controls_j$ represent a set of controls that cover the entrepreneur and his or her household, which includes the food security of the household, non-food expenditures and its square value, the number of household members, the number of adults in the household, the value of the household assets and its square value, the gender of the entrepreneur, the age of the entrepreneur and its square value, two dummy variables covering the religion of the entrepreneur and indicator variables on whether the entrepreneur is literate and receives remittances from abroad. The vector $Controls_d$ is similar to estimation (1) and is described above. $Controls_e$ represents a set of enterprise-level controls, the age of the enterprise, the age of the enterprise squared, dummy variables covering whether the enterprise is officially registered, has multiple owners, the value of the current physical capital stock, the total sales of the last month, indicator variables on the place of operation and whether the products are sold to final consumers and 13 industry dummies. The model controls for variation in ownership since multiple owners might proxy for a deeper commitment to the enterprise (Åstebro and Bernhardt, 2003). Rajan and Zingales (1998) argue that industries vary in their financial needs, therefore are the industry dummies included. The size of the firm is of importance to its financial behavior (amongst others: Jovanovic, 1982; Weinberg, 1994; Beck, Demirgüç-Kunt and Maksimovic, 2005a) and is controlled for by the use of proxies; value of physical capital stock and total sales of the last month. The estimation controls for the age of the firm, and its square value since the model of Jovanovic (1982) identifies age of firm as the main heterogeneity dimension across firms. The place of operation is important to control for since an enterprise that operates at home might have few investment costs and therefore have lower finance needs. The inclusion of the indicator variable that equals one if the enterprise is registered by the government follows from the logical reasoning that an unregistered enterprise is unable to apply for formal credit.

V. Results

Estimates of equation (1) are reported in table 1. The probit results suggest that slave trade and financial development are unrelated since they indicate that people that inhabit areas that were heavily targeted by slave traders are no more of less financially developed. The coefficients are consistently insignificant, however the coefficients in the first two columns are in the anticipated direction since they indicate that people that inhabit an LGA that suffered severely from slave trade experience more credit turndowns and are less likely to own a bank account. The coefficient of the third column is harder to interpret since there is an ongoing debate on the use of informal finance to gauge the development of the financial sector. The traditional view argues that informal finance market is a substitute of formal finance that arises due to financial frictions; hence informal finance is a result of an inefficient financial sector (Bell, 1990; Bell et al., 1997; Kochar, 1997; Andersen and Malchow-Møller, 2006). The other view states that informal finance is, at least partially, complementary to formal finance, hence it provides an increased access to finance by serving market segments that are unable to obtain formal finance (Ayyagari, Demirgüç-Kunt and Maksimovic, 2010). Due to moral hazard and adverse selection problems are the formal finance institutions reluctant to provide finance to the lower end of the market, people that are unable to provide collateral. Informal lenders often have more information and are therefore willing to lend. The formal financial sector is called exclusive and the informal financial sector inclusive. The coexistence of a formal and an informal financial sector with little linkage in a single financial system is called financial dualism (Myint, 1970). Financial dualism is primarily existent in developing countries, where the majority of finance often exists of informal finance. Therefore the informal finance market in developing counties contributes to financial development as argued by Aryeetey (2005) in his cross country study covering the continent of Africa. The dualistic structure in the Nigerian financial system and the prominence of informal finance in Nigeria are confirmed by Oloyede (2008). The results are inconsistent with the literature on the long term debilitating impact of slave trade on present economical outcomes (amongst others: Inikori, 1982, Inikori and Engerman, 1992 and Nunn, 2008) as well as with Fage (1969), since he argues that slave trade was beneficial to Africa through a development of their sense of economic reasoning. The results are in accordance with the view that slave trade has no fundamental impact on present day economic outcomes (amongst others: Eltis, 1987; Eltis and Jennings, 1988), however since this

Table I—Probit estimates of the effect of slave trade on financial development

Dependent variable:	Ownership of bank account	Credit application turned down	Use of informal credit
LGA slave export	-0.0329	0.0623	-0.0455
	(0.0412)	(0.0371)	(0.0324)
Individual controls	Yes	Yes	Yes
District controls	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
Number of observations	2627	2604	2645
Number of LGA clusters	104	96	100
Pseudo R^2	0.3772	0.1685	0.1451

Notes: The table reports probit estimates. The unit of observation is an individual. The standard errors adjusted for clustering by LGA are reported in brackets below the point estimate. The individual controls are for education, education of a parent, age, age squared, gender, income, income squared, indicator variables indicating whether the individual is an entrepreneur, is unemployed, is the head of the household, is a student, is literate and receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative population share of males in the LGA, an indicator variable whether the LGA is primarily rural, dummies of border LGAs, a ordinal variable covering the average living situation, a ordinal variable of economic state, a proxy for corruption, the distance to the coast from the centroid of the LGA and two ordinal variables of land fertility. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-per cent level.

