ONLINE APPENDIX - For Online Publication Only

The Side Effects of Immunity: Malaria and African Slavery in the United States

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This Online Appendix accompanies the paper "The Side Effects of Immunity: Malaria and African Slavery in the United States". Section A presents additional material complementing the Background section in the main text. Section B presents data sources, additional figures, additional results and robustness results for the cross-county analysis, Section C for the difference-in-difference exercise, and Section D for the analysis of slave prices.

Contents

A Background

Section A.1 presents background information on malaria transmission, malaria symptoms, and immunities to malaria. Section A.2 complements the main text presenting narratives on: (i) the health consequences of malaria spread in the United States, and (ii) the perception of higher resistance of Africans to tropical and semi-tropical diseases. Section A.3 presents, as a case study, the peculiar history of Georgia, the only British colony that initially banned slavery and that then decided to remove the ban under the pressure of a powerful pro-slavery movement.

A.1 Malaria: the Great Debilitator

A.1.1 Transmission

Malaria is a parasite transmitted to humans by mosquitoes. How threatening the disease is to humans depends on three key variables: the parasite, the mosquitoes, and the weather.

- **Parasite.** The single-cell parasite, the *Plasmodium*, exists in different strains and, among these strains, *vivax* malaria and *falciparum* malaria are the most widespread.[1] *Vivax* malaria is a milder form of the disease, rarely fatal, whereas *falciparum* malaria is the most virulent and lethal form and if untreated can cause seizure, coma, and death.

- **Mosquitoes.** The mosquitoes that transmit malaria are the females of certain *Anopheles* species, and some of these species are better transmitters than others. Of the 430 Anopheles species that we know, only 30 to 40 transmit malaria. Certain *Anopheles* species, for instance the primary malaria vectors in Africa, prefer to feed on humans rather than on any other vertebrate, encouraging the process of malaria transmission. Another characteristic of mosquitoes that affects their ability to transmit the disease is their average life span; mosquitoes that live longer have greater chances of transmitting the infection.

- **Weather.** The weather is the third key variable for malaria transmission. Higher temperatures reduce the duration of the development of the parasite within the mosquito, aiding malaria transmission. At the same time, mosquitoes require enough water and hot enough temperatures to reproduce, develop, and survive. More specifically, malaria transmission intensity is a complex function of temperature, as temperature affects several aspects of the transmission process. It affects the number of available mosquitoes per human, mosquito feeding rates, daily vector survival, and time required for sporogony (the development of the parasites ingested by the mosquito). See Gething et al. (2011) for a modeling of the effect of temperature on the intensity of *vivax* malaria versus *falciparum* malaria transmission. On top of this, the two major strains of malaria require different climatic conditions, with *falciparum* malaria needing higher temperatures than *vivax* malaria to become infectious. *Vivax* malaria can continue development with temperatures as low as 9 degrees C; *falciparum* reproduction stops below 18 degrees (Humphreys, 2001). For this reason, in the hot season *vivax* malaria used to reach as far north as Pennsylvania, New York, and even Maine (Russel, 1968).

[1]Other strains are the *Plasmodium malariae*, *Plasmodium ovale* and *Plasmodium knowlesi.*

A.1.2 Symptoms

The classic clinical symptoms of malaria attacks are fever, chills, nausea, and aches. Of all the existing strains, *falciparum* malaria is responsible for the most serious malaria symptoms, as it can lead to impaired consciousness, psychological disruption, coma, and even death (cognitive malaria). The untreated mortality rate of *falciparum* malaria can range between 20% and 40% in a susceptible population, whereas *vivax* does not kill more than 5% of infected individuals (Rutman and Rutman, 1976).[2] After repeated infections malaria virulence and the mortality risk are reduced; however, continual infections deteriorate an individual's general health conditions, decreasing the ability to resist other diseases.[3] Precisely because it tends to weaken the immune system and drain energy, malaria has been nick-named the "the great debilitator" (Dobson, 1989).

A.1.3 Immunities

Malaria represented such a burden for humanity that during the last millennia a vast range of genetic adaptations have arisen to protect humans against the disease, to the point that malaria is considered the 'strongest known force for evolutionary selection in the recent history of the human genome' (Kwiatkowski, 2005). Blood cell abnormalities are the most well-known and studied genetic resistances to malaria. Malaria is the evolutionary force behind genetic variation such as the Duffy blood group antigen, sickle cell disease, thalassemia, glucose-6-phosphatase deficiency, and many more. See Sirugo et al. (2006) and Carter and Mendis (2002) for insightful reviews. In Table A0 of the Appendix, we summarize the main blood cell-abnormalities and the type of protection they grant. Importantly, different populations have independently developed specific evolutionary responses to malaria Kwiatkowski et al. (2005). However, current research has shed light only on the tip of the iceberg, since a vast set of protective mechanisms remain unexplored and genetic factors seem to account for many more than the sole protective effects of blood cell disorders (MacKinnon et al., 2005).

After repeated infections, individuals also develop acquired immunities.[4] A recent stream of research has pointed out that innate and acquired immunities are likely to interact, so that infections can trigger innate responses that might facilitate the acquisition of acquired immunities.[5] In other words, innate resistance to malaria can engender better adaptive responses once an individual faces an episode of infection.

[2] On the west coast of Africa in the early 1800s, mortality rates for Europeans often exceeded 50% per year (Curtin, 1989). After the introduction of quinine (in the late 1800s) the mortality rate fell to about 25%, indirect evidence that the majority of deaths were caused by *falciparum* malaria (Hedrick, 2011).

[3] Rutman and Rutman (1976) report the result of a study documenting that for every ascertained malaria death, 5 additional deaths are caused by malaria indirectly, which acts by worsening the virulence of other diseases.

[4] The key determinants of the acquired immune status of an individual are the number of malarial infections experienced and the intervals between infections. While resistance to the severe life-threatening consequences of infection is acquired relatively fast (Doolan et al., 2009), clinical immunity to milder symptoms is acquired slowly and requires repeated infections (Stevenson and Riley, 2004). Based on available knowledge, innate and acquired resistance interact in complex ways, granting various levels of protection: (i) by reducing the number of parasites; (ii) once parasitized, by reducing the risk of becoming ill with fever; and (iii) once infected with malaria, by reducing the risk of developing severe malaria (Carter et al., 2002; Kwiatkowski et al., 2005).

[5] See MacKinnon et al. (2005) for the case of sickle cell trait.

Table A0: Common Polymorphisms That Affect Resistance to Malaria

	Type of Protection	**Geographical Distribution**
Thalassemias	Approximately 50% reduction in the risk of malarial disease	High frequencies around Mediterranean sea shores, through most of Africa, Middle East, Central Asia, Arabian peninsula, Indian subcontinent, Southeast Asia, southern China, and Western Pacific Island (from Philippines to New Guinea and Melanesia)
Sickle Cell Trait	Approximately 90% protection against P. falciparum malarial mortality	In many parts of Africa, frequent at 30%
G6PD	Approximately 50% protection against severe P. falciparum malaria	same as Thalassemias
Hemoglobin C	Approximately 90% protection against P. falciparum malarial infection in the homozygote (30% in a heterozygous combination)	among certain West African population, frequent at 10%-20%
Hemoglobin E	May protect against P. vivax, and clear P. falciparum infection more rapidly	High frequencies in population across South-East Asia
Ovalocytosis	Reduced risk of P. vivax and P. falciparum infection	New Guinea (up to 20%), Solomon Islands and Vanuatu
RBC Duffy Negativity	Complete refractoriness to P. vivax infection	More than 95% frequencies in West and Central Africa, at lower frequencies through the Arabian peninsula, across the Middle East and to the edges of Central Asia

Sub-Saharan Africa hosts the most debilitating strains of the disease and the species of mosquitoes most threatening to humans. Therefore, African populations have developed a particularly vast range of innate immunities to malaria. For instance, the sickle cell trait, a blood cell disorder that can reduce the likelihood of developing cerebral malaria after a *falciparum* infection by up to 90%, is widespread among several African populations. Even African populations that do not present a high frequency of the sickle cell trait have independently developed a high frequency of other resistances, such as the HbC allele in Dogons in Mali or the high levels of antimalarial antibodies in Fulani in Burkina Faso. On top of this, a great majority of Sub-Saharan Africans are completely immune to *vivax* malaria (thanks to the protection granted by the Duffy blood group antigen), whereas all other human populations are vulnerable to this species of malaria parasite.

A.2 Malaria Reaches the US Colonies

Section A.2.1 presents narratives documenting the burden that malaria represented in the malaria-infested land of the United States. Section A.2.2 assembles evidence from numerous historians that documented the perception of higher resistance of Africans living in tropical and semi-tropical areas.

A.2.1 The Burden of Malaria-infested Areas

Malaria represented a constant burden for the southern United States. Despite various attempts by the colonial governments to hide news of diseases from potential settlers, information on health conditions in the colonies frequently reached Europe (Wood, 1974; Merrens and Terry, 1984;). Merrens and Terry (1984) and Carcamo and Matthews (2012) report a German proverb claiming:

> *"They who want to die quickly, go to Carolina"*

The unhealthy environment was likely the consequence of several diseases, including yellow fever. There is evidence, however, suggesting that malaria represented a particularly serious threat. A German observer, in fact, noted that: *"Carolina is in the spring a paradise, in the summer a hell, and in the autumn a hospital"* (Merrens and Terry, 1984). The seasonality of malaria infection, striking in particular in the summer and in the fall at those latitudes, is a feature of malaria infections. Yellow fever strikes in epidemic form following patterns more scattered during the year and does not have the yearly frequency that the statement seems to suggest. Let's take South Carolina as an example (the state more frequently hit by yellow fever epidemics). According to data from Duffy (1972), South Carolina was hit by yellow fever epidemics in: 1699, 1706, 1711, 1728, 1732, 1739, 1745, 1748, 1753 and 1755. So, while being a frequent threat, yellow fever was not the constant threat that the statement suggests.

A.2.2 Perception of Africans Resistance to Malaria: Narratives

Spaniard settlers were used to claim:

> *"if we did not hang a Negro, he would never die."* (Kiple, 1986)

Indeed, European settlers rapidly reached the conviction that Africans were more resistant to tropical diseases than Europeans and indigenous people.

Curtin (1968) provides some of the most suggestive statistics documenting a substantial differential in mortality rates between Africans and Europeans in the American tropics. Relying on data of British soldiers serving in the Caribbeans, he looks at mortality rate for Africans British soldiers and European British soldiers sharing similar diets and working conditions. According to his findings, European troops in Jamaica experienced an annual mortality rate of 130 out of 1000, while for African troops the rate was of 40 out of 1000.

Such figures were no surprise for settlers and slaves, as it seems apparent from the lyrics of a song that African slaves in Jamaican plantations dedicated to the white man *buckra*:

> *"New-come buckra, He get sik, He tak fever, He be die, He be die"* (McNeill, 2010)

On a similar line, white planters all across the New World grew convinced that Africans slaves represented the most productive form of labor they could employ. In North American semi-tropical regions similar views were widespread:

> *"The old plantation was situated in rich lands, abounding in malaria, against which only the negro was proof"* (Mallard, 1892)

The health differential was so apparent to attract inquiry of the scientific community. Dr. Alfred Tebault, in 1856 on *American Journal of the Medical Sciences*, was reporting the results of his studies of malaria incidence on African and White Americans. According to his analysis, blacks suffered from about one-third of the malaria attacks that struck white Americans (Kiple, 2003).

A.3 Malaria and African Slavery in Georgia: A Case Study

When Georgia was founded, the Trustees of Georgia had the strong intention of banning slavery, as they thought that a state composed of small landowners would represent a better safety buffer against the Spanish neighbors. So that James Oglethorpe in 1732 declared: *"The Trustee [of Georgia] had"determined not to suffer from slavery"* (Jennison, 2012).

In 1734, in effect, the Parliament approved the official ban to African slavery, approving the act named: *"An act of Parliament for rendering the colony of Georgia more defensible by prohibiting the importation and use of black slaves or (free) negroes into the same"*.

However, already within 2 years, a pro-slavery sentiment emerged in the colony. The unhealthy environment posed serious threats to the permanence/survival of the local communities. The situation deteriorated rapidly, so that Hon. James Habersham in August 1740 claimed that: *"The colony is reduced to one-sixth of its former number... without some proper remedies, must dwindle away into nothing"* (Stevens, 1847).

European servants were not considered a viable option as they were considered too susceptible to disease: *"[Europeans] succumb to "Distempers which render them useless for almost one half of the Year"*, Trailfer (1735) from (Wood, 2007).

According to pro-slavery movements, health conditions in Georgia made impossible to find European labor on a commercially viable term. Hon. James Habersham (August 1740) claimed: *"...I don't know where I could purchase, or hire, at any reasonable rate, one servant"* (Stevens, 1847). While, a petitioning freeholder in August 1740 stated that *"'... a white servant cost three times what he could produce"* (Kenzer, 1998).

The pressure to lift the ban continued to grow over the years. Until 1751, when the ban on slavery was removed. In 1755 Georgia adopted a slave code very similar to the one in force in South Carolina.

B Malaria and African Slavery across US Counties

B.1 Data Construction and Sources

Section B.1.1 provides information on the construction of all malaria indexes used in this paper. Section B.1.2 presents data sources and data construction information for all dependent, independent and control variables of text Section 3.1.

B.1.1 Malaria Indexes

Malaria Stability Index (Kiszewski et al., 2004) The malaria stability index, constructed by Kiszewski et al., 2004, has been the most widely used measure used to predict suitability for malaria transmission. The most disaggregated version of the index is available at a resolution of 0.5 x 0.5 degrees. The index is constructed as a prediction of the likelihood of malaria infection as a function of:

- **Mosquitoes**' characteristics:
  - proportion biting people p (0-1)
  - daily survival rate a (0-1)

  According to the formula:

$$\sum_{m=1}^{12} \frac{a_{im}^2 p_{im}^E}{-lnp_{im}}$$

  where m stands for month and i for dominant mosquito vector in the region

- **Temperature** t: trough E, that is the length of extrinsic incubation period in days ($E = \frac{111}{t-16}$ for falciparum and $E = \frac{105}{t-14.5}$ for vivax)

- **Precipitation**: a minimum precipitation threshold of 10 mm per month lagged

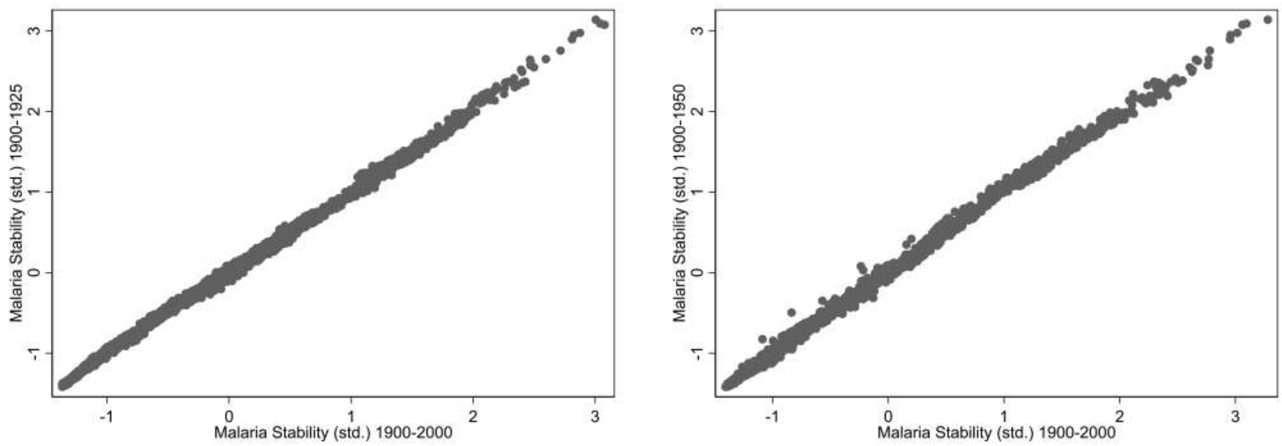
The index is designed to predict malaria suitability in the long-run. For this reason, monthly values of malaria stability are averaged over the period 1901-1990. Therefore the index exploits long-run average of malaria suitability.