thesis only covers a subsection of present day economic outcomes do the results not support this view unconditionally. Table II reports the estimation of equation (2) with the use of credit as measure of financial development. The first column estimates without control variables, the second column adds entrepreneur controls, the third column adds the district controls and the final column estimates the complete model. The coefficients of slave extraction are inconsistent and insignificant, indicating that slave trade and the credit use of enterprises are unrelated. The insignificance of the results is unlikely to be caused by the sample size, since even the least extensive model that is estimated, is only significant at a 36 per cent level. The last column includes enterprise controls and suffers from a substantial number of missing observations. The estimation of the full model results in a coefficient that is inconsistent with the hypothesis.

The results contradict Pierce and Snyder (forthcoming) since they find a significant and robust negative relationship between use of credit of firms and slave extraction. This can be explained by the fact that the samples of firms are incomparable, their sample consists of more

Table II—Probit estimates of the effect of slave trade on entrepreneurs' financial development

Dependent variable:	Credit use	Credit use	Credit use	Credit use
LGA slave export	-0.0195	-0.0218	-0.0069	0.0055
	(0.0212)	(0.0185)	(0.0235)	(0.0484)
Entrepreneur controls	No	Yes	Yes	Yes
Enterprise controls	No	No	No	Yes
District controls	No	No	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Number of observations	1522	1410	1410	720
Number of LGA clusters	117	110	110	100
Pseudo R2	0.0774	0.1154	0.1340	0.2498

Notes: The table reports probit estimates. The unit of observation is an enterprise. The standard errors adjusted for clustering by LGA are reported in brackets below the point estimate. The entrepreneur controls are for education, education of a parent, age, age squared, gender, indicator variables indicating whether the entrepreneur is literate, inhabits a rural area, and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The entrepreneur controls further cover some household characteristics; the size of the household, the number of adults inhabiting the household and the value of the household assets. The enterprise controls cover the total sales of last month, the age of the enterprise in months and its square value, the value of physical capital stock, indicator variables that cover whether the enterprise is officially registered; has multiple owners; operates at home; sells to final consumers and industry dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative share of male population, an indicator variable of a border LGA, the estimated distance to the coast from the centroid of the LGA to the nearest coast in kilometers, ordinal variables that proxy for the living situation; the state of the local economy; the local corruption and two ordinal variables of land fertility. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-per cent level.

than 35 per cent of firms with over 20 employees whereas my sample consists primarily of micro-enterprises. Furthermore does their model not control for the characteristics of the entrepreneur and his/her household, which is arguably relevant in a sample that consist primarily of micro-enterprises.

In order to check the robustness of the results reported in table II the model is estimated with another dependent variable; the turndown of a credit application. Although the observations are few, the results are in support of table II since all the coefficients are insignificant, noteworthy though is that the all the point estimates are in the direction that supports the hypothesis. The full results are reported in the appendix. The appendix furthermore includes

estimations that replicate table I and II with clustering on a household level, the results confirm the robustness of the results.

Table III reports the results of the OLS estimates of equation (2) with the natural log of the amounts borrowed and interest paid as measures of financial development. The results are in support of the statement that slave trade is unrelated to the financial development of enterprises, since the coefficients are predominantly insignificant. The single significant coefficient is an estimation of the model without enterprise controls. An important note to the results is that they are obtained from a very small sample. A final measure of financial development is included in the appendix; whether the enterprise has any loans it was repaying. The costly enforcement of loan repayment is considered a financial friction that limits financial intermediation and hence the financial development (Blackburn, Bose and Capasso, 2005); therefore can the loan repayment be a measure to gauge the financial development. The results confirm the results in Table II and III; slave trade and financial development are unrelated.

Furthermore are the main credit sources used as start-up capital analyzed in relationship to slave trade. Six main sources are identified; household savings, proceeds from family activities, relatives/friends, remittances, informal finance suppliers and assistance by governmental, religious or NGO organizations. Formal finance institutions are excluded since there are very few positive observations. Hernández-Trillo, Pagán and Paxton (2005) examine the start-up capital of microenterprises in a similar financial system to Nigeria, a similar sample of enterprises, e.g. with microenterprises, both officially registered as unofficially operating, similar definitions of credit sources and the vast majority of start-up capital is obtained from of non-formal capital providers. They find that informal credit suppliers are less efficient than their formal counterparts and that the loan terms of banks are more favorable. They argue that a relative small share of entrepreneurs utilizes bank loans and hence the majority resorts to other credit sources. Therefore they conclude that inadequate initial capital restricts the entrepreneur in its ability to invest in labor and capital equipment. In the line of this paper the credit sources can help to gauge the efficiency of the financial sector. The choice of credit source is likely to be influenced by individual characteristics and firm characteristics; therefore equation (2) is the baseline model for the credit source analysis. The results report some statistical and economic significant relationships; however the estimation of the model uses a limited sample. The analysis of the primary credit sources does not indicate a clear impact of slave trade on a

Table III—OLS estimates of the effect of slave trade on entrepreneurs' financial development

Dependent variable:	Log(borrowed)	Log(borrowed)	Log(borrowed)	Log(interest)	Log(interest)	Log(interest)
LGA slave export	0.0179	-0.2364***	-0.0486	-0.0532	-0.2884	-0.3711
	(0.0723)	(0.0851)	(0.2570)	(0.1492)	(0.2673)	(0.3898)
Entrepreneur controls	Yes	Yes	Yes	Yes	Yes	Yes
Enterprise controls	No	No	Yes	No	No	Yes
District controls	No	Yes	Yes	No	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	98	98	86	150	150	143
Number of LGA clusters	55	55	51	48	48	48
Adjusted R^2	0.3040	0.2661	0.4467	0.3101	0.5567	0.6559

Notes: The table reports OLS estimates. The unit of observation is an enterprise. The standard errors adjusted for clustering by LGA are reported in brackets below the point estimate. The entrepreneur controls are for education, education of a parent, age, age squared, gender, indicator variables indicating whether the entrepreneur is literate, inhabits a rural area, and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The entrepreneur controls further cover some household characteristics; the size of the household, the number of adults inhabiting the household and the value of the household assets. The enterprise controls cover the total sales of last month, the age of the enterprise in months and its square value, the value of physical capital stock, indicator variables that cover whether the enterprise is officially registered; has multiple owners; operates at home; sells to final consumers and industry dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative share of male population, an indicator variable of a border LGA, the estimated distance to the coast from the centroid of the LGA to the nearest coast in kilometers, ordinal variables that proxy for the living situation; the state of the local economy; the local corruption and two ordinal variables of land fertility. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-per cent level.

particular credit source choice and hence it suggests no strong effect on the efficiency of the financial sector. The full results are included in the appendix.

VI. Identifying Causal Relationships

Since there are some minor indications that slave trade might affect financial development, although far from convincing, I aim to identify causality in the possible relationship. Since slave trade is an historic event is reverse causality impossible, however the relationship might be influenced by an omitted variable. For example, if financially less developed regions were targeted by slave raiders a negative relationship between slave trade and financial development is generated through the positive relationship between historical- and contemporary financial development. This could be the case since debt slavery was present in Africa prior to the European trade (Hair, 1965; Barzel, 1977; Campbell and Stanziani, 2013). Lower loan

repayments in a region can be interpreted as lower financial development, since the scarcity of external finance is driving the rates up and thereby the defaults. If Nigerians that inhabit a financially less developed region consider slavery as more normal it is likely that, because the slave raiding was primarily done by Africans (Thornton, 1992), more slaves were extracted in those regions.

I pursue an instrumental variable approach and use average ordinal height of newborn in the LGA as instrument. The instrument is constructed with the use of data obtained from the 2003 Nigerian Demographic and Health Survey (DHS), conducted by the Nigerian National Population Commission. Unfortunately is the data on height is unavailable for all the LGAs, therefore is the dataset further decreased to 4,272 observations, covering 109 LGAs.

The strategy requires an instrument that it is correlated with slave trade but uncorrelated to financial development. Height has evidently no correlation with financial development and is theoretically and empirically linked to slave selection. Steckel (1979) and Eltis (1990) show suggestive evidence of a tendency of slave traders to extract taller Africans. The logical reasoning behind this trend is that the height of slaves was a logical proxy for strength and strength had a positive effect on the marginal profit of the slave trader. Margo and Steckel (1982) confirm this view in their examination of slave characteristics since they state that height is positively related to value. Pritchett and Freudenberger (1992), in their study on New Orleans, argue that slave traders selected taller slaves since it provided them profit maximization. They state that taller slavers were considered as higher quality slaves and therefore the choice of slaves by traders was far for random. In a comment Komlos and Alecke (1996) argue that their conclusion is not justified, their main argument is that the costs of transportation are overestimated, therefore the marginal gain of height is overestimated. They argue that it is unlikely that slave traders selected taller slaves in order to gain a minimal extra profit. Finally they raise questions on the generalizability of the results, since they argue that the slave trade market is examined whilst not in equilibrium and that the specific demand conditions might bias the results. In a response Pritchett (1997) provides additional support for the competitive equilibrium assumption and the assumed transport costs per slave.