Malaria Stability Index - Climatic (Cervellati et al., 2019) Cervellati et al. (2019) reproduce a version of the malaria stability index that ignores variation in mosquitoes' characteristics. Proportion biting people and daily survival rate are predicted as non-linear function of temperature, using calibration results from epidemiological models.[6]

Importantly, this approach allows us to reconstruct various versions of the index exploiting only historical climatic data, for instance using temperature and precipitation from 1900 to 1925, and to 1900 to 1950. This exercise can give us a sense of how our measurement of malaria

[6]The parameter p is calibrated following McCord (2017), as $p(T) = exp^{-1/(-4.4+(1.31*T)-(0.03*T^2))}$ where T is temperature. The parametrization of the mosquito biting rate follows Garske et al. (2013), who estimate $a(T)$ looking at *Anopheles maculipennis*, a vector similar to *Anopheles gambiae*, and find a biting rate dependence on temperature of $a(T) = max(0, (1 + \frac{36.5}{T-9.9}))$.

Figure B1: Correlation of Malaria Indexes Constructed with Historical and More Recent Climatic Data



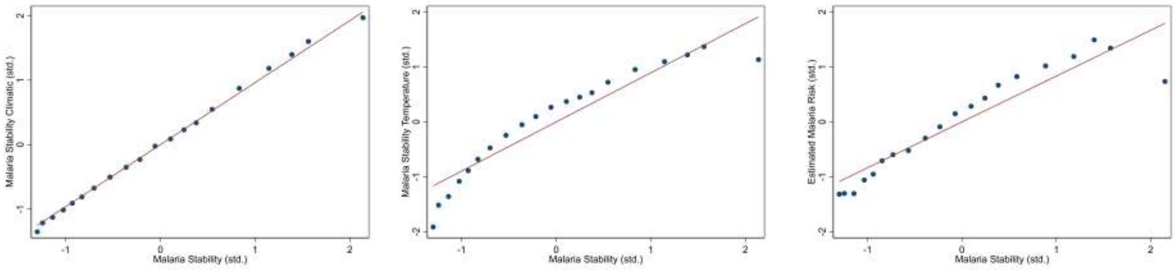
(a) 1900-1925 (b) 1900-1950

is sensitive to secular changes in temperature and precipitation. Figure B1 portrays the scatter correlation between the Climatic Malaria Stability Index - constructed using data from 1900 to 2000, and the same indexes constructed only using information from 1900 to 1925 and to 1900 to 1950 respectively. A Binned scatter plots between the baseline measure of malaria stability (the Malaria Stability Index by Kiszewski et al., 2004) and the Index of Climatic Malaria stability is reported in panel a) of Figure B2.

Temperature-based Malaria Suitability Index - Flückiger and Ludwig (2017) An index constructed with a similar approach was produced by Flückiger and Ludwig (2017). Their index predicts mosquitoes' characteristics as a non-linear function of temperature, ignoring variation in precipitation. Following Flückiger and Ludwig (2017), we reconstruct their index using historical data on temperature at a resolution of 0.5 x 0.5 degrees. We show that their index is highly correlated with our baseline index (0.89). Results, available upon request, are very much in line with baseline ones. Binned scatter between the baseline measure of malaria stability and the Temperature-based Malaria Suitability Index as per Flückiger and Ludwig (2017) is reported in panel b) of Figure B2.

Estimated Malaria Risk (Hong, 2007) We further verify our results using the index by Hong (2007). Exploiting data on malaria incidence rates among soldiers in 143 U.S. Army forts located across the United States between 1829 and 1874, Hong estimates a model of morbidity based on several environmental features of the land where the forts were located. The model features are: i) annual mean temperature, which determines the degree of survival and speed reproduction of both the malaria plasmodium and the malaria mosquito; ii) annual accumulated precipitation during the months when the mean temperature was higher than 59 degrees Fahrenheit. High level of precipitation increase the breeding habitat for the vectors, the threshold of 59 degrees permits to consider only areas where the temperature is high enough

Figure B2: Binned Scatter Plots: Alternative Malaria Indexes



(a) Malaria Stability - Climatic (b) Temp.-based Malaria Index (c) Estimated Malaria Risk

for pathogen and mosquito to survive; iii) standard deviation of elevation approximating the existence of wetlands or swamps, which are strong predictor for the presence of breeding sites; iv) the extent to which land was improved for agriculture, and v) whether or not the region was adjacent to the ocean, as vector breeding is less frequent in salty water. Based on these estimates, Hong computes a predicted morbidity index for US counties, relying solely on the six geographic and climatic characteristics reported above. This index has the advantage of being predicted based on historical data on malaria hospitalization from the United States in the 19th century.

For our analysis, the main disadvantage is that it also exploits information on whether county land was improved for agriculture, which makes it potentially endogenous with respect to our dependent variable. A binned scatter plot of our baseline measure of malaria stability and the estimated malaria risk by Hong (2007) is reported in panel c) of Figure B2.

B.1.2 Other Data Sources

Sources for main variables used for the cross-county analysis are summarized in Table B1.

Table B1: Data Sources - Cross-Sectional Analysis

US Counties 1790 and 1860
Share of Slaves
Ratio of slaves to total population in the county in 1790/1860. Source: *www.nhgis.org*. National Historical Geographic Information System (NHGIS): Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 15.0 [dataset]. Minneapolis, MN: IPUMS. 2020. `http://doi.org/10.18128/D050.V15.0`. Data is subject to a redistribution restriction and can be freely downloaded after registration from *www.nhgis.org*.
Share of Blacks
Ratio of blacks to total population in the county in 1790/1860. Source: Historical U.S. census. *www.nhgis.org*.
Malaria Stability
Average Malaria Stability Index in the state. Source: average Malaria Stability is constructed as the state average of the Malaria Stability index from Kiszewski *et al.* (2004). The original measure, in raster format, is made publicly available by Gordon McCord and was downloaded from `http://sdgpolicyinitiative.org/gmresearch/`.
Malaria Climatic Suitability
Average Malaria Suitability, predicted as a non-linear function of temperature and precipitation using climatic data from 1900 to 1950. Source: replicated following Cervellati *et al.* (2019).
Estimated Malaria Risk
Predicted risk of malaria infection estimated on 19th century morbidity data from US forts. Source: Hong (2007).
Crop Suitability Indexes
Estimated suitability index (value) for cultivating cotton, coffee, rice, sugar, tea, and tobacco with low input in a rainfed agriculture. Source: FAO/IIASA, 2011. Global Agro-ecological Zones (GAEZv3.0). FAO Rome, Italy and IIASA, Laxenburg, Austria. *http://gaez.fao.org/Main.html*. Raster data are publicly available and can be downloaded, after registration, at `https://webarchive.iiasa.ac.at/Research/LUC/GAEZv3.0/`.
Distance to Sea
Average county distance to seas and oceans (1000 km). Source: "GSHHG - A Global Self-consistent, Hierarchical, High-resolution Geography Database" from Wessel and Smith (1996). Data are publicly available at: `https://www.soest.hawaii.edu/pwessel/gshhg/`.
Distance to Rivers
Average county distance to inland water bodies, rivers and lakes (1000 km). Source: "North America Rivers and Lakes" produced by the Commission for Environmental Cooperation (2011). Data are publicly available at `https://www.sciencebase.gov/catalog/item/4fb55df0e4b04cb937751e02`.
Average Precipitation
Average county precipitation mm/month (baseline period 1900-1950). Source: CRU TS v.1.1 data from New, Hulme and Jones (2000). Data are publicly available and can be downloaded at `https://crudata.uea.ac.uk/cru/data/hrg/`.
Average Temperature
Average county temperature (baseline period 1900-1950). Source: CRU TS v.1.1 data from New (2000).
Rice, Tobacco, Ginned Cotton, Canesugar
Source: Historical U.S. census. *www.nhgis.org*. Variables: agy005, agy006, agy007, agy028.
Farmland Value
Average value of farmland and buildings per acre. Source: Historical U.S. census. *www.nhgis.org*. Variable ae7001.
Yellow Fever Suitability
Predicted global distribution of *Aedes Aegypti*. Source: Kraemer *et al.* (2015).
Hookworms Prevalence
Historical hookworms prevalence. Source: Chandler (1929).

Constitutional Convention 1878
Pro-Slavery Vote Pro-slavery delegate vote on votes number convention votes 39, 132, 136, 145, 147, 253, 367, 368, and 999. Pro-slavery position assigned following Dougherty and Heckelman (2008). Source: Dougherty, Keith, and Heckelman, Jac C. Delegate Votes on 28 Motions at the United States Constitutional Convention, 1787. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2009-06-24. https://doi.org/10.3886/ICPSR24544.v1
Data is subject to redistribution restriction and can be downloaded at `https://www.icpsr.umich.edu/web/ICPSR/studies/24544#`
Pro-Slavery Attitudes
Presidential Vote Share Vote share for the Republica, Democratic and for the Democratic Equivalent presidential candidates (1860 and 1868). Source: Clubb, Jerome M., Flanigan, William H., and Zingale, Nancy H. Electoral Data for Counties in the United States: Presidential and Congressional Races, 1840-1972. Inter-university Consortium for Political and Social Research [distributor], 2006-11-13. https://doi.org/10.3886/ICPSR08611.v1
Data is subject to redistribution restriction and can be downloaded at `https://www.icpsr.umich.edu/web/ICPSR/studies/8611/versions/V1`
US, Brazil and Cuba - Regions 1850
Share of Blacks
Ratio of blacks to total population in US (1860), Cuba (1872), Brazil (1872). Source: Bergad (2007).

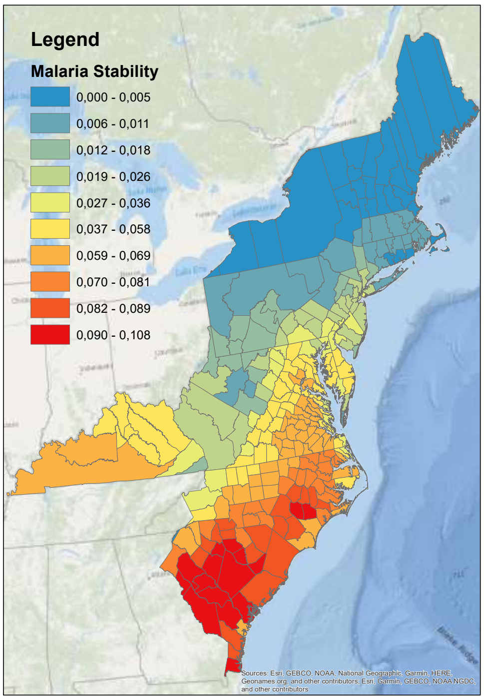
B.2 Summary Statistics and Figures

Table B2 presents summary statistics of main variables of the cross-county analysis. Figure B3 maps the malaria transmission intensity and the share of slaves in the total population across US counties in 1790, highlighting a strong correlation between malaria intensity and African slavery. The strength of the correlation is evident when looking at binscatters reported in Figure B4, where on the left side the sample contains all states and on the right side only slave states in 1860. Figure B6 proposes a counterfactual exercise, where gray bars map the actual share of African slaves in the population in 1860, and the level we would expect in the absence of malaria, according to our baseline estimates.

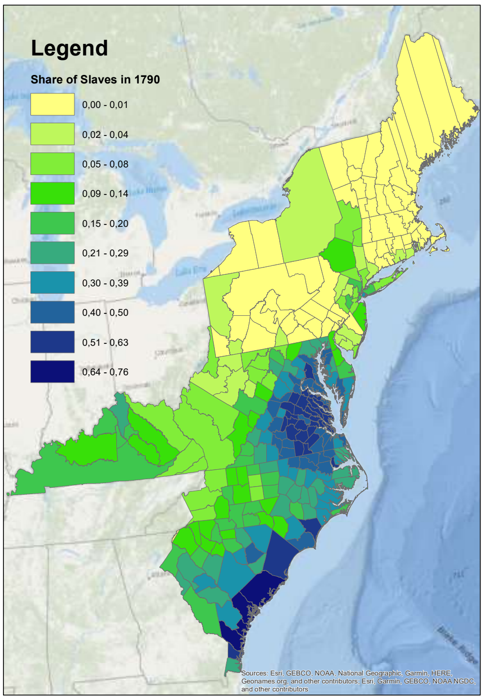
Table B2: Summary Statistics - Cross-Sectional Analysis

Variable	Mean	Std. Dev.	Min	Max	N
US Counties 1790					
Share of Blacks in 1790	0.239	0.209	0.002	0.772	285
Share of Slaves in 1790	0.224	0.205	0	0.762	285
Malaria Stability	0	1	-1.493	2.24	285
Malaria Stability Climatic (std)	0	1	-1.604	2.3	285
Estimated Malaria Risk (std)	0	1	-1.677	2.001	283
Cotton Suitability	0	1	-1.413	2.872	285
Rice Suitability	0	1	-0.753	3.325	285
Sugar Suitability	0	1	-0.276	5.381	285
Tea Suitability	0	1	-0.991	2.325	285
Tobacco Suitability	0	1	-2.897	2.361	285
Indigo Suitability	0	1	-0.458	2.476	285
Sea Distance	0	1	-0.87	4.37	285
River Distance	0	1	-1.726	3.846	285
Average Precipitation	0	1	-2.986	3.001	285
Average Temperature	0	1	-2.469	2.093	285
Elevation	0	1	-0.947	3.85	285
Individual Enslaved in 1790	2435.814	3821.312	0	50633	285
White Population in 1790	2643.519	3886.554	16	51583	285
Latitude	38.256	2.933	30.933	45.803	285
Longitude	-77.263	3.369	-86.416	-67.724	285
US Counties 1860					
Share of Slaves	0.164	0.217	0	0.925	1956
Malaria Stability	0	1	-1.306	7.746	1956
Rice Production	95605.418	1638880.587	0	55805384	1956
Tobacco Production	215359.194	878884.945	0	13446550	1956
Ginnedcotton Production	2751.272	8524.748	0	141493	1956
Canesugar Production	118.114	1279.11	0	30731	1956
Any Cotton	0.354	0.478	0	1	1956
Top 90 Slave Crops	0.305	0.461	0	1	1956
Aedes Aegypti Suitability	0	1	-1.186	2.129	1956
Hookworm Intensity	0	1	-0.71	2.79	1956
US, Brazil and Cuba - Regions 1850					
Share of Blacks	0.3	0.247	0	0.727	73
Malaria Stability	0	1	-0.559	2.768	73
Pro-Slavery Attitudes					
Pro-Slavery Vote	0.275	0.447	0	1	495
Sh. votes for Lincoln, 1860	37.684	27.529	0	100	1091
Sh. votes for Breckinridge, 1860	4.704	13.445	0	94.3	1096
Sh. votes for Grant, 1868	51.495	21.06	0	100	1539
Sh. votes for Seymour, 1868	48.503	21.061	0	100	1539

Figure B3: Malaria and Slavery across US Counties in 1790

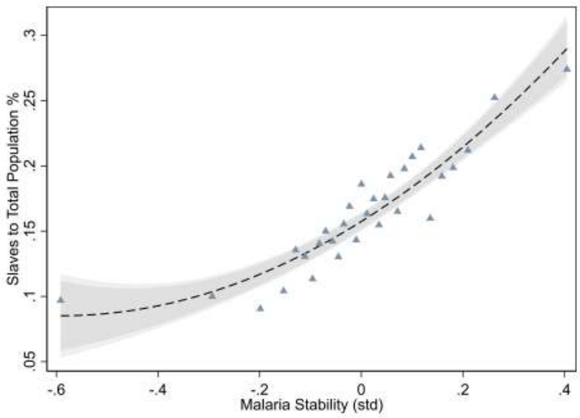


(a) Malaria Stability

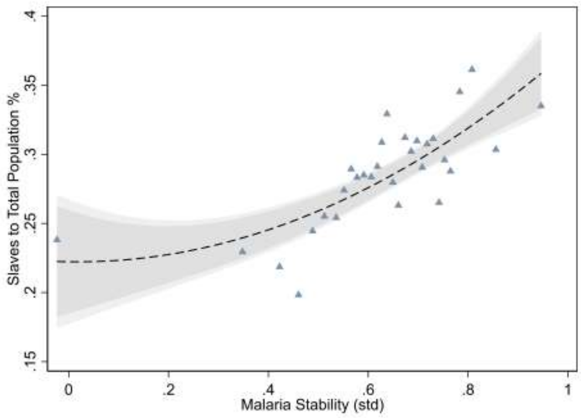


(b) Share of Slaves

Figure B4: Binned Scatter Plots - Malaria and Share of Slaves



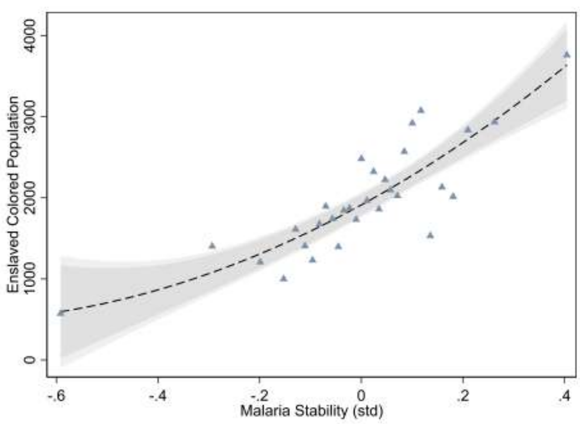
(a) All Counties



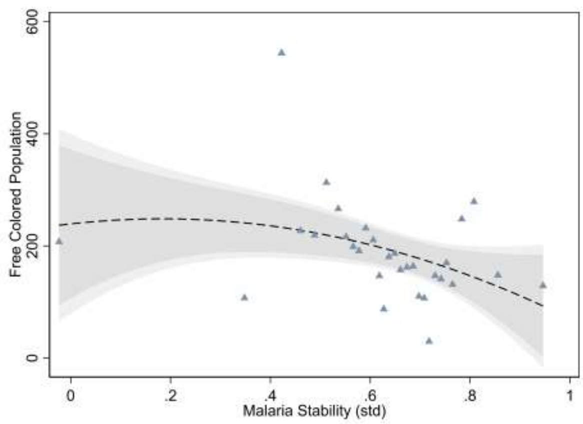
(b) Only Slave States

Note: The graphs plot the values of Malaria Stability and the share of Blacks to Total Population in 1860 (%) along the two axes through binned scatterplots (describing the average x-value for each y-value). In the left figure the sample includes all counties, in the right figure only counties of slave states. Baseline specification including State Fixed Effects, Crop Suitability, Distance and Geography Controls.