Unfortunately is data on average regional height in the slave trade era unavailable. Since height is largely explained by genetics, the consensus is that approximately 80% of height is genetically explained (amongst others: MacGregor et al, 2006; Perola et al., 2007; McEvoy and

Visscher, 2009), present regional average height is a justifiable proxy of regional average height during the slave trade. The use of this proxy requires caution since regional height patterns are influenced by nutrition (amongst others: Jacobs and Tassenaar, 2004; Steckel, 2009; Hatton and Bray, 2010). However, I argue that long term trends in regional nutrition are likely to be captured by the rural dummy, the state fixed effects and the distance to the coast. Trends in nutrition that cover larger regions are unlikely to have a specific effect in a within country approach. The use of the instrumental variable approach rests on the assumption that the intensity of slave trade extraction is the only channel through which the historic average height affects contemporary financial development.

The proxy might be subject to endogeneity since it might by influenced by migration, as described previously. Furthermore might a possible height heritage occur as a result of specific selection of slaves that has a negative affects the height proxy. If taller Nigerians were selected as slaves, this might result in a lower regional average that persists though genetics until the present and thereby provide a misleading picture. This effect would be accelerated by the regional heterogeneity in slave trade extraction and therefore it might even result in an opposite result. However, I argue that the effect of slave selection on the average height is unlikely to have more than a marginal impact, which indicates that contemporary average height is justified as an instrumental variable.

Table IV reports the IV estimates, I pursued a 2SLS regression on the three measures of individual financial development. Although the measures of financial development are binary I use 2SLS since Lewbel, Dong and Yang (2012) argue that the probit instrumental variable generally becomes inconsistent since the assumptions necessary to derive estimates of the first stage error term cannot be guaranteed. They state that 2SLS is usually a good approximation. They state that despite its name the instrumental variable probit approach is not an IV estimator but a control function estimator. The results of this approach and the 2SLS with household clustering are included as robustness checks in the appendix. The first stage results suggest that slave trade is positively correlated with average height, consistent with the literature on specific selection of slave traders of taller Africans (Steckel, 1979 and Eltis, 1990). The positive relationship between slave trade and average height is confirmed in an OLS regression on a LGA level, reported in the appendix. The F-statistic is significantly below 10, the number generally accepted to indicate that the instrument is relevant, thereby indicating that the instrument might

Table IV– IV Estimates of the Effect of Slave Trade on Financial Development

	Ownership of bank account	Credit application turned down	Use of informal credit
Second stage: Dependent variable is individual's financial development			
Slave Trade	0.0505	0.0068	-0.0473*
	(0.0416)	(0.0318)	(0.0277)
Number of observations	2,148	2,146	2,149
Number of LGA clusters	93	93	93
First stage: Dependent variable is Slave Trade			
Average birth height	1.1012***	1.0870***	1.0846***
	(0.4089)	(0.4110)	(0.4102)
Individual controls	Yes	Yes	Yes
District controls	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
Number of observations	2148	2146	2,149
Number of LGA clusters	93	93	93
F-stat of excluded instrument	7.25	7.00	6.99
R^2	0.9544	0.9543	0.9543

Notes: The table reports 2SLS estimates. The unit of observation is an individual. The standard errors adjusted for clustering by LGA are reported in brackets below the point estimate. The entrepreneur controls are for education, education of a parent, age, age squared, gender, indicator variables indicating whether the entrepreneur is literate, inhabits a rural area, and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The entrepreneur controls further cover some household characteristics; the size of the household, the number of adults inhabiting the household and the value of the household assets. The enterprise controls cover the total sales of last month, the age of the enterprise in months and its square value, the value of physical capital stock, indicator variables that cover whether the enterprise is officially registered; has multiple owners; operates at home; sells to final consumers and industry dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative share of male population, an indicator variable of a border LGA, the estimated distance to the coast from the centroid of the LGA to the nearest coast in kilometers, ordinal variables that proxy for the living situation; the state of the local economy; the local corruption and two ordinal variables of land. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-percent level.

be irrelevant. However, since the clustering of standard errors influences the F-stat is the F-stat in the model with household clustering well above 10. Therefore it is hard to interpret the relevance of the instrument. The results of the second stage provide no clear evidence on a causal effect of slave trade on contemporary financial development, since the coefficients are largely insignificant. The single significant result is in support of the hypothesis; however it is too weak to conclude that the hypothesis is accepted since the other coefficients are inconsistent and far from significant. The negative effect of slave trade on the use of informal finance is interesting since it suggests that trust would be the channel of a possible effect of slave trade on financial development. Informal finance is unlikely to be influenced by institutional development other than that poor institutional development could drive financial demand to the informal financial

sector; this would result in positive coefficient. The results are broadly in support of the probit and OLS outcomes.

VII. Conclusions

This paper adds to a young field of literature in economics that focusses on identifying the persistence of slave trade effects. Since the financial development is partly determined by the persistence of the historical events (amongst others: LLSV, 1997; 1998; ARJ, 2001) and Nunn (2008) finds long term effects of slave trade on contemporary economic outcomes, a natural subsequent step is examining the persistence of effects rooted in slave trade on contemporary financial development. The causal relationship between slave trade and financial development is plausible since the literature identifies two likely channels through which the effect can persist; cultural transmission of trust and institutional development. Since both channels indicate a negative relationship therefore I test the hypothesis that slave trade has a negative effect on financial development. I use probit and OLS estimates to test the hypothesis.

I have shown that this hypothesis is not confirmed since the heterogeneity in financial development between individuals and entrepreneurs cannot be traced back to slave trade. The findings suggest that individuals and entrepreneurs that inhabit an area that suffered severely from slave extraction exhibit no higher or lower levels of financial development. I performed several robustness checks that all confirm that there is no clear relationship. Finally I reported IV estimates that use average height, as proxy of historical average height, as an instrument for the intensity of the slave trade. I use this instrument since slave traders selected taller slaves (Steckel, 1979; Eltis, 1990) and height is largely explained by genetics (McEvoy and Visscher, 2009). The results of the IV show no causal effect of slave trade on financial development and thereby confirm the probit and OLS results.

The results are broadly in conflict with the only paper that I am aware of on the fundamental impact of slave trade on financial development (Pierce and Snyder, forthcoming) since they find a robust negative effect on the access to finance of African firms. However, since the IV results present some suggestive evidence that trust is the persistence channel the presumption of Pierce and Snyder that their results are explained through trust is supported. Furthermore are the results not in line, however not necessary in contradiction, with the vast majority of the literature on the fundamental effects of slave trade since no clear relationship can

be established, neither positive nor negative. Overall, the findings do not suggest that the history of slave trade does not matter for contemporary economical outcomes; however it is unrelated to the financial development of individuals and small entrepreneurs.

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Appendix

1. Descriptive statistics of the individual sample

Panel A. on an individual level

Variables	Observations	Mean	Standard Deviation	Min	Median	Max
Bank Account	5,152	0.1884	0.3911	0	0	1
Informal Credit	5,215	0.1565	0.3633	0	0	1
Credit Turn Down	5,143	0.0997	0.2997	0	0	1

Panel B. on an LGA level

Variables	Observations	Mean	Standard Deviation	Min	Median	Max
Bank Account	131	0.1906	0.2040	0	0.1190	0.9
Informal Credit	131	0.1024	0.1322	0	0.0556	0.9545
Credit Turn Down	131	0.1596	0.1334	0	0.1167	0.5926
Slave Trade	131	4.530	4.7103	0	1.9150	13.9756

2. Descriptive statistics of the enterprise sample

Panel A. on an enterprise level

Variables	Observations	Mean	Standard Deviation	Min	Median	Max
Credit use	1,651	0.0660	0.3911	0	0	1
Credit Turn Down	86	0.3605	0.2997	0	0	1
Loan repayment	1,650	0.0618	0.2409	0	0	1
Log(borrowed)	108	10.2282	1.8246	0.6931	10.2178	15.8950
Log(interest)	154	8.1612	1.5542	0.6931	8.4551	10.8198

Panel B. on an LGA level

Variables	Observations	Mean	Standard Deviation	Min	Median	Max
Credit use	131	0.4076	0.0923	0	0.0357	0.5
Credit Turn Down	44	0.4076	0.4517	0	0.3333	1
Loan repayment	131	0.0566	0.0935	0	0	0.5
Log(borrowed)	59	10.2282	1.5939	6.2146	10.3090	13.1224
Log(interest)	49	8.1612	1.9295	0.6931	8.3233	10.1659
Slave Trade	131	4.530	4.7103	0	1.9150	13.9756

Panel C. Credit sources on an enterprise level

Credit sources	Positive Observations	Relative share
Household Savings	779	0.4779
Family Proceeds	379	0.2325
Relatives / Friends	113	0.0693
Remittances from abroad	205	0.1258
Assistance	59	0.0362
Institutional Informal	87	0.0534
Formal	8	0.0049
Total	1630	1
Missing Observations	31	