Figure B5: Enslaved and Free Colored Population



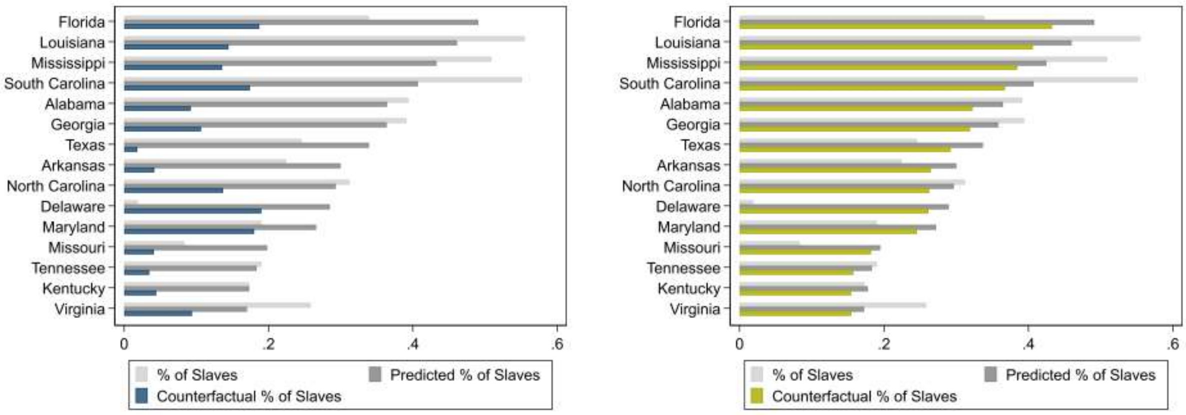
(a) Enslaved Colored Population



(b) Free Colored Population

Note: The graphs plot the values of Malaria Stability and the size of enslaved Colored (*left panel*) and free Colored (*right panel*) in 1860 along the two axes through binned scatterplots (describing the average x-value for each y-value). In the left figure the sample includes all counties, in the right figure only counties of slave states. Baseline specification including State Fixed Effects, Crop Suitability, Distance and Geography Controls.

Figure B6: Malaria, Yellow Fever and African Slavery - Counterfactual Scenario



(a) Malaria

(b) Yellow Fever

The graph plots estimates of a counterfactual scenario where counties are assigned the malaria and yellow fever suitabilty of Rhode Island. To do so, we randomly assign malaria and yellow fever suitability values taken from a normal distribution mimicking the disease suitability of counties in Rhode Island (mean and standard deviation) to US counties in 1860. Using estimates from the baseline model (Column 5, Table 1 in the Text), we compute the predicted share of African slaves with these counterfactual (Rhode Island) values of disease suitability. The light gray bars depict the real average shares of slaves in the population of the state in 1860, while the dark gray bars depict the ones predicted by the model. In the left (right) graph, the blue (yellow) bars depict the predicted average shares of slaves in the population in a counterfactual scenario where all states were assigned the malaria (*Aedes Aegipty*) suitability of Rhode Island, based on model estimates.

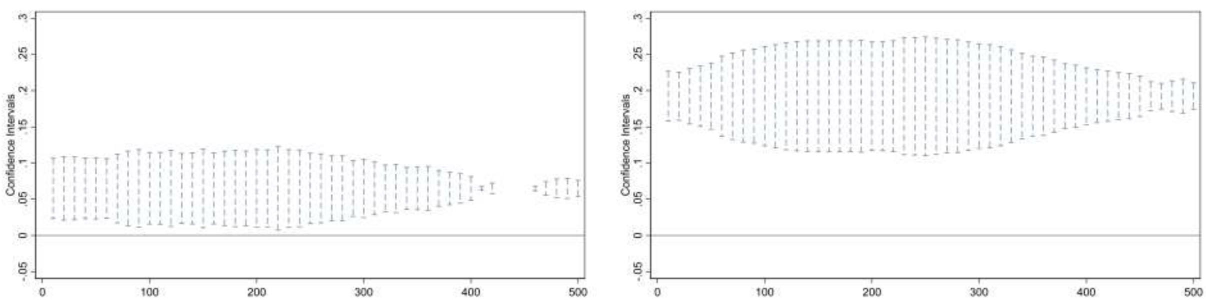
B.3 Robustness Checks

This section presents estimates showing that results are confirmed with alternative standard errors, definitions of the dependent and of the independent variables.

B.3.1 Conley Standard Errors - Alternative Threshold Values

Figure B7 plots 90% confidence intervals of the coefficient Malaria Stability of our preferred specification, including state fixed effects, Crops, Geography and Distance controls, using cutoff values ranging from 10 to 500 km. The left graph presents results for 1790, the right graph presents results for 1860.

Figure B7: Conley Standard Errors - Cutoff Values from 10 to 500 km



(a) 1790 (b) 1860

Note: The graphs plot the values of confidence intervals (10% significance) of Conley standard errors computed using cutoff values ranging from 10 to 500 km. Baseline specification including State Fixed Effects, Crop Suitability, Distance and Geography Controls.

B.3.2 Alternative Measures of Malaria Incidence

Table B3 presents results using the climatic version of the malaria stability index, ignoring variation in mosquitoes' characteristics and using only climatic data from 1900 to 1950. Table B4 presents results using the predicted malaria risk produced by Hong (2007). Both measures are standardized in order to have a standard deviation of 1 and a 0 mean.

B.3.3 Alternative Measures of Slavery

Malaria stability predicts also the share of black people living in a county. In fact, across counties there was an almost one-to-one correlation between the share of blacks and the share of slaves (0.90). Table B5 summarizes results where share of blacks is the dependent variable. As an alternative, we use as dependent variable the total number of individuals enslaved in the county. Results are summarized in Table B6.

Table B3: Malaria Stability - Climatic Index

Dependent Variable:	Share of Slaves (%)						
Sample:	All States			All States		Slave States	
Year:	1790			1860		1790	1860
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Malaria Stability (Climatic)	0.245***	0.269***	0.129***	0.170***	0.318***	0.105***	0.254**
Conley s.e. 100 km	(0.037)	(0.031)	(0.037)	(0.032)	(0.044)	(0.036)	(0.102)
Conley s.e. 250 km	(0.048)	(0.033)	(0.009)	(0.050)	(0.061)	(.)	(0.095)
Crops Suitabilities	No	Yes	Yes	No	Yes	Yes	Yes
Distances & Geography	No	No	Yes	No	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	285	285	285	1956	1956	244	1081
R-squared	0.696	0.779	0.827	0.655	0.713	0.793	0.597

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1790 (Columns 1, 2, 3 and 6) and in 1860 (Columns 4, 5 and 7). The dependent variable is the county share of slaves. Malaria Climatic Suitability is an index measuring the climatic suitability to malaria transmission, standardized in order to have 0 mean and unit standard deviation. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100, 250 and 500 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

Table B4: Estimated Malaria Risk - Hong (2007)

Dependent Variable:	Share of Slaves (%)						
Sample:	All States			All States		Slave States	
Year:	1790			1860		1790	1860
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Estimated Malaria Risk	0.082*	0.091***	0.053**	0.111***	0.086***	0.048**	0.060***
Conley s.e. 100 km	(0.048)	(0.027)	(0.022)	(0.020)	(0.013)	(0.023)	(0.013)
Conley s.e. 250 km	(0.071)	(0.032)	(0.019)	(0.027)	(0.014)	(0.021)	(0.014)
Crops Suitabilities	No	Yes	Yes	No	Yes	Yes	Yes
Distances & Geography	No	No	Yes	No	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	283	283	283	1,880	1,880	242	1,074
R-squared	0.515	0.680	0.822	0.649	0.697	0.790	0.606

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1790 (Columns 1, 2, 3 and 6) and in 1860 (Columns 4, 5 and 7). The dependent variable is the county share of slaves. Estimated Malaria Risk measure the risk of infection as predicted by Hong (2007) (see text for further details), standardized in order to have 0 mean and unit standard deviation. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at at 100, 250 and 500 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

Table B5: Malaria and Share of Blacks

Dependent Variable:	Share of Blacks (%)						
Sample:	All States			All States		Slave States	
Year:	1790			1860		1790	1860
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Malaria Stability	0.171***	0.162***	0.063**	0.182***	0.193***	0.055*	0.121**
Conley s.e. 100 km	(0.041)	(0.041)	(0.029)	(0.033)	(0.041)	(0.030)	(0.047)
Conley s.e. 250 km	(0.055)	(0.045)	(0.027)	(0.051)	(0.049)	(0.029)	(0.052)
Crops Suitabilities	No	Yes	Yes	No	Yes	Yes	Yes
Distances & Geography	No	No	Yes	No	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	285	285	285	1956	1956	244	1081
R-squared	0.593	0.715	0.836	0.659	0.711	0.808	0.616

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1790 (Columns 1, 2, 3 and 6) and in 1860 (Columns 4, 5 and 7). The dependent variable is the county share of blacks. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100, 250, and 500 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

Table B6: Absolute Number of Individuals Enslaved

Dependent Variable:	Number of Individuals Enslaved						
Sample:	All States			All States		Slave States	
Year:	1790			1860		1790	1860
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Malaria Stability	1,992***	2,197***	1,389***	2,576***	2,690***	1,306**	1,586**
Conley s.e. 100 km	(453)	(525)	(457)	(461)	(607)	(510)	(755)
Conley s.e. 250 km	(517)	(416)	(539)	(700)	(706)	(611)	(727)
Crops Suitabilities	No	Yes	Yes	No	Yes	Yes	Yes
Distances & Geography	No	No	Yes	No	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	285	285	285	1956	1956	244	1081
R-squared	0.248	0.342	0.368	0.417	0.466	0.328	0.465

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1790 (Columns 1, 2, 3 and 6) and in 1860 (Columns 4, 5 and 7). The dependent variable is the absolute number of enslaved individuals in the county. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100, 250 and 500 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

Table B7: Free Colored Population in 1860

Dependent Variable:	Free Colored Population						
Sample:	**All States**			**All States**		**Slave States**	
Year:	1790			1860		1790	1860
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Malaria Stability	118***	105*	-44	235***	-53	-17	-129
Conley s.e. 100 km	(40)	(57)	(59)	(81)	(37)	(50)	(92)
Conley s.e. 250 km	(33)	(35)	(.)	(98)	(17)	(21)	(62)
Crops Suitabilities	No	Yes	Yes	No	Yes	Yes	Yes
Distances & Geography	No	No	Yes	No	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	285	285	285	1,956	1,956	244	1,081
R-squared	0.350	0.360	0.471	0.284	0.325	0.463	0.554

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1790 (Columns 1, 2, 3 and 6) and in 1860 (Columns 4, 5 and 7). The dependent variable is the absolute number of free colored individuals in the county. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100, 250 and 500 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

Table B8: Indian Population in 1860

Dependent Variable:	Indian Population					
Sample:	**All States**			**All States**		
	(1)	(2)	(3)	(4)	(5)	(6)
Malaria Stability	-0.327**	-0.685***	-0.620	-0.213	-0.382**	-0.685**
Conley s.e. 100 km	(0.140)	(0.205)	(0.386)	(0.160)	(0.184)	(0.332)
Conley s.e. 250 km	(0.129)	(0.206)	(0.017)	(0.139)	(0.183)	(0.244)
Crops Suitabilities	No	Yes	Yes	No	Yes	Yes
Distances & Geography	No	No	Yes	No	No	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,956	1,956	1,956	1,081	1,081	1,081
R-squared	0.406	0.419	0.432	0.166	0.176	0.205

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1860. The dependent variable is the hyperbolic sine transformation of the size of the Indian population in the county in 1860. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100 and 250. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

Table B9: Endogenous Controls

Dependent Variable:	Share of Slaves (%)					
Sample:	All States 1860					
	(1)	(2)	(3)	(4)	(5)	(6)
Malaria Stability	0.172***	0.136***	0.195***	0.171***	0.134***	0.192***
Conley s.e. 100 km	(0.029)	(0.033)	(0.044)	(0.031)	(0.035)	(0.042)
Conley s.e. 250 km	(0.045)	(0.051)	(0.055)	(0.048)	(0.054)	(0.050)
Controls:	Farmland Value			Total Population		
Crops Suitabilities	No	Yes	Yes	No	Yes	Yes
Distances & Geography	No	No	Yes	No	No	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,842	1,842	1,842	1,956	1,956	1,956
R-squared	0.671	0.686	0.715	0.661	0.675	0.709

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1790 (Columns 1, 2, 3 and 6) and in 1860 (Columns 4, 5 and 7). The dependent variable is the county share of slaves. Malaria Climatic Suitability is an index measuring the climatic suitability to malaria transmission, standardized in order to have 0 mean and unit standard deviation. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100, 250 and 500 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

B.3.4 Accounting for Farmland Value and Total Population

In Table B9 we account for potentially endogenous controls that might be driving the observed relationship. In the first 3 columns we account for farmland values, in the last 3 columns for the total population in the county. Reassuringly, results are largely unaffected.

B.4 Additional Results

Section B.4.1 further analyzes the role of suitability for crops that have been often associated with slave labor. Section B.4.2 presents results using the high-dimensional LASSO method to account for geography in a more flexible way. Section B.4.3 explores the role of yellow fever and hookworms.

B.4.1 The Role of Crop Suitabilities

In this section we provide evidence showing that the relationship between malaria and slavery is not driven by the suitability of malaria-ridden areas for specific crops. First of all, we show that suitability measures employed in the analysis are good predictors of total crops produced in 1860, Table B10. Table B11 replicates baseline results in the text and shows coefficients for each specific crop suitability in the regression. Suitability to cotton, rice, and sugar indeed predicts the share of individual enslaved. Their inclusion leaves the coefficient of malaria stability unaffected. Another strategy is to control for actual production, instead of suitability for certain crops. In Table B12 we control for quantity of ginnedcotton, rice, tobacco, and sugar produced in the county.