3. Descriptive statistics of the Instrumental variable sample

Panel A. on an enterprise level

Variables	Observations	Mean	Standard Deviation	Min	Median	Max
Bank Account	4,218	0.2039	0.4029	0	0	1
Informal Credit	4,272	0.1458	0.3530	0	0	1
Credit Turn Down	4,211	0.0933	0.2909	0	0	1

Panel B. on an LGA level

Variables	Observations	Mean	Standard Deviation	Min	Median	Max
Average LGA Height	108	2.5397	0.4523	1.4286	2.5400	4
Bank Account	108	0.2130	0.4113	0	0	1
Informal Credit	109	0.1284	0.3361	0	0	1
Credit Turn Down	107	0.0935	0.2924	0	0	1
Slave Trade	109	4.6946	4.6568	0	2.1813	13.9756

4. Probit regressions of slave trade on financial development with incomplete models

Dependent variable:	Bank account	Bank account	Bank account	Turndown	Turndown	Turndown	Informal credit	Informal credit	Informal credit
LGA slave export	0.0013	-0.0468	0.0023	0.0034	0.0227	0.0447*	-0.0316**	-0.0260	-0.0411**
	(0.0253)	(0.0379)	(0.0241)	(0.0200)	(-0.0300)	(0.0243)	(0.0155)	(0.0290)	(0.0195)
Individual controls	No	Yes	No	No	Yes	No	No	Yes	No
District controls	No	No	Yes	No	No	Yes	No	No	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	5,152	2627	5,152	5,143	2,604	5,143	5,152	2645	5,152
Number of LGA clusters	131	104	131	131	96	131	131	100	131
Pseudo R^2	0.1284	0.3734	0.1608	0.0907	0.1629	0.1048	0.0591	0.1370	0.0607

Notes: The table reports probit estimates. The unit of observation is an individual. The standard errors adjusted for clustering by LGA are reported in brackets below the point estimate. The individual controls are for education, education of a parent, age, age squared, gender, income, income squared, indicator variables indicating whether the individual is an entrepreneur, is unemployed, is the head of the household, is a student, is literate and receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative population share of males in the LGA, an indicator variable whether the LGA is primarily rural, dummies of border LGAs, a ordinal variable covering the average living situation, a ordinal variable of economic state, a proxy for corruption, the distance to the coast from the centroid of the LGA and two ordinal variables of land fertility. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-per cent level.

5. Probit estimates with an alternative financial development measurement

Dependent variable:	Credit application turndown	Credit application turndown	Credit application turndown	Credit application turndown
LGA slave export	0.0435	0.0226	0.0270	0.0967
	(0.0364)	(0.0447)	(0.0548)	(0.1240)
Entrepreneur controls	No	Yes	No	Yes
Enterprise controls	No	No	Yes	Yes
District controls	No	No	No	Yes
State fixed effects	No	No	No	No
Number of observations	86	83	41	62
Number of LGA clusters	44	43	27	36
Pseudo R2	0.0228	0.2160	0.3453	0.2785

Notes: The table reports probit estimates. The unit of observation is an enterprise. The standard errors adjusted for clustering by LGA are reported in brackets below the point estimate. The entrepreneur controls are for education, education of a parent, age, age squared, gender, indicator variables indicating whether the entrepreneur is literate, inhabits a rural area, and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The entrepreneur controls further cover some household characteristics; the size of the household, the number of adults inhabiting the household and the value of the household assets. The enterprise controls cover the total sales of last month, the age of the enterprise in months and its square value, the value of physical capital stock, indicator variables that cover whether the enterprise is officially registered; has multiple owners; operates at home; sells to final consumers and industry dummies. The fourth column represents the estimation of a model with a representative selection of controls; age and its square value, gender, indicator variables indicating whether the entrepreneur is literate and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a proxy for living condition, the ethnic fractionalization, ordinal variables on the LGA's economic state and corruption, the total sales of last month, indicator variables that cover whether the enterprise is officially registered; operates at home; sells to final consumers and industry dummies.

6. Probit estimates slave trade and financial development with household clustering

Dependent variable:	Ownership of bank account	Credit application turned down	Use of informal credit
LGA slave export	-0.0329	0.0623	-0.0455
	(0.0349)	(0.0341)	(0.0342)
Individual controls	Yes	Yes	Yes
District controls	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
Number of observations	2,627	2,604	2,645
Number of household clusters	970	967	987
Pseudo R^2	0.3772	0.1665	0.1443

Notes: The table reports probit estimates. The unit of observation is an individual. The standard errors adjusted for clustering by household are reported in brackets below the point estimate. The individual controls are for education, education of a parent, age, age squared, gender, income, income squared, indicator variables indicating whether the individual is an entrepreneur, is unemployed, is the head of the household, is a student, is literate and receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative population share of males in the LGA, an indicator variable whether the LGA is primarily rural, dummies of border LGAs, a ordinal variable covering the average living situation, a ordinal variable of economic state, a proxy for corruption, the distance to the coast from the centroid of the LGA and two ordinal variables of land fertility. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-per cent level.

7. Probit estimates slave trade and financial development with household clustering

Dependent variable:	Credit use	Credit use	Credit use	Credit use
LGA slave export	-0.0195	-0.0218	-0.0069	0.0055
	(0.0274)	(0.0256)	(0.0306)	(0.0487)
Entrepreneur controls	No	Yes	Yes	Yes
Enterprise controls	No	No	No	Yes
District controls	No	No	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Number of observations	1522	1410	1410	720
Number of household clusters	978	912	912	507
Pseudo R2	0.0774	0.1154	0.1340	0.2498

Notes: The table reports probit estimates. The unit of observation is an enterprise. The standard errors adjusted for clustering by household are reported in brackets below the point estimate. The entrepreneur controls are for education, education of a parent, age, age squared, gender, indicator variables indicating whether the entrepreneur is literate, inhabits a rural area, and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The entrepreneur controls further cover some household characteristics; the size of the household, the number of adults inhabiting the household and the value of the household assets. The enterprise controls cover the total sales of last month, the age of the enterprise in months and its square value, the value of physical capital stock, indicator variables that cover whether the enterprise is officially registered; has multiple owners; operates at home; sells to final consumers and industry dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative share of male population, an indicator variable of a border LGA, the estimated distance to the coast from the centroid of the LGA to the nearest coast in kilometers, ordinal variables that proxy for the living situation; the state of the local economy; the local corruption and two ordinal variables of land fertility. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-per cent level.

8. Probit estimates of the effect of slave trade on alternative measure of financial development

Dependent variable:	Loan repayment	Loan repayment	Loan repayment	Loan repayment
LGA slave export	-0.0194	-0.0235	-0.0068	0.0135
	(0.0208)	(0.0182)	(0.0251)	(0.0595)
Entrepreneur controls	No	Yes	Yes	Yes
Enterprise controls	No	No	No	Yes
District controls	No	No	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,345	1,294	1,294	644
Number of LGA clusters	96	94	94	87
Pseudo R2	0.0930	0.1874	0.2104	0.3505

Notes: The table reports Probit estimates. The unit of observation is an enterprise. The standard errors adjusted for clustering by LGA are reported in brackets below the point estimate. The entrepreneur controls are for education, education of a parent, age, age squared, gender, indicator variables indicating whether the entrepreneur is literate, inhabits a rural area, and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The entrepreneur controls further cover some household characteristics; the size of the household, the number of adults inhabiting the household and the value of the household assets. The enterprise controls cover the total sales of last month, the age of the enterprise in months and its square value, the value of physical capital stock, indicator variables that cover whether the enterprise is officially registered; has multiple owners; operates at home; sells to final consumers and industry dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative share of male population, an indicator variable of a border LGA, the estimated distance to the coast from the centroid of the LGA to the nearest coast in kilometers, ordinal variables that proxy for the living situation; the state of the local economy; the local corruption, two ordinal variables of land fertility and seven vegetation dummies. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-percent level.

9. Credit sources analyzed

Dependent variable:	Household savings	Relatives / Friends	Family proceeds	Remittan-ces from Abroad	Informal non friends/ relatives	NGO/gove-rnmental/ religious Assistance
LGA slave export	0.0477	-0.1529	-0.0750***	0.0967	0.2331***	0.1090
	(0.0337)	(0.1168)	(0.0280)	(0.1240)	(-0.0853)	(0.0984)
Entrepreneur controls	Yes	Yes	Yes	Yes	Yes	Yes
Enterprise controls	Yes	Yes	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	886	459	894	662	536	452
Number of LGA clusters	116	55	117	80	63	57
Pseudo R^2	0.3826	0.3523	0.2486	0.3299	0.3683	0.3452

Notes: The table reports probit estimates. The unit of observation is an enterprise. The standard errors adjusted for clustering by LGA are reported in brackets below the point estimate. The entrepreneur controls are for education, education of a parent, age, age squared, gender, indicator variables indicating whether the entrepreneur is literate, inhabits a rural area, and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The entrepreneur controls further cover some household characteristics; the size of the household, the number of adults inhabiting the household and the value of the household assets. The enterprise controls cover the total sales of last month, the age of the enterprise in months and its square value, the value of physical capital stock, indicator variables that cover whether the enterprise is officially registered; has multiple owners; operates at home; sells to final consumers and industry dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative share of male population, an indicator variable of a border LGA, the estimated distance to the coast from the centroid of the LGA to the nearest coast in kilometers, ordinal variables that proxy for the living situation; the state of the local economy; the local corruption, two ordinal variables of land fertility. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-per cent level.