Table B10: Validation of the Crop Suitability Measures with Production Data in 1860

Dependent Variable:	Crop Production			
Type of Crop:	**Ln(Ginnedcotton)**	**Ln(Rice)**	**Ln(Tobacco)**	**Ln(Sugar)**
	(1)	(2)	(3)	(4)
Cotton Suitability	0.526***			
Conley s.e. 100 km	(0.161)			
Conley s.e. 250 km	[0.253]			
Rice Suitability		0.759***		
		(0.249)		
		[0.310]		
Tobacco Suitability			0.899***	
			(0.233)	
			[0.307]	
Sugar Suitability				0.630***
				((0.161)
				[0.127]
State Fixed Effects	Yes	Yes	Yes	Yes
Observations	1956	1956	1956	1956
R-squared	0.78	0.54	0.46	0.45

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1860. The dependent variable is the natural logarithm of crop produced in the county. Crop suitabilities measure the suitability of the county for the cultivation of the specific crop, standardized in order to have 0 mean and unit standard deviation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100, and 250 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

B.4.2 High Dimensional Method to Control for Geography

Elevation, temperature and precipitation might be related to African slavery in a non-linear way. Second and higher order terms might thus play a role. Moreover, their effect might materialize in an interacted way. To more flexibly account for the role of geography, we rely on the high-dimensional LASSO method presented by Belloni, Chernozhukov, and Hansen (2014). We can thus account for the effect of first, second, and third order geographical factors (temperature, precipitation, altitude, longitude and latitude) and a full set of interactions between various order terms. Table B13 summarizes results. Columns (2) and (5) include the full set of controls (higher order terms of geographic variables and interactions), corresponding to 85 variables. In the last 3 Columns of the table, we account also for crop suitabilities. Columns (3) and (6) contain the subset of controls selected by LASSO for predicting the county share of African slaves and the county average malaria. Throughout specifications, the results remain quantitatively stable.

B.4.3 Other Diseases

This section explores the role of other diseases that were thriving in the New World tropical and semi-tropical areas. In Table B15 we account for the role of suitability to *Aedes Aegipty*, the vector of yellow fever, in a specification that mirrors our baseline one. Next, we try to proxy for the presence of hookworms. To our knowledge, there is no predicted measure of hookworm prevalence for the area, and we have to rely on a historical measure of actual intensity taken from Chandler (1929), which however might be endogenous to living conditions in areas with a high

Table B11: Crop Suitabilities and African Slavery

Dependent Variable:	Share of Slaves							
Malaria measure:	Malaria Stability							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Malaria Stability	0.199***	0.210***	0.202***	0.201***	0.210***	0.210***	0.209***	0.192***
	(0.042)	(0.043)	(0.045)	(0.043)	(0.043)	(0.043)	(0.039)	(0.042)
Cotton Suitability (std.)	0.014*							0.010*
	(0.007)							(0.006)
Coffee Suitability (std.)		-0.010***						-0.009***
		(0.002)						(0.002)
Indigo Suitability (std.)			0.013					0.004
			(0.010)					(0.009)
Rice Suitability (std.)				0.032***				0.025***
				(0.009)				(0.009)
Tea Suitability (std.)					-0.002			-0.001
					(0.011)			(0.012)
Tobacco Suitability (std.)						0.005		-0.006
						(0.008)		(0.008)
Sugar Suitability (std.)							0.036***	0.031**
							(0.013)	(0.014)
Distances & Geography	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1956	1956	1956	1956	1956	1956	1956	1,956
R-squared	0.698	0.698	0.697	0.702	0.696	0.697	0.703	0.709

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1860. The dependent variable is the county share of slaves. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. Crop suitabilities are also standardized in order to have 0 mean and unit standard deviation. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively.

Table B12: Accounting for Crop Production

Dependent Variable:	Share of Slaves (%)				
	(1)	(2)	(3)	(4)	(5)
Malaria Stability	0.162***	0.219***	0.189***	0.219***	0.158***
Conley s.e. 100 km	(0.042)	(0.041)	(0.042)	(0.043)	(0.038)
Conley s.e. 250 km	(0.051)	(0.047)	(0.051)	(0.050)	(0.044)
Ginnedcotton (std.)	0.065***				0.072***
	(0.010)				(0.010)
Rice (std.)		0.014***			0.016***
		(0.003)			(0.003)
Canesugar (std.)			0.028***		0.032***
			(0.004)		(0.004)
Tobacco (std.)				0.017***	0.026
				(0.004)	(.)
Distances & Geography	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1,956	1,956	1,956	1,956	1,956
R-squared	0.749	0.700	0.710	0.700	0.780

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1860. The dependent variable is the county share of slaves. Malaria Stability is an index measuring the force and stability of malaria transmission. All variables are standardized in order to have 0 mean and unit standard deviation. All regressions include "Distance" controls, "Geography" controls and State Fixed Effects. Conley standard errors 100, 250 anf 500 km cutoff threshold are reported in round brackets. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

Table B13: High Dimensional Method to Control for Geography

Dependent Variable:	Share of Slaves (%) - 1860					
	Baseline	All Controls	Double Selection	Baseline	All Controls	Double Selection
	(1)	(2)	(3)	(4)	(5)	(6)
Malaria Stability	0.172***	0.157	0.212***	0.121**	0.154	0.198***
	(0.051)	(.)	(0.057)	(0.052)	(.)	(0.054)
Crops Suitabilities	No	No	No	Yes	Yes	Yes
Distances	No	No	No	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,956	1,956	1,956	1,956	1,956	1,956
R-squared	0.661	0.773	0.677	0.675	0.781	0.688

Notes: In this table we report results of our baseline regression using the LASSO high-dimensional method to flexibly control for geography. All columns reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1860. The dependent variable is the county share of slaves. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. Of standard controls, in Columns 1, 2 and 3 we control for State Fixed Effects, in Columns 4, 5 and 6 we add crop suitabilities for cotton, indigo, sugar, rice, tea, and tobacco and distances. In Columns 1 and 3 we report baseline specifications. In Columns 2 and 4 we include 85 additional variables. These variables are: "Geography" controls (i.e. altitude, temperature, precipitation, longitude and latitude), "Geography" controls^2, "Geography" controls^3 and a full set of interactions between first and higher order "Geography" controls. Double Selection – Columns 3 and 6 – uses the subset of controls selected by LASSO for predicting the county share of slaves and the county average malaria. See Belloni, Chernozhukov and Hansen (2014). Standard errors clustered at the state level are reported in brackets. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively.

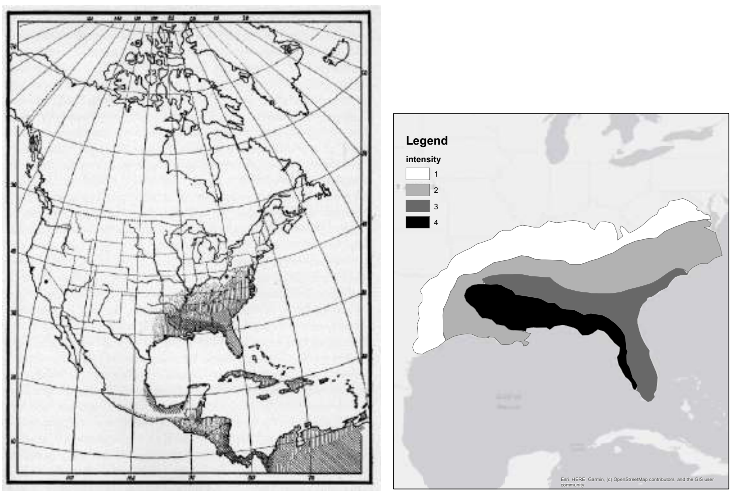
Table B14: High and Low Land Suitability Places

Dependent Variable:	Share of Slaves (%) - 1860				
	All	High Suit	Low Suit	Top 75 Wheat	Top 90 Wheat
	(1)	(2)	(3)	(4)	(5)
Malaria Stability	0.131**	0.207***	0.016	0.401***	0.356***
Conley s.e. 100 km	(0.056)	(0.033)	(0.097)	(0.050)	(0.082)
Conley s.e. 250 km	[0.068]	[0.047]	[0.107]	[0.040]	[0.022]
Suitability	0.035				
	(0.045)				
Suit * Malaria Stability	0.101**				
	(0.050)				
Crops Suitabilities	Yes	Yes	Yes	Yes	Yes
Distances	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1,952	196	196	489	195
R-squared	0.715	0.861	0.766	0.874	0.916

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1860. Columns 2 and 3 include all counties in the top and bottom decile of land suitability respectively. In Columns 4 an 5, Top Wheat producers are US counties in the top quartile and decile of wheat production in 1860. The dependent variable is the county share of slaves. Malaria Stability is an index measuring the force and stability of malaria transmission. All regressions include "Distance" controls, "Geography" controls and State Fixed Effects. Conley standard errors 100, 250 anf 500 km cutoff threshold are reported in round brackets. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

density of recently enfranchised individuals, agricultural workers and low-income households. Binscatters in Figure B9 shows that areas with higher malaria stability do not feature higher mortality related to cholera or smallpos, as measured by the United States Census of Mortality: 1850, 1860, and 1870 by Fogel et al. (2000).

Figure B8: Hookworms Prevalence in 1929



(a) Original (b) Digitized

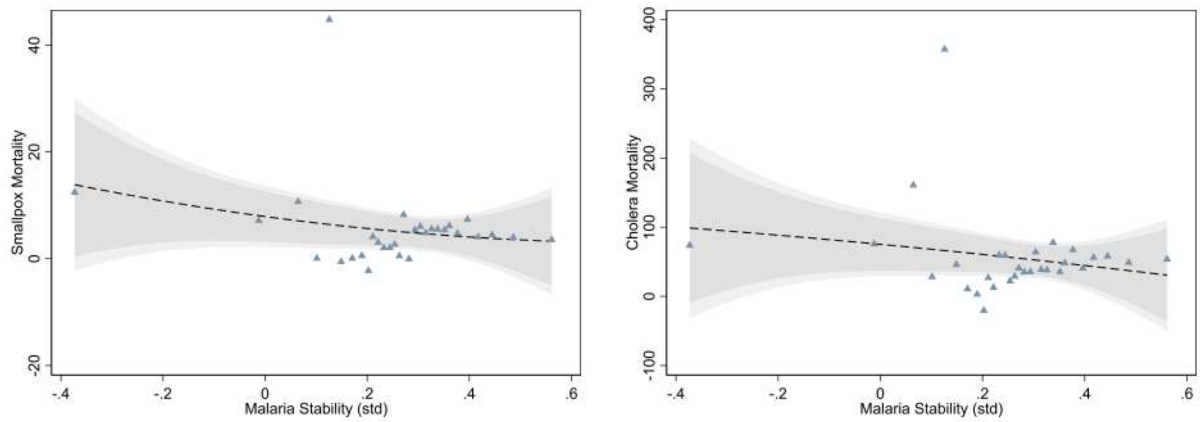
Note: The graphs plot the level of hookworm intensity according to a map produced Chandler (1929).

Table B15: Yellow Fever and Hookworms

	Share of Slaves				
	(1)	(2)	(3)	(4)	(5)
Malaria Stability		0.180***		0.162***	0.150***
Conley s.e. 100 km		(0.043)		(0.045)	(0.045)
Conley s.e. 250 km		(0.051)		(0.050)	(0.050)
Conley s.e. 500 km		(0.006)		(0.016)	(0.013)
Aedes aegypti Suitability	0.056***	0.031**			0.030**
Conley s.e. 250 km	(0.008)	(0.011)			(0.007)
Hookworm Intensity			0.103***	0.078***	0.078***
Conley s.e. 250 km			(0.008)	(0.014)	(0.012)
Crop Suitabilities	Yes	Yes	Yes	Yes	Yes
Distances & Geography	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1,956	1,956	1,956	1,956	1,956
R-squared	0.687	0.710	0.701	0.720	0.722

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county in 1860. The dependent variable is the county share of slaves. Malaria Stability is an index measuring the force and stability of malaria transmission. Yellow Fever Suitability measures the suitability of local weather for the mosquito Aedes aegypti. Hookworm Intensity measures the historical prevalence of the disease before eradication. All measures are standardized in order to have 0 mean and unit standard deviation. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100 and 250 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with the largest of the standard errors reported.

Figure B9: Binned Scatter Plots - Cholera, Smallpox and Malaria



(a) Smallpox (b) Cholera

Note: The graphs plot the values of Malaria Stability and the average mortality (1850, 1860, and 1870) for cholera (left) and smallpox (right) along the two axes through binned scatterplots (describing the average x-value for each y-value). Data on smallpox and cholera mortality are from the United States Census of Mortality: 1850, 1860, and 1870 by Fogel et al. (2000).

Table B16: Malaria and the Progressive Eradication of Slavery

Dependent Variable:	Reduction in Share of Slaves (1790-1860)					
	All States			Slave States		
	(1)	(2)	(3)	(4)	(5)	(6)
Malaria Stability	-0.138***	-0.095*	-0.116**	-0.123**	-0.081	-0.094
Conley s.e. 100 km	(0.037)	(0.049)	(0.050)	(0.054)	(0.069)	(0.072)
Cotton Suitability (std.)		0.000		0.000		
		(0.000)		(0.000)		
Cotton Suitability (std.)		-0.058***		-0.056**		
* Malaria Stability		(0.018)		(0.024)		
Ginnedcotton (std.)			-0.012			-0.001
			(0.065)			(0.064)
Ginnedcotton (std.)			-0.072			-0.085
* Malaria Stability			(0.080)			(0.083)
Crop Suitability	Yes	Yes	Yes	Yes	Yes	Yes
Distances & Geography	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	247	247	247	172	172	172
R-squared	0.682	0.699	0.710	0.655	0.665	0.687

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county of all states (Columns 1, 2, 3, and 4) and slave states (Columns 4, 5, 6 and 7). The dependent variable is the change in county share of slaves between 1790 and 1860, $\Delta Sh.Blacks = Sh.Blacks_{1790} - Sh.Blacks_{1860}$. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. Cotton suitability (standardized in order to have 0 mean and unit standard deviation) measure the suitability of the county for cotton, while Ginnedcotton measure actual cotton production. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100 and 250 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

B.4.4 Malaria and the Progressive Eradication of Slavery

We next look at how the prevalence of slavery changed between 1790 and 1680. The working hypothesis is that places with more malaria benefited more of African slavery, and while other parts of the country started to reduce their reliance of slave labor (i.e. Maryland and Virginia), more-malaria infested areas continued to rely on slave labor and to fight politically for its persistence. The boom of cotton production actually increased the share of African slaves in the total population in many counties, and we find that this effect was even stronger in more-malaria infested areas. Table B16 presents results showing that a one standard deviation increase in malaria stability brings about a 10 percentage point reduction in the share of individual enslaved. Columns (3), (4), (7) and (8) - consistently with results of Masera and Rosenberg (2018) - show that in places with suitability for cotton slavery did not decrease (and actually increased), and this was particularly strong the higher the level of malaria suitability in the county.

B.4.5 Malaria, Civil War and Change in Population

Table B17 looks at the change in population, of Blacks and Whites, between 1860 and 1870, across counties with different levels of Malaria Stability. Fully controlled specifications indicate that counties with higher level of malaria, experienced a larger drop in population, entirely

Table B17: Eradication of Slavery and Population Movements

Dependent Variable:	Changes 1870-1860							
	Δ Total Pop		Δ White Pop		Δ Black Pop		Δ Value Farm Production	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Malaria Stability	-37	-1,552**	-327	-1,340**	289	-118	7,136	-227,986***
Conley s.e. 100 km	(808.168)	(711.465)	(741.870)	(660.585)	(181.343)	(380.815)	(52,007)	(68,558)
Conley s.e. 250 km	(772.175)	(366.058)	(698.176)	(418.763)	(217.210)	(299.276)	(58,539)	(45,556)
Crop Suitability	No	Yes	No	Yes	No	Yes	No	Yes
Distances & Geography	No	Yes	No	Yes	No	Yes	No	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,829	1,829	1,830	1,830	1,830	1,830	1,827	1,827
R-squared	0.094	0.106	0.107	0.120	0.035	0.046	0.458	0.505

Notes: The table reports Ordinary Least Square (OLS) estimates. The unit of observation is the US county of all states (Columns 1, 2, 3, and 4) and slave states (Columns 4, 5, 6 and 7). The dependent variable is the change in county population between 1860 and 1870, $\Delta Population = Sh.Blacks_{1870} - Sh.Blacks_{1860}$, in columns 1 and 2. The change in white population, columns 3 and 4, and black population, in columns 5 and 6. And the change in the average value of farm products in columns 7 and 8. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. Cotton suitability (standardized in order to have 0 mean and unit standard deviation) measure the suitability of the county for cotton, while Ginnedcotton measure actual cotton production. The "Crop suitability" controls include soil suitability for cotton, indigo, sugar, rice, tea, and tobacco. The "Distance" controls include distances to the sea and to the closest river. The "Geography" controls include average temperature, precipitation and elevation. Conley standard errors are reported in brackets, with cutoff thresholds for latitude and longitude at 100, 250 and 500 km. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively, computed with 100 km Conley standard errors.

driven by white population. Together with the drop in population, the average value of farm production decreased.

C The Introduction of Falciparum Malaria into the US Colonies

This section looks at the effect of the introduction of malaria falciparum into the US colonies. Section C.1 presents data used in the analysis. Section C.2 presents summary statistics and relevant figures complementing the analysis in the text. Section C.3 presents robustness analysis complementing the baseline results reported in the main text.

C.1 Data Sources and Construction

Section C.1.1 presents background material on historical evidence over the introduction of the disease in the US colonies. Section C.1.2 reviews evidence on the approval of slave codes. Section C.1.3 details data sources of all other variables used in the analysis.

C.1.1 Dating the Introduction of Malaria Falciparum

This section collects extracts from articles and books of historians that, analyzing historical sources, documented the epidemiological changes accompanying the arrival of malaria *falciparum* in the US colonies. While there is no agreement on who introduced the disease - see extract from Peter Wood (1974) and the extract from Savitt and Young (2002) - all accounts are surprisingly consensual in dating these epidemiological changes the mid-1680s.

Table C1: Introduction of Malaria Falciparum in the US Colonies

Source	**Colony**	**Extract**
Child (1940)	**South Carolina**	... malaria was not endemic in this area when the first English foothold was established in 1670 near the mouth of the Ashley River. The first serious epidemic occurred in 1684, when the disease undoubtedly became endemic. Therefore it was brought in during the intervening fourteen years, either by settlers from England or other English colonies (but not from Barbados which was free from malaria), or possibly from Africa or Hispaniola by slaves or pirates.
Merrens and Terry (1984)	**South Carolina**	... By 1680, however, as new arrivals began to push their settlement up to the headwaters of the Ashley and Cooper rivers, inhabitants began to encounter health problems. According to Maurice Mathews, in that year the inhabitants were "generally verry healthful" but "some years about July and August wee have the fevar and ague among us, but it is not mortall." In some parts of the colony the mortality rate was so high that a number of parishes did not experience a natural increase in population until the American Revolution. That many of these deaths resulted from malaria is illustrated by the large proportion that occurred between the months of August and November. In those months the numbers of malaria-related deaths reached the highest levels. For example, in Christ Church Parish, which was situated on the Wando River, 43 percent of all deaths recorded in the Parish register between 1700 and 1750 were during this four-month period. In St. Andrews Parish, adjacent to Charleston, 44 percent of the deaths recorded in the period between 1700 and 1750 occurred in the same four-month period.
Peter Wood (1974)	**South Carolina**	... by the early 1680s the mild type of malaria plasmodium (*vivax*) appears to have been supplemented by one of the more dangerous strains, known as *falciparum*. It seems likely that this new variety of malaria parasite reached the colony via an English sailor or a West Indian slave who had previously been in West Africa.
Rutman and Rutman (1976)	**Virginia**	... The evidence from Carolina suggests to Wood that the benign vivax was prevalent in the 1670s but was supplanted by the more virulent falciparum in the 1680s. The literary evidence for Virginia supports this model, although in relating the archaic and imprecise terminology of the sources to the modern symptomatology of the disease we enter on the most treacherous ground of medical history.
Savitt and Young (2002)	**Virginia**	... From Virginia the Reverend John Clayton wrote in 1687 that intermitting fever was first among the diseases attacking English settlers... The importation of slaves into South Carolina in the 1680s may have introduced new strains of malaria, in particular falciparum, the most deadly form, and thus led to the intensification of the disease in the succeeding years.

C.1.2 Slave Codes

For a long time, the legal status of Africans brought to North America remained blurred, regulated more by customary practice than by actual laws. Importantly, many of the first Africans brought to the US colonies were employed as indentured servants, just like Europeans. Unlike Europeans, their settlement was often involuntary, but after a period of work they were not infrequently able to gain their freedom. In effect, during the first half of the seventeenth century Africans were allowed to work independently; could buy and sell their produce, barter their free time for wages, and eventually buy their freedom. Indeed, Ira Berlin (2009) writes on the African slaves shipped to Jamestown in 1619 that they were "Set to work alongside a melange of English and Irish servants, little but skin color distinguished them..." Handlin (1950) claimed that "The status of Negroes was that of servants." Along the same lines, Wood (2005) commented, "One thing that can be said with certainty is that this small African component of the Virginia population was not immediately enslaved by the English. In fact, their legal status remained somewhat ambiguous until the late seventeenth century."

Starting in the second half of the seventeenth century, states started to approve legislation aiming at a reduction of the liberties of African workers. As Handlin (1950) put it, "...Negroes did cease to be servants and became slaves": Africans became the property of their owners, for life. From Handlin (1950): "slavery was not there from the start...," and it was in the last decades of the seventeenth century that "Negroes did cease to be servants and became slaves, ceased to be men in whom masters held a proprietary interest and became chattels, objects that were the property of their owners. In that transformation originated the Southern labor system." This process culminated in the approval of "slave codes," which were comprehensive sets of laws that attempted to define slave status and sanction once and for all its elementary characteristics. Broadly speaking, all "slave codes" had in common three basic elements: slavery was a life-long condition inherited through the mother, slave status had a racial basis, and slaves were defined as property (Wiecek, 1977) .

Slave Code Approval We construct a variable taking value 1 in each state-decade during which a slave code was approved (or a new version of a slave code is approved).[7] We take the date of approval of slave codes from Wiecek (1977). Dates are detailed below.

Slave Code Approval: Wiecek (1977)

- Delaware 1721
- Georgia 1755, 1770
- Maryland 1715
- New Jersey 1713
- New York 1712
- North Carolina 1715, 1741
- Pennsylvania 1725
- South Carolina 1690, 1696, 1740
- Virginia 1705, 1723, 1748

[7]Results would not change if we were to construct a variable taking value 1 for each state-decade during which a slave code is in force.

C.1.3 Data Sources

Table C2 summarize data sources of dependent, independent and control variables in the analysis.

Table C2: Data Sources: Malaria and Slavery - Panel United States

Blacks to Total Population
Ratio of black population in the state in the decade. Maine, Playmouth and Massachusetts added up together. States for which we have information only after 1690 are excluded (Kentucky, Tennessee, Georgia and Vermont). Source: Historical Statistics of the United States, Colonial Times to 1957. Colonial and Prefederal Statistics, Chapter Z.

Total Population
Total population in the state in the decade. Source: Colonial and Prefederal Statistics, Chapter Z.

Post-1690
Indicator variable that equaling 1 from 1690 onwards, and 0 otherwise.

Malaria Stability
Average Malaria Stability Index in the state. Source: Kiszewski (2004).

Malaria Climatic Suitability
Average Malaria Suitability, predicted as a non-linear function of temperature and precipitation using climatic data from 1900 to 1950. Source: replicated following Cervellati *et al.* (2019).

Malaria Mortality
Malaria Mortality 1850, 1860, 1870: United States Census of Mortality: 1850, 1860, and 1870. Source: Robert W. Fogel, Joseph Ferrie, Dora Costa, and Dean S. Karlan. Malaria Mortality 1900, 1910, 1920, 1930. Source: Mortality Statistics of the United States (NCHS). Data shared by Barreca (2010).

Crop Suitability Indexes
Estimated suitability index (value) for cultivating cotton, coffee, rice, sugar, tea and tobacco at a disaggregated geographic level. Source: FAO/IIASA, 2011. Global Agro-ecological Zones (GAEZv3.0). FAO Rome, Italy and IIASA, Laxenburg, Austria. *http://gaez.fao.org/Main.html.* The suitability index employed is the one estimated for low inputs level and rain-fed conditions.

Crop Prices
Average Price of Tobacco in the decade. Source: Colonial and Prefederal Statistics, Chapter Z. Average price of rice in the decade in England. Source: Clark (2004, 2005, and 2007).

Yellow Fever
Number of yellow fever epidemics in the decade within the decade. Source: Duffy (1972).

Yellow Fever Suitability
Predicted global distribution of *Aedes Aegypti*. Source: Kraemer *et al.* (2015).

Average Temperature
Average monthly temperature (baseline period 1900-1950). Source: CRU TS v.1.1 data from New (2000).
FAO Rome, Italy and IIASA, Laxenburg, Austria.

England Farm Wage
Daily Farm Wage England, averaged over decades. Source: English prices and wages, 1209-1914 Clark (2008)

South Nantucket
States located South of Nantucket: Maryland, South Carolina, Virginia, Pennsylvania, Delaware, North Carolina, New Jersey.

Slave Code Approved
Indicator variable taking value 1 in each state-decade during which a slave code was approved, 0 otherwise. Source: Wiecek (1977).

 # El Niño Events
Number of El Niño years in the decade. Source: Couper-Johnston (2000).

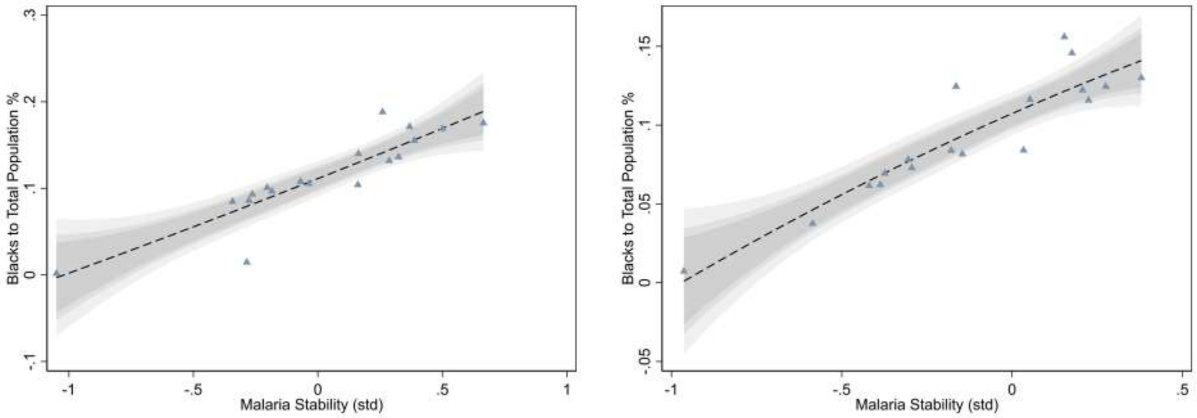
C.2 Summary Statistics and Figures

Table C3 presents summary statistics of the main variables. In Figure C1 we report binned scatterplots between the variable share of blacks in total population and the values of Malaria Stability x Post 1690, using residual variation from various specifications. Figure C2 repeats the same exercise with the first difference and the absolute number of whites (left figure) and blacks (right figure) in the population. Figure C3 presents the same event study analysis in the text, using alternative time windows. Figure C4 presents a time-seires of weather anomalies, extending before the British settlement of North America (1609).

Table C3: Summary Statistics - Panel United States 1630-1750

Variable	Mean	Std. Dev.	Min.	Max.	N
Time-Varying					
Share of Black Population	0.104	0.135	0.001	0.704	133
Total Black Population	4901.496	12381.335	0	101452	133
Total White Population	28008.662	34337.495	170	183925	133
Post 1690	0.632	0.484	0	1	133
Post 1690 x Malaria Stability	0	0.796	-0.974	2.3	133
Post 1690 x Malaria Stability	0	0.796	-1.035	2.293	133
Falciparum Malaria	0.211	0.409	0	1	133
El Nino Events x Malaria Stability	-0.142	3.575	-4.871	11.499	133
Yellow Fever Epidemics	0.218	0.644	0	4	133
Servants' Revolts'	0.068	0.252	0	1	133
Time-Invariant					
Malaria Stability (non std.)	0.025	0.025	0.001	0.087	133
Malaria Stability (std.)	-0.059	0.965	-0.974	2.3	133
Malaria Stability Climatic (std.)	-0.053	0.951	-0.792	2.759	133
Malaria Stability, Historical States	-0.064	0.968	-1.035	2.293	133
Share Black Population 1680	0.061	0.044	0.003	0.168	133
Rice Suitability (non std.)	758.573	820.101	29.463	2546.633	133
Tobacco Suitability (non std.)	3177.313	1220.852	1040.467	4670.695	133
Yellow Fever Suitability (non std.)	0.239	0.213	0.024	0.631	133

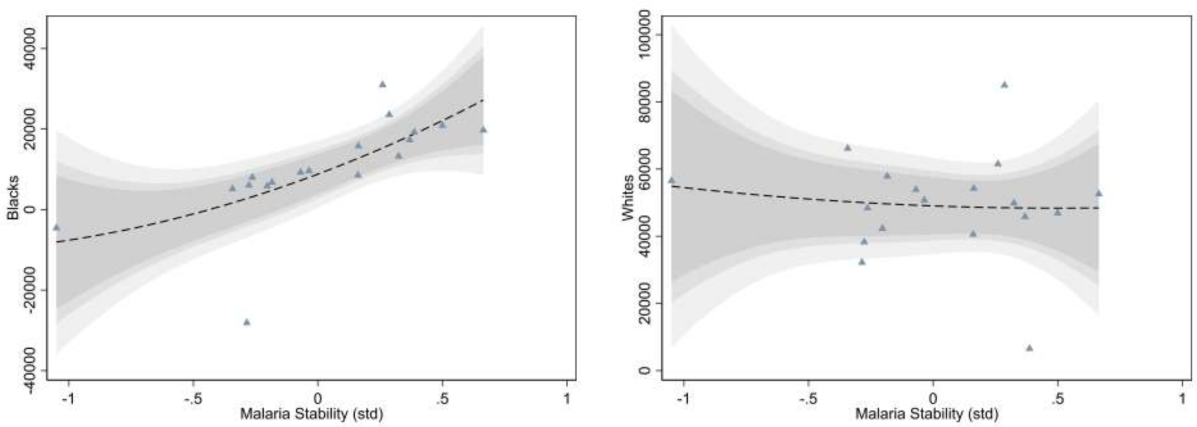
Figure C1: Introduction of Malaria and African Slavery



(a) Decade and State FE, All Sample (b) Decade and State FE, No South Carolina

Note: The graphs plot the values of Malaria Stability x Post 1690 and the share of Blacks to Total Population (%) along the two axes through binned scatterplots (describing the average x-value for each y-value). Plotted values are the residuals of regressions including decade and state fixed effects.

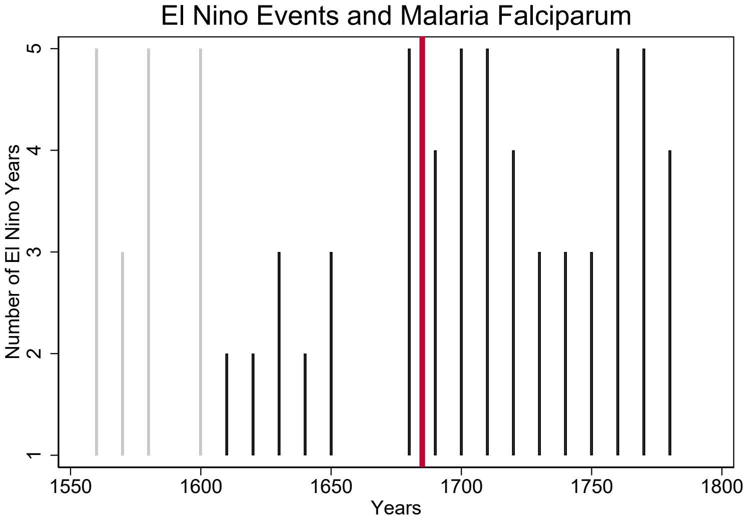
Figure C2: Introduction of Malaria, Black and White Population



(a) African Population (b) White Population

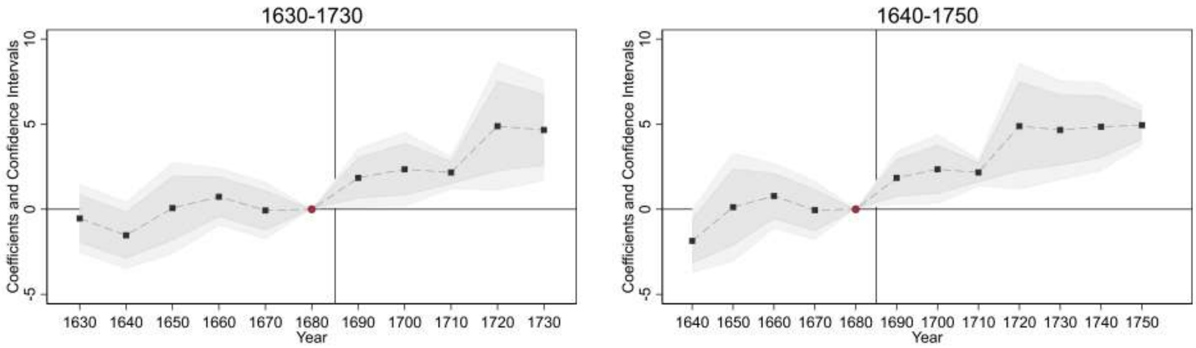
Note: The graphs plot the values of Malaria Stability and absolute number of white and black population in the state. Plotted values are the residuals of regressions including decade and state fixed effect.

Figure C4: Weather Anomalies and Malaria Introduction - El Niño Events



The graph plots the time series of El Niño events for an extended number of decades. The brown bars measure the numbers of El Niño years registered in the decade during the period of British colonization of North America, while bars in light gray show the numbers of El Niño years registered in the decade before the settlement of the British. The red vertical line plots the year 1684, year of the first major *falciparum* malaria epidemics in the country.

Figure C3: Event Study - Alternative Samples



Note: The graph plots coefficients in an event study type of framework, comparing states with different level of malaria stability over time. The red dot indicates the omitted decade, 1680. Black squares mark regression coefficients. Gray areas depict confidence intervals, at 99% (dark gray) and 95% (light gray) significance.

C.3 Additional Results

This section contains a full set of additional exercises aiming to verify the robustness of the findings to the inclusion of additional controls, to alternative measures of malaria suitability, accounting for the fact that certain states are scarcely populated in earlier decades, and comparing results with placebo estimates of a spatial randomization analysis.

C.3.1 Accounting for Other Soil Suitabilities

While sugar, cotton, and tea are crops important for the US economy in the 19th century, they had no or a residual role in the colonial economy around the period we are considering. Table C4 summarizes the average annual value of commodity exports (£) from US Colonies between 1768 and 1772. As expected, their inclusion in the baseline regression does not affect our findings, Table C5. In the top panel, we verify whether the effect of suitability to each crop on the share of African slaves changed after 1690, and results point to no significant increase in slavery in places with specific suitability around that period. In the bottom panel, we control for a more flexible time-varying effect of soil suitabilities for these crops.

Table C4: Average Annual Value of Commodity Exports (£) from US Colonies (1768-1772)

	Upper South	**Lower South**	**Middle Colonies**	**Total**
Tobacco	756,128			756,128
Rice		305,533		305,533
Grains, grain product	199,485	13,152	379,380	592,017
Indigo		111,864		111,864
Wood Products	29,191	25,764	29,348	84,303
Iron	22,484		27,669	50,153
Deerskins		37,093		37,093
Flaxseed			35,956	35,956
Livestock, beef, pork		12,930	20,033	32,963
Naval store		31,709		31,709
Potash			12,272	12,272
Others	12,368	13,904	21,887	75,386
Total	1,046,883	551,949	514,273	

Notes: Data from McCusker and Menard (2014).

C.3.2 Alternative Measures of Malaria Incidence

Table C6 replicates baseline findings using the reconstructed malaria index that i) ignores variation in mosquitoes characteristics and ii) employ climatic averages between 1900 and 1950 (instead of 1900-1990). Reassuringly, the coefficient of the baseline estimation is very close in magnitude to the one obtained using the baseline malaria stability index. While the effect is not always precisely estimated across specifications and sub-samples, results are largely in line with baseline ones.

Table C5: US States 1630-1750 – Accounting for Other Soil Suitabilities

Dependent Variable:	Share of Blacks				
	PANEL A - Soil Suitability Pre-Post 1690				
Malaria Stability x Post-1690	0.084***	0.091**	0.118**	0.074*	0.173***
	(0.023)	(0.030)	(0.045)	(0.039)	(0.023)
	[0.023]	[0.032]	[0.050]	[0.040]	[0.031]
	Rice	**Tobacco**	**Cotton**	**Sugar**	**Tea**
Crop Suit x Post-1690	0.022	0.007	-0.022	0.036	-0.082***
	(0.017)	(0.022)	(0.039)	(0.033)	(0.016)
Observations	133	133	133	133	133
R-squared	0.872	0.868	0.869	0.873	0.880
Dependent Variable:	Share of Blacks				
	PANEL B - Soil Suitability Over Time				
Malaria Stability x Post-1690	0.084***	0.092**	0.125**	0.079*	0.167***
	(0.025)	(0.032)	(0.047)	(0.042)	(0.028)
	[0.025]	[0.034]	[0.050]	[0.043]	[0.033]
Crop Suit x Decade fe	**Rice**	**Tobacco**	**Cotton**	**Sugar**	**Tea**
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	133	133	133	133	133
R-squared	0.906	0.882	0.902	0.919	0.917

Notes: The table reports OLS estimates. The unit of observation is the US state in the decade. The panel includes Ln(decades from 1630 to 1750. The dependent variable is the share of black people in the state. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. The variable Post-1690 is an indicator variable equaling 1 from 1690 onwards and 0 otherwise. All regressions include decade fixed effects and state fixed effects. In **PANEL A**, regressions include an interaction between the variable Post-1690 and the soil suitability for the crop reported in bold. In **PANEL B**, regressions include a full set of interaction variables between decade fixed effects and the state soil suitability for the crop reported in bold. Robust standard errors double clustered at the decade and state level are reported in round brackets, standard errors clustered at the state level are reported in squared brackets. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively (related to standard errors clustered at the state level).

Table C6: Malaria Introduction - An alternative Measure of Malaria Suitability

Dependent Variable:	Share of Blacks				Δ Sh.Blacks	Δ Blacks	Δ Whites
	All Sample 1630-1750	1650-1720	No South Carolina	No Virginia	All Sample 1630-1750	All Sample 1630-1750	All Sample 1630-1750
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Malaria Suitability (Climatic)	0.096***	0.096***	0.074	0.079**	0.016*	2,731	-1,269**
	(0.023)	(0.023)	(0.055)	(0.029)	(0.008)	(1,878)	(562)
	[0.026]	[0.026]	[0.060]	[0.033]	[0.006]	[1,922]	[626]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	133	133	124	120	121	121	121
R-squared	0.861	0.861	0.707	0.866	0.232	0.479	0.702
Number of states	12	12	11	11	12	12	12

Notes: The table reports OLS estimates. The unit of observation is the US state in the decade. The panel includes Ln(decades from 1630 to 1750 in Columns 1, 3, 4, 5, 6 and 7, and decades from 1650 to 1720 in Column 2. The dependent variable is the share of black people in the state in Columns 1, 2, 3 and 4; the first difference of the share of black people in the state $\Delta Sh.Blacks_t = Sh.Blacks_t - Sh.Blacks_{t-1}$ in Column 5; the first difference in the absolute number of black people in the state $\Delta Blacks_t = Blacks_t - Blacks_{t-1}$ in Column 6; the first difference in the absolute number of white people in the state $\Delta Whites_t = Whites_t - Whites_{t-1}$ in Column 7. Malaria Climatic Stability is an index measuring the climatic suitability to malaria transmission. The variable Post-1690 is an indicator variable equaling 1 from 1690 onwards and 0 otherwise. All the regressions include decade fixed effects and state fixed effects. Robust standard errors double clustered at the decade and state level are reported in round brackets, standard errors clustered at the state level are reported in squared brackets. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively (related to standard errors clustered at the state level).

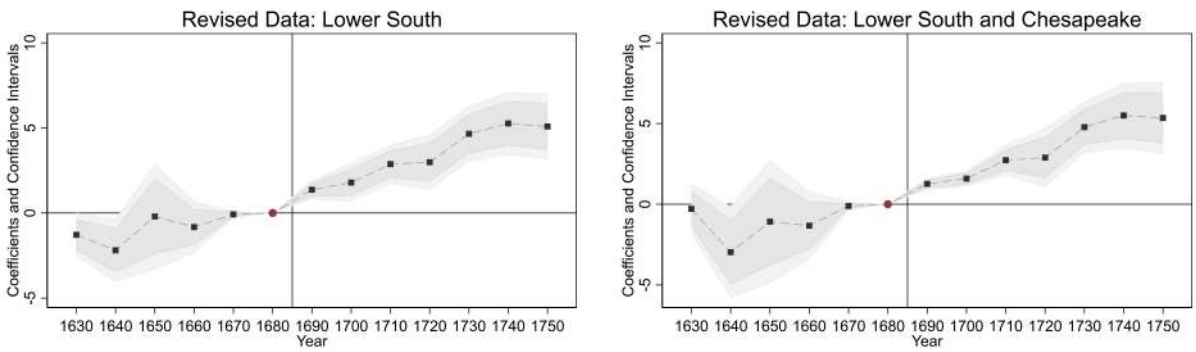
C.3.3 Accounting for Measurement Errors in Pre-Colonial Population

Baseline population data by race are from the U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970 (Sez. z). A methodological description of how the data were constructed is presented in the document "Population in the Colonial and Continental Period". The compiler of the census explains that enumerations in the colonial period were originated by the British Bureau of Trade, under the immediate supervision of the colonial governors, sheriffs, justices of peace and and other town or county officers. Sometimes governors struggled to receive the requested information, and in those cases population estimates were based on muster rolls or lists of taxables. The small population dispersed over large areas and the difficulty of travel might have amplified the inaccuracy of population enumerations. In principle, it is possible that in the colonies funded last, such as North and South Carolina, the more sparse population was more difficult to monitor and enumerate.

As a validation of our baseline data, we propose an alternative measure of "Share of Blacks" in the decade in the state, that relies on revised estimates by McCusker and Menard (2014). McCusker and Menard (2014) complement and revise population data from the U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970 (Sez. Z), with their own estimations. The revision are based on extended sources on which to base the population data. The data from McCusker and Menard (2014) cannot be directly used for the main analysis of this paper because the racial composition of the population is only available for aggregate regions (Lower South, Chesapeake...). For instance, for population data on the lower South, they provide estimates of total population for North Carolina, South Carolina and Georgia, and then they present data on black and white population of these areas as a whole. Still, as an approximation, it is possible to compute the share of blacks in the population in the macro region, and then compute the state share by attributing to each single state the racial composition of the macro-region.

We produced these alternative versions of the data and replicated the baseline event study graph. In the first version, we imputed to the Census data revised enumerations from McCusker and Menard (2014) for North and South Carolina. In the second version, we imputed to the Census data revised enumerations from McCusker and Menard (2014) for North and South Carolina, Virginia and Maryland. Results, summarized in the two graphs in Figure C5, document that the same increase in the share of African slaves in more-malaria suitable states after 1690 emerges even when using data form McCusker and Menard (2014).

Figure C5: Event Study with Data from McCusker and Menard (2014)



Note: The graph plots coefficients in an event study type of framework, comparing states with different level of malaria stability over time. The red dot indicates the omitted decade, 1680. Black squares mark regression coefficients. Gray areas depict confidence intervals, at 99% (dark gray) and 95% (light gray) significance. On the left, we use revised data from McCusker and Menard (2014) for North and South Carolina. In the right Figure, we use data from McCusker and Menard (2014) North and South Carolina, Virginia and Maryland.

C.3.4 Accounting for Scarce Population

The total population of each state varied widely, with certain states in certain decades having a very small population. For this reason, in Table C7 we weight observations by population in 1680. In Table C8, we exclude observations with a population lower than various thresholds, and we provide estimates robust to outliers.

C.3.5 Location of Historical Population in 1750

The baseline measure of malaria suitability and other geographical variables are computed using borders of the states in 1790. If most of the population was concentrated in areas along the coast, these measures might misrepresent actual conditions. For this reason, as robustness, we digitize a historical figure attempting to map the location of population in 1742 and verify our

Table C7: Population-Weighted Regressions

Dependent Variable:	Share of Blacks				Δ Sh.Blacks	Δ Blacks	Δ Whites
	All Sample 1630-1750	1650-1720	No South Carolina	No Virginia	All Sample 1630-1750	All Sample 1630-1750	All Sample 1630-1750
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Malaria Stability x Post-1690	0.132***	0.099**	0.132***	0.067***	0.023**	6,612**	-2,613
	(0.032)	(0.034)	(0.033)	(0.018)	(0.009)	(2,647)	(1,655)
	[0.030]	[0.033]	[0.032]	[0.014]	[0.006]	[1,738]	[693]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	133	88	124	120	121	121	121
R-squared	0.887	0.865	0.882	0.874	0.447	0.608	0.733
Number of states	12	12	11	11	12	12	12

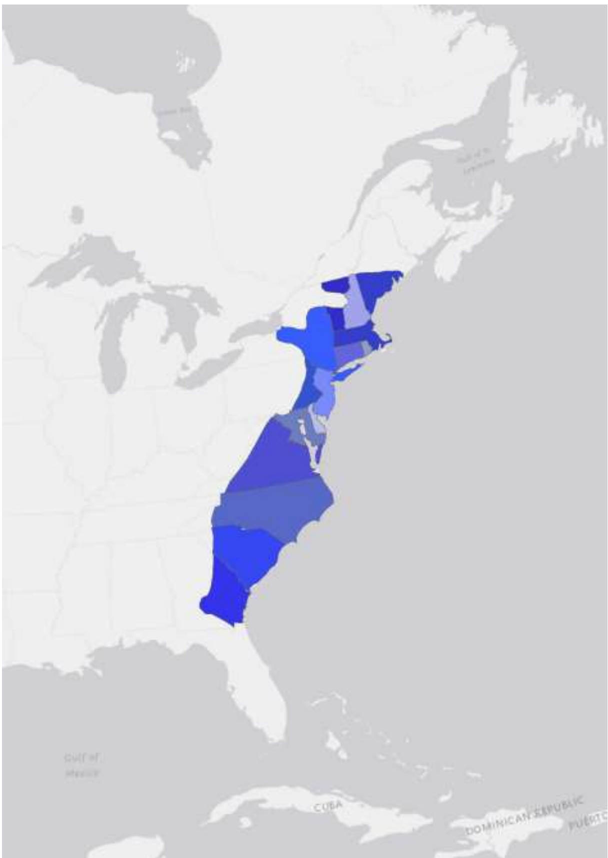
Notes: The table reports OLS estimates. All regression are weighted by total population in the county in the decade. The unit of observation is the US state in the decade. The panel includes Ln(decades from 1630 to 1750 in Columns 1, 3, 4, 5, 6 and 7, and decades from 1650 to 1720 in Column 2. The dependent variable is the share of black people in the state in Columns 1, 2, 3 and 4; the first difference of the share of black people in the state $\Delta Sh.Blacks_t = Sh.Blacks_t - Sh.Blacks_{t-1}$ in Column 5; the first difference in the absolute number of black people in the state $\Delta Blacks_t = Blacks_t - Blacks_{t-1}$ in Column 6; the first difference in the absolute number of white people in the state $\Delta Whites_t = Whites_t - Whites_{t-1}$ in Column 7. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. The variable Post-1690 is an indicator variable equaling 1 from 1690 onwards and 0 otherwise. All the regressions include decade fixed effects and state fixed effects. Robust standard errors double clustered at the decade and state level are reported in round brackets, standard errors clustered at the state level are reported in squared brackets. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively (related to standard errors clustered at the state level).

Table C8: Sensitivity to Scarce Population and Outliers

Dependent Variable:	Share of Blacks				
	Population				Outliers
	More than 2500	More than 5000	More than 10000	More than 20000	MS-Estimator
	(1)	(2)	(3)	(4)	(5)
Malaria Stability x Post-1690	0.087**	0.101**	0.145***	0.153***	0.071***
	(0.038)	(0.039)	(0.028)	(0.013)	(0.004)
	[0.037]	[0.037]	[0.026]	[0.000]	
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	108	96	82	59	133
R-squared	0.891	0.907	0.927	0.963	
Scale Parameter					0.012

Notes: The table reports OLS estimates in Columns 1 to 4 and MS estimates in Column 5. The unit of observation is the US state in the decade. The panel includes all states/decades with a total population higher than 2500 in Column 1, higher than 5000 in Column 2, higher than 10000 in Column 3, higher than 20000 in Column 4, all available states/decades in Column 5. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. The variable Post-1690 is an indicator variable equaling 1 from 1690 onwards and 0 otherwise. All the regressions include decade fixed effects and state fixed effects. Robust standard errors double clustered at the decade and state level are reported in round brackets, standard errors clustered at the state level are reported in squared brackets. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

Figure C6: Approximate Location of Population in 1750



(a) Digitized

findings. The digitized map is reported in Figure C6. Results, unaffected, are summarized in Table C9.

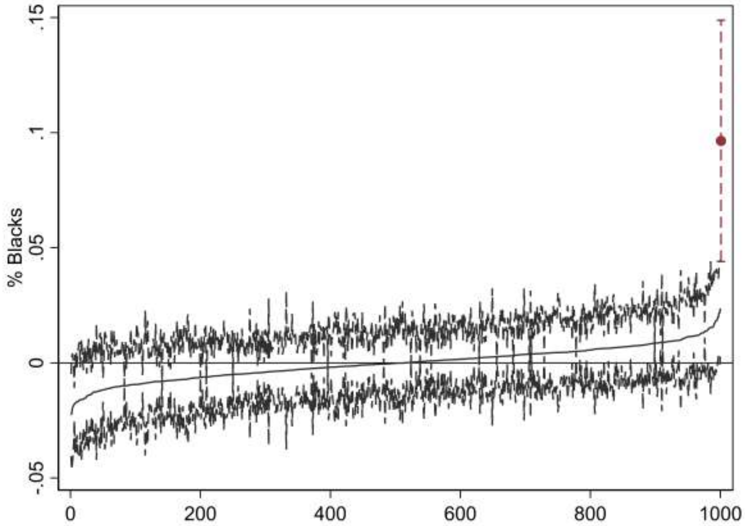
C.3.6 Excluding States from the Sample

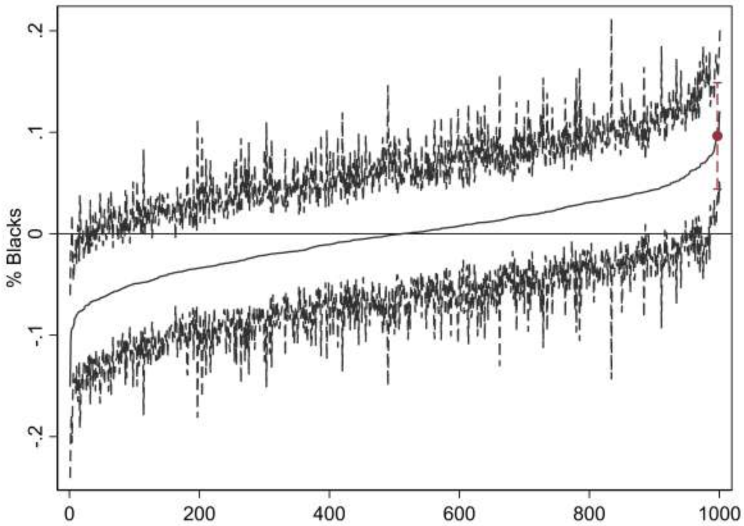
Table C10 reports estimates excluding each one of the states in the sample one by one.

C.3.7 Spatial Randomization Analysis

Figure C7 summarizes the results of a spatial randomization analysis. In order to show that results are not the consequence of limited variation in the data or some more general form of model mis-specification, we randomly assign malaria stability 1,000 times to state-decades (top panel of Figure C7) or to states (bottom panel of Figure C7) and compare it with the baseline treatment effect (maroon in the picture). Results show that no coefficients of the placebo exercise is higher than the baseline treatment effect when malaria stability is assigned to state-decade. Only five coefficients (0.005) of the placebo exercise are higher than the treatment effect when malaria-stability is randomly assigned to states.

Figure C7: Spatial Randomization Analysis





The graphs plot the coefficients and confidence intervals of regression estimates of two placebo exercises. The top graph plots coefficients (in blue) obtained by randomly assigning 1,000 values of malaria stability to each state-decade of the sample. The bottom graph plots coefficients (in blue) obtained by randomly assigning 1,000 values of malaria stability to each state of the sample. Baseline "true" treatment effect and confidence intervals are reported in maroon.

Table C9: Measuring Malaria Suitability according to Historical Maps

Dependent Variable:	**Share of Blacks**				**Δ Sh.Blacks**	**Δ Blacks**	**Δ Whites**
	All Sample 1630-1750	1650-1720	No South Carolina	No Virginia	All Sample 1630-1750	All Sample 1630-1750	All Sample 1630-1750
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Malaria Suitability * Post 1690	0.095***	0.072**	0.073**	0.082**	0.017**	2,804	-949
	(0.024)	(0.025)	(0.031)	(0.026)	(0.005)	(1,602)	(718)
	[0.025]	[0.025]	[0.032]	[0.028]	[0.004]	[1,386]	[745]
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	133	88	124	120	121	121	121
R-squared	0.867	0.851	0.743	0.880	0.236	0.486	0.700
Number of states	12	12	11	11	12	12	12

Notes: The table reports OLS estimates. The unit of observation is the US state in the decade. The panel includes Ln(decades from 1630 to 1750 in Columns 1, 3, 4, 5, 6 and 7, and decades from 1650 to 1720 in Column 2. The dependent variable is the share of black people in the state in Columns 1, 2, 3 and 4; the first difference of the share of black people in the state $\Delta Sh.Blacks_t = Sh.Blacks_t - Sh.Blacks_{t-1}$ in Column 5; the first difference in the absolute number of black people in the state $\Delta Blacks_t = Blacks_t - Blacks_{t-1}$ in Column 6; the first difference in the absolute number of white people in the state $\Delta Whites_t = Whites_t - Whites_{t-1}$ in Column 7. Malaria Stability is an index measuring the suitability to malaria transmission. The variable Post-1690 is an indicator variable equaling 1 from 1690 onwards and 0 otherwise. All the regressions include decade fixed effects and state fixed effects. Robust standard errors double clustered at the decade and state level are reported in round brackets, standard errors clustered at the state level are reported in squared brackets. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively (related to standard errors clustered at the state level).

Table C10: Excluding States from the Sample

Dependent Variable:	Share of Blacks						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sample:	Baseline	No Connecticut	No Delaware	No Maryland	No Massachusetts	No New Hampshire	No New Jersey
Malaria Suitability * Post 1690	0.096***	0.097***	0.104***	0.097***	0.098***	0.096***	0.096***
	(0.024)	(0.024)	(0.024)	(0.027)	(0.025)	(0.025)	(0.024)
Observations	133	121	122	121	120	121	124
R-squared	0.868	0.865	0.890	0.869	0.866	0.867	0.870

Dependent Variable:	Share of Blacks					
	(8)	(9)	(10)	(11)	(12)	(13)
Sample:	No New York	No North Carolina	No Pennsylvania	No Rhode Island	No South Carolina	No Virginia
Malaria Suitability * Post 1690	0.099***	0.113***	0.096***	0.098***	0.074**	0.083**
	(0.025)	(0.021)	(0.024)	(0.024)	(0.032)	(0.027)
Observations	120	123	125	122	124	120
R-squared	0.870	0.889	0.870	0.869	0.745	0.882

Notes: The table reports OLS estimates. The unit of observation is the US state in the decade. The panel includes Ln(decades from 1630 to 1750 and each column excludes one state. The dependent variable is the share of black people in the state. Malaria Stability is an index measuring the suitability to malaria transmission. The variable Post-1690 is an indicator variable equaling 1 from 1690 onwards and 0 otherwise. All the regressions include decade fixed effects and state fixed effects. Robust standard errors double clustered at the decade and state level are reported in round brackets. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

C.4 Slave Codes

Table C11 re-examine the relationship between malaria introduction and slave code approval.

Table C11: Malaria and Slave Codes

Dependent Variable:	Slave Code					
Sample:	All States	No South Carolina	No Virginia	All States Red. Form	All States OLS	All States IV
	(1)	(2)	(3)	(4)	(5)	(6)
Malaria Stability x Post-1690	0.294***	0.330**	0.276***			
	(0.075)	(0.104)	(0.068)			
Malaria Stability * El Niño Events				0.043***		
				(0.011)		
Falciparum Malaria					0.507***	0.630**
					(0.138)	(0.235)
Decade Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat						12.01
Observations	169	157	153	169	169	169
R-squared	0.756	0.743	0.747	0.710	0.744	0.153

Notes: The table reports OLS (Columns 1 to 6) and IV estimates (Column 7). The dependent variable is an indicator variable taking value 1 in each state-decade during which a slave code was approved. Falciparum Malaria is an indicator variable taking value 1 if falciparum malaria is endemic in the state/decade. Malaria Stability is an index measuring the force and stability of malaria transmission, standardized in order to have 0 mean and unit standard deviation. # El Niño Events is a variable counting the number of El Niño episodes registered in the decade. All regressions include decade fixed effects and state fixed effects. Robust standard errors clustered at the state level are reported in round brackets. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

D Malaria Resistance and Slave Prices

Section D.1 summarizes data sources and data construction details. Section D.2 presents summary statistics and figures. Section D.3 presents robustness exercises related to the empirical analysis of Section 4, while Section D.4 summarizes additional results.

D.1 Data Sources and Construction

Section D.1.1 presents price data and how information of the original dataset was utilized for the analysis. Section D.1.2 details sources for all variables of the analysis.

D.1.1 Construction of Slave Price Data

We focus on the subset of records of the "Louisiana, Slave Records, 1719-1820" database that provide information on the country of birth of the individual enslaved. Following the instructions of the author, (Hall, 2005), we exclude records retrieved from the Atlantic Slave Trade database, which mixes the place of birth and the place of embarkation of the slave. The choice to exclude slaves for whom we only know the port of embarkation and not the exact place of birth follows from the aim to proxy the endowment of acquired immunities to malaria with the epidemiological environment of the place of birth. We keep observations with nonmissing values for selling price, year of the sale, sex and age, type and language of the document source. We further exclude individuals that are sold in groups.

For over half of the individuals in this sample, the place of birth is defined in terms of "modern countries" or political entities largely overlapping with modern country borders (Angola, Benin, Coast of Senegal, Mozambique...). For about one- third of the records, the ethnicity of the slave is provided, whereas city or geographical location is the place of birth indicated for about 10% of individuals. For the remaining records, we could not track the recorded place of birth to any geographical location. We are left with a total of 3,186 individuals. The countries of origin for the individuals in our sample are Angola, Benin, Burkina Faso, Cameroon, Central African Republic, Congo, Congo Democratic Republic, Gabon, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mozambique, Nigeria, Senegal, Sierra Leon, Tanzania, Togo and Zimbabwe. Excluding observations for which we do not have country level controls, we are left with a baseline sample of 3,175 individuals from 20 countries.

Two types of prices are provided: sale and inventory prices. For our baseline results we use selling prices. If we included inventory prices, the results would not change. Since different slave transactions took place in different currencies, we exploit the price conversion variable constructed by Robert A. Rosenberg, which converts all prices into dollar values.

Table D1: Country of Origin: Louisiana Slave Database

Country	Entry in the Louisiana Slave Database	Total
Angola	Angola (3), Dimba (2)	5
Benin	Aja/Fon/Arada (65), Bargu (6), Juda, Port of (1)	72
Burkina Faso	Bobo (3), Marka (1)	4
Cameroon	Bakoko/Bacoro (1)	1
Central African Republic	Papelaou (1), Sango (1)	2
Congo	Atoyo/Atyo/Auda (2), Congo (1198)	1200
Congo Democratic Republic	Ham/Hamba (1), Louba (1), Mandongo (11), Ngala (1), Samba (1),	15
Cote d'Ivoire	Bacoy (1), Gold Coast (10)	11
Gabon	Gabon (10)	10
Ghana	Akwa (1), Coromanti (7), Fanti (7), Mina (197)	212
Guinea	Guinea/Guinea Coast (354), Kisi (26), Kouniaca (2), Soso (15), Toma (3)	400
Guinea Bissau	Bissago (1), Gabu/Cabao (1), Nalo (1)	3
Liberia	Gola (1)	1
Mali	Bamana (150)	150
Mozambique	Makwa (29), Mozambique (9)	38
Nigeria	Apa (3), Benin (9), Birom (1), Calabar (47), Edo (20), Ekoi (1), Esan/Edoid (1), Hausa (54), Ibibio/Moko (35), Igbo (189), Nago/Yoruba (110), Nupe (1)	471
Senegal	Coast of Senegal (1), Diola (4), Moor/Nar (59), Serer (3), Wolof (231)	298
Sierra Leone	Boke (1), Kanga (127), Koranko (2), Limba (2), Mende (2), Temne (5)	139
Tanzania	Makonde (3)	3
Togo	Cotocoli (2), Konkomba (148)	150
Zimbabwe	Karanga (1)	1

D.1.2 Data Sources

Sources of explanatory, dependent and control variables in the analysis are summarized in Tables D2 and D3.

D.2 Summary Statistics and Figures

Table D4 presents summary statistics of the main variables of interest. The binned scatter plot in Figure D2 maps the binned correlation between malaria stability and prices of individuals enslaved. The binned scatter plots in Figure D3 show that the same relationship is not present when looking at historical precipitation and temperature.

Table D2: Data Sources: Slave Prices and Malaria in the Country of Origin

Slave Price
Sale value of an individual slave converted into a common denominator price (original prices were expressed in different currencies). Source: Louisiana Slave Database (SALEVALP).
The Louisiana, Slave Records database, conceived and designed by Gwendolyn Midlo Hall (2005). SPSS version of the database retrieved at `https://www.ibiblio.org/laslave/downloads/` Description of variables used in the analysis summarized in Appendix Table D2. Matching between ethnic origin and African countries described in Appendix Section D.1.1.
Document Language
Language of the document or file: English, French or Spanish. Source: Louisiana Slave Database (LANGUAGE).
Document Type
Type of document or file: estate inventory, estate sale, sale which does not involve probate, criminal litigation, other litigation, mortgage, marriage contract, will, seizure for debt, confiscation in criminal proceedings, reports of a runaway, miscellaneous, list (as in census or taxation list), testimony of slaves, Atlantic slave trade. Source: Louisiana Slave Database (DOCTYPE).
Male Slave
Male dummy created on variable SEX, excluding slaves whose sex was unidentified. Source: Louisiana Slave Database (SEX).
Slave Age
Age of slave as reported in document or file. If a range of years was given, the mean age was computed: e.g., for a slave of 30 to 35 years, 32.5 was entered. Source: Louisiana Slave Database (AGE).
Malaria Stability
Average Malaria Stability Index in the country of origin of the slave. Source: average Malaria Stability is constructed as the country average of the Malaria Stability index from Kiszewski (2004) across grids.
Voyage Length
Average voyage length in days. Source: the Trans-Atlantic Slave Trade Database. Average voyage length in days by location, constructed using data from Trans-Atlantic Slave Trade Database (Eltis, 2007), publicly available at `https://www.slavevoyages.org/voyage/database`
Distance Atlantic Markets
Distance to slave markets, Atlantic trade (1000 km). Computed as "the sailing distance from the point on the coast that is closest to the country's centroid to the closest major market of the Atlantic slave trade (Virginia, USA; Havana, Cuba; Haiti; Kingston, Jamaica; Dominica; Martinique; Guyana; Salvador, Brazil; and Rio de Janeiro, Brazil)". Source: from Nunn (2008).
Land Suitability
Average land suitability in the country of origin of the slave. Source: average Land Suitability is constructed as the country average of the land suitability index from Ramankutty (2002) across grids.
Average Rice Suitability
Country average of soil suitability to rice, low input rain-fed agriculture. Source: FAO GAEZ.
Slave Height
Average height of African slaves from the area. Based on average country/ethnic group/region historical data on heights. Source: Eltis (1982).
Famine in Childhood
Indicator variable taking value 1 if a famine was registered in the two first years of life of the individual in his/her African country of birth. Source: constrcuted using historical weather information from Nicholson (2001).
Drought in Childhood
Indicator variable taking value 1 if a drought was registered in the two first years of life of the individual in his/her African country of birth. Source: constrcuted using historical weather information from Nicholson (2001) and Nicholson et al. (2012).
Average Temperature
Average country monthly temperature (baseline period 1900-1950). Source: CRU TS v.1.1 data from New (2000).
FAO Rome, Italy and IIASA, Laxenburg, Austria.
Ruggedness
Average country ruggedness (Terrain Ruggedness Index, 100 m). Source: Nunn and Puga (2012).
Historical Croplands Cover
Country average of the fraction of grid cells occupied by cultivated land in 1700. Source: average historical cropland cover across grids is computed using crop cover data from 1700 by Goldewijk (2001) and Goldewijk and Ramankutty (2004).
Transition to Agriculture
Year of transition from reliance mainly on hunting and gathering to reliance mainly on cultivated crops (and livestock). Source: from Chanda (2007).
Ln(Population in 1400)
Natural log of population in 1400. Source: from Nunn and Puga (2012).
State Antiquity in 1700
Index measuring the presence of a supra-tribal polity within the present-day boundaries of countries. Computed adding up 50-year scores from year 1 to 1700 aC. Source: from Bockstette, Chanda and Putterman (2002).

Table D3: Data Sources: Slave Prices and Malaria in the Country of Origin

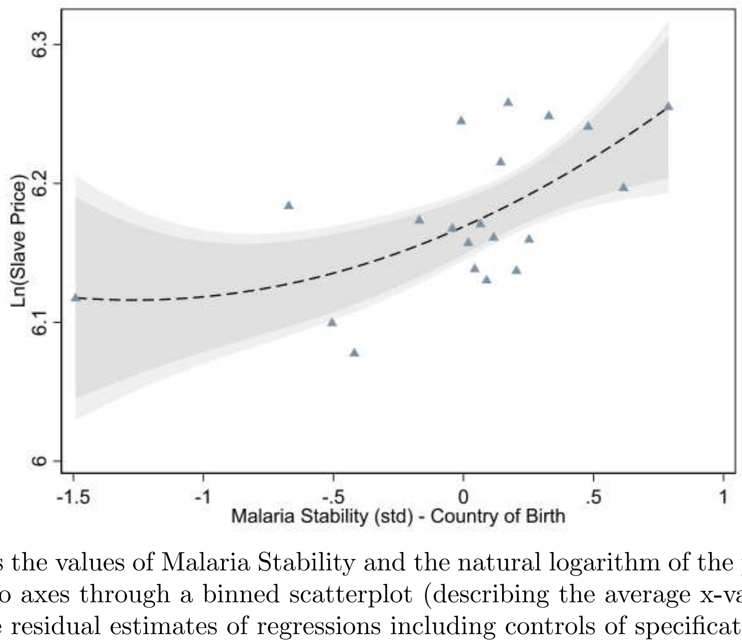
Mean Elevation
Average country elevation. Source: Elevation data National Oceanic and Atmospheric Administration (NOAA) and U.S. National Geophysical Data Center, TerrainBase, release 1.0 (CD-ROM) from Hastings and Dunbar (1999).
TseTse Fly Suitability
Average country predicted suitability for tsetse flies. Source: sum of predicted suitability (0 to 1) for the presence of Tsetse groups (Fusca, Morsitans and Palpalis). Data produced for FAO - Animal Health and Production Division and DFID - Animal Health Programme by Environmental Research Group Oxford (ERGO Ltd) in collaboration with the Trypanosomosis and Land Use in Africa (TALA) research group at the Department of Zoology, University of Oxford.
Yellow Fever Suitability
Predicted global distribution of *Aedes Aegypti*. Source: Kraemer *et al.* (2015).
Average Precipitation
Average country monthly precipitation mm/month (baseline period 1900-1950). Source: CRU TS v.1.1 data from New (2000).
Average Relative Humidity
Average country relative humidity (%). Source: New (1999) accessed through Atlas of Biosphere.
Tropical Land
Share of tropical land. Source: Nunn and Puga (2012).
Sickle-Cell, G6PD, Duffy Antigen
Average share of Duffy negative phenotype in the country. Source: Howes et al. (2012), and Piel et al. (2013)

Figure D1: Advertisements

Table D4: Summary Statistics - Malaria in the Country of Origin and Prices

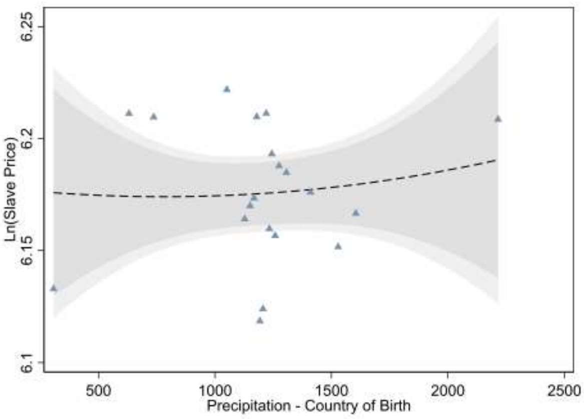
Variable	Mean	Std. Dev.	Min.	Max.	N
Individual-Level Variables					
Ln Slave Price	6.177	0.645	2.303	8.102	3175
Male	0.693	0.461	0	1	3175
Age	29.486	12.299	1.8	80	3175
Age Squared	1020.623	889.404	3.24	6400	3175
Document Year	1802.088	11.848	1741	1820	3175
Country-Level Variables					
Malaria Stability (std.)	0	1	-3.586	3.306	3175
Voyage Length	0	1	-1.461	5.222	3175
Distance Atlantic Markets	0	1	-1.327	6.291	3175
Land Suitability	0	1	-1.864	2.01	3175
Rice Suitability	0	1	-2.459	1.641	3175
TseTse Fly Suitability	0	1	-2.33	0.838	3175
Ruggedness	0	1	-0.774	4.563	3175
Historical Croplands Cover	0	1	-1.221	2.547	3175
Transition to Agriculture	0	1	-6.334	1.739	3175
Ln(Population in 1400)	0	1	-1.649	2.148	3175
State Antiquity	0	1	-1.308	1.757	3169
Yellow Fever Suit.	0	1	-3.115	1.548	3175
Average Precipitation	1201.872	404.034	290.583	2345.734	3175
Average Temperature	25.971	1.293	21.013	28.132	3175
Average Relative Humidity	0	1	-2.62	1.087	3175
Tropical Land	0	1	-2.976	0.566	3175

Figure D2: Binned Scatterplots - Malaria in the County of Birth and Slave Price

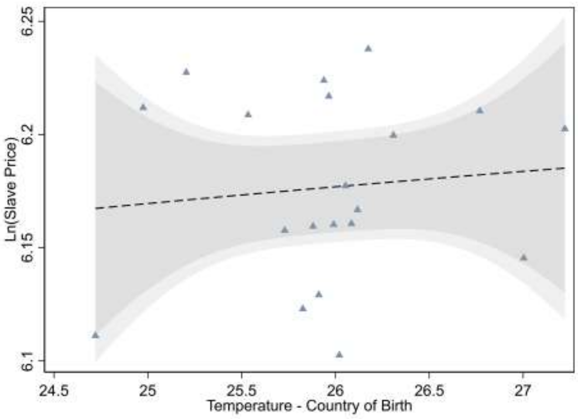


Note: The graph plots the values of Malaria Stability and the natural logarithm of the price of the individual enslaved along the two axes through a binned scatterplot (describing the average x-value for each y-value). Plotted values are the residual estimates of regressions including controls of specification (1) Table 8.

Figure D3: Binned Scatterplots - Climate in the County of Birth and Slave Price



(a) Precipitation



(b) Temperature

Note: The graph plots the values of precipitation (left) and temperature (right) and the natural logarithm of the price of the individual enslaved, along the two axes through binned scatterplots (describing the average x-value for each y-value). Plotted values are the residual estimates of regressions including controls of specification (1) Table 8.

Table D5: Malaria in the Country of Birth, Slave Prices and Geography

	Ln(Slave Price)					
Malaria Stability	0.063***	0.077***	0.095***	0.085***	0.089***	0.112**
	(0.015)	(0.014)	(0.022)	(0.018)	(0.021)	(0.041)
Average Precipitation		-0.000				0.000
		(0.000)				(0.000)
Average Relative Humidity			-0.038			-0.073
			(0.024)			(0.084)
Tropical Land				-0.021**		0.007
				(0.010)		(0.048)
TseTse Fly Suitability					-0.021*	-0.011
					(0.011)	(0.034)
Observations	3175	3175	3175	3175	3175	3175
R-Squared	0.446	0.446	0.446	0.446	0.446	0.447

Notes: The table reports OLS estimates. The unit of observation is the individual slave transaction. The dependent variable is the natural logarithm of the selling price of the slave. Malaria Stability is an index measuring the force and stability of malaria transmission in the African country of birth of the individual enslaved, standardized to have 0 mean and unit standard deviation. All the regressions also control for the age of the slave, the square of the age and whether the slave is a male, "Region fixed effects", "Year fixed effects", "Document Language fixed effects", "Document Type fixed effects". Standard errors are clustered at the country level. P-values for the null hypothesis, i.e. Malaria Stability = 0, computed with wild bootstrap standard errors are reported in italics. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

D.3 Robustness Checks

Section D.3.1 proposes results with additional controls. Section D.3.2 verifies whether results are confirmed with alternative proxies for malaria resistance. Section D.3.3 demonstrates that results do not rest on any specific choice in the mapping of individual origin to countries.

D.3.1 Additional Controls

Malaria stability is constructed as a non-linear function of long-averages of temperature and precipitation and as a function of characteristics of the mosquito vector prevalent in a region. The index might be therefore correlated with features of tropical and semi-tropical areas that might have a direct impact on health, strength, and a wealth of other characteristics. Table D5 explores the matter and shows that average historical precipitation, average humidity, fraction of tropical land and suitability to tse-tse are not positively correlated with prices.

D.3.2 Alternative Measures of Malaria Resistance and Genetic Immunities

Table D6 reproduces the baseline table using a reconstructed version of the malaria stability index, using only climatic data from 1900 to 1950 (while the baseline measure uses long-averages from 1900 to 1990) and ignoring variation originated by differences of the species of Anopheles prevalent in the region. In Table D7 we use as a proxy of historical malaria resistance, three contemporary measures of innate traits that provide resistance to malaria. These measures use contemporary information from scattered surveys, interpolated through spatial model into raster data. Moreover, as detailed in Section 2.1 different immunities emerged in different areas acting as substitutes. The perfect example is the Fulani of Mali, known for their high resistance to malaria despite a relatively low level of sickle-cell trait. Notwithstanding all these caveats,

Table D6: Slave Prices – Alternative Measures of Malaria Suitability

	Ln(Slave Price)					
	(1)	(2)	(3)	(4)	(5)	(6)
Malaria Stability (Climatic)	0.137***	0.102**	0.170***	0.168***	0.215**	0.319
Cluster (s.e.)	(0.044)	(0.039)	(0.048)	(0.044)	(0.099)	(0.201)
Male Slave	Yes	Yes	Yes	Yes	Yes	Yes
Slave Age	Yes	Yes	Yes	Yes	Yes	Yes
Slave Age Squared	Yes	Yes	Yes	Yes	Yes	Yes
Voyage Length		Yes				Yes
Distance Atlantic Markets			Yes			Yes
Land Suitability				Yes		Yes
Average Rice Suitability					Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Document Language fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Document Type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3175	3175	3175	3175	3175	3175
R-Squared	0.445	0.445	0.445	0.445	0.445	0.446

Notes: The table reports OLS estimates. The unit of observation is the individual slave transaction. The dependent variable is the natural logarithm of the selling price of the slave. Malaria Stability (Climatic) is an index of malaria stability predicted as a function of historical temperature and precipitation (see text for further details). All the regressions also control for the age of the slave, the square of the age and whether the slave is a male, "Region fixed effects", "Year fixed effects", "Document Language fixed effects", "Document Type fixed effects", temperature and temperature squared. Standard errors are clustered at the country level. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

while coefficients are not always precisely estimated, all these measures of malaria resistance confirm a positive effect on prices of individuals enslaved in the Louisiana slave market.

D.3.3 Country of Origin

Tables D8 and D9 verify the robustness of results to the mapping of individual origins to modern countries. Results summarized in Appendix Table D8 show that the results do not depend on slave transactions including slaves whose origin is only imperfectly attributable to a modern country, by excluding all individuals from ethnic groups whose geographical distribution crosses a border, even if only marginally. Note that we have already excluded from the sample individuals from groups whose territory is almost evenly split across two (or more) locations. All the ethnicities left in the baseline specification have a predominantly larger amount of their land in one specific modern country. Moreover, we show that the results do not depend on the inclusion of slaves whose place of birth is Congo, nor on slaves whose place of birth is Guinea or Benin. Table D9 shows that results are not driven by any specific country in the sample.

Table D7: Slave Prices – Genetic Immunities

	Ln(Slave Price)					
	SICKLE CELL		**G6PD**		**DUFFY**	
	(1)	(2)	(3)	(4)	(5)	(6)
Genetic Immunities	0.215	3.036*	1.115***	0.866	0.020***	0.007
Cluster (s.e.)	(0.666)	(1.572)	(0.369)	(0.589)	(0.005)	(0.015)
Male Slave	Yes	Yes	Yes	Yes	Yes	Yes
Slave Age	Yes	Yes	Yes	Yes	Yes	Yes
Slave Age Squared	Yes	Yes	Yes	Yes	Yes	Yes
Voyage Length		Yes		Yes		Yes
Distance Atlantic Markets		Yes		Yes		Yes
Land Suitability		Yes		Yes		Yes
Average Rice Suitability		Yes		Yes		Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Document Language fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Document Type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3175	3175	3175	3175	3175	3175
R-Squared	0.444	0.446	0.445	0.446	0.445	0.445

Notes: The table reports OLS estimates. The unit of observation is the individual slave transaction. The dependent variable is the natural logarithm of the selling price of the slave. Genetic Immunities measure the modern prevalence of three types of innate traits conferring malaria resistance. All the regressions also control for the age of the slave, the square of the age and whether the slave is a male, "Region fixed effects", "Year fixed effects", "Document Language fixed effects", "Document Type fixed effects", temperature and temperature squared. Standard errors are clustered at the country level. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

Table D8: Slave Prices - Robustness Checks

	Ln(Slave Price)								Slave Price	
	No Border Groups		**No "Congo"**		**No "Guinea"**		**No Benin**		**Full Sample**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Malaria Stability	0.072***	0.075***	0.069***	0.084***	0.066***	0.085***	0.062***	0.085***	34.702***	40.491***
Cluster s.e.	(0.016)	(0.019)	(0.019)	(0.022)	(0.013)	(0.024)	(0.015)	(0.022)	(7.839)	(6.776)
Observations	1606	1606	1977	1977	2821	2821	3128	3128	3175	3175
R-Squared	0.449	0.450	0.443	0.445	0.450	0.452	0.449	0.450	0.364	0.365

Notes: The table reports OLS estimates. The unit of observation is the individual slave transaction. The dependent variable is the natural logarithm of the selling price of the slave in Columns (1) to (8), and the absolute value of the sale price in Column (9) to (10). Malaria Stability is an index measuring the force and stability of malaria transmission in the African country of birth of the individual enslaved, standardized to have 0 mean and unit standard deviation. All the regressions also control for the age of the slave, the square of the age and whether the slave is a male, "Region fixed effects", "Year fixed effects", "Document Language fixed effects", "Document Type fixed effects", temperature and temperature squared. Standard errors are clustered at the country level. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

Table D9: Slave Prices - Excluding One Country at the Time

	Ln(Slave Price)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Baseline	No ANGOLA	No BENIN	No BURKINA FASO	No CAMEROON	No CENTRAL AFRICAN REPUBLIC	No CONGO
Malaria Stability	0.063***	0.064***	0.058***	0.061***	0.058***	0.062***	0.069***
	(0.015)	(0.016)	(0.014)	(0.015)	(0.013)	(0.015)	(0.019)
Observations	3,175	3,170	3,103	3,171	3,174	3,173	1,975
R-squared	0.446	0.445	0.447	0.446	0.447	0.447	0.443
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
VARIABLES	No CONGO DEMOCRATIC REPUBLIC	No GABON	No GHANA	No GUINEA	No GUINEA BISSAU	No LIBERIA	No MALI
Malaria Stability	0.063***	0.063***	0.068***	0.067***	0.061***	0.063***	0.088***
	(0.015)	(0.015)	(0.020)	(0.013)	(0.014)	(0.015)	(0.023)
Observations	3,160	3,165	2,963	2,775	3,172	3,174	3,025
R-squared	0.446	0.447	0.457	0.449	0.446	0.446	0.452
	(15)	(16)	(17)	(18)	(19)	(20)	(21)
VARIABLES	No MOZAMBIQUE	No NIGERIA	No SENEGAL	No SIERRA LEONE	No TANZANIA	No TOGO	No ZIMBABWE
Malaria Stability	0.068***	0.054***	0.062***	0.060***	0.067***	0.062***	0.064***
	(0.017)	(0.019)	(0.017)	(0.016)	(0.016)	(0.015)	(0.016)
Observations	3,137	2,704	2,877	3,036	3,172	3,025	3,174
R-squared	0.447	0.431	0.449	0.441	0.446	0.452	0.446

Notes: The table reports OLS estimates. The unit of observation is the individual slave transaction. Each column excludes from the sample individual whose place of birth is the country indicated in the header. The dependent variable is the natural logarithm of the selling price of the individual enslaved. Malaria Stability is an index measuring the force and stability of malaria transmission in the African country of birth of the individual enslaved, standardized to have 0 mean and unit standard deviation. All the regressions also control for the age of the slave, the square of the age and whether the slave is a male, "Region fixed effects", "