10. OLS estimates of slave trade and mean height

Dependent variable:	Slave Trade	Slave Trade
Mean height	1.1772*	1.0489*
	(0.5963)	(0.6242)
District controls	No	Yes
State fixed effects	Yes	Yes
Number of observations	108	108
Adjusted R^2	0.8034	0.8058

Notes: The table reports OLS estimates. The unit of observation is an LGA. The standard errors are reported in brackets below the point estimate. The district controls include ethnic fractionalization, size in square kilometers, population density, relative share of male population, an indicator variable of a border LGA, the estimated distance to the coast from the centroid of the LGA to the nearest coast in kilometers, ordinal variables that proxy for the living situation; the state of the local economy; the local corruption and two ordinal variables of land fertility. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-per cent level.

11. IV estimates with household clustering

	Ownership of bank account	Credit application turned down	Use of informal credit
Second stage: Dependent variable is individual's financial development			
Slave Trade	0.2496*	0.1364	-0.2940**
	(0.1473)	(0.1523)	(0.1334)
Number of observations	1,893	2,021	2,094
Number of LGA clusters	715	758	789
First stage: Dependent variable is Slave Trade			
Average birth height	1.1012***	1.0870***	1.0846***
	(0.1565)	(0.1573)	(0.1570)
Individual controls	Yes	Yes	Yes
District controls	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
Number of observations	2,148	2,146	2,194
Number of household clusters	816	816	817
F-stat of excluded instrument	49.53	47.75	47.73
R^2	0.9544	0.9543	0.9543

Notes: The table reports 2SLS estimates. The unit of observation is an individual. The standard errors adjusted for clustering by household are reported in brackets below the point estimate. The entrepreneur controls are for education, education of a parent, age, age squared, gender, indicator variables indicating whether the entrepreneur is literate, inhabits a rural area, and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The entrepreneur controls further cover some household characteristics; the size of the household, the number of adults inhabiting the household and the value of the household assets. The enterprise controls cover the total sales of last month, the age of the enterprise in months and its square value, the value of physical capital stock, indicator variables that cover whether the enterprise is officially registered; has multiple owners; operates at home; sells to final consumers and industry dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative share of male population, an indicator variable of a border LGA, the estimated distance to the coast from the centroid of the LGA to the nearest coast in kilometers, ordinal variables that proxy for the living situation; the state of the local economy; the local corruption and two ordinal variables of land. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-percent level.

12. IV probit estimates

	Ownership of bank account	Credit application turned down	Use of informal credit
Second stage: Dependent variable is individual's financial development			
Slave Trade	0.2496	0.1364	-0.2940**
	(0.1726)	(0.1770)	(0.1325)
Number of observations	1,893	2,021	2,094
Number of LGA clusters	78	74	79
First stage: Dependent variable is Slave Trade			
Average birth height	1.1477***	1.1716***	1.0780***
	(0.4067)	(0.4072)	(0.4113)
Individual controls	Yes	Yes	Yes
District controls	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
Number of observations	1,893	2,021	2,094
Number of household clusters	78	74	79
p-value (chi^2 test)	0.1423	0.6375	0.0412

Notes: The table reports IV probit estimates. The unit of observation is an individual. The standard errors adjusted for clustering by household are reported in brackets below the point estimate. The entrepreneur controls are for education, education of a parent, age, age squared, gender, indicator variables indicating whether the entrepreneur is literate, inhabits a rural area, and whether the entrepreneur receives money from friends/relatives outside Nigeria, two religion dummies, a living condition dummies and two wealth dummies. The entrepreneur controls further cover some household characteristics; the size of the household, the number of adults inhabiting the household and the value of the household assets. The enterprise controls cover the total sales of last month, the age of the enterprise in months and its square value, the value of physical capital stock, indicator variables that cover whether the enterprise is officially registered; has multiple owners; operates at home; sells to final consumers and industry dummies. The district controls include ethnic fractionalization, size in square kilometers, population density, relative share of male population, an indicator variable of a border LGA, the estimated distance to the coast from the centroid of the LGA to the nearest coast in kilometers, ordinal variables that proxy for the living situation; the state of the local economy; the local corruption and two ordinal variables of land. The symbols ***, **, * mean that the coefficient is statistically different from zero, respectively, at the 1-, 5-, and 10-percent level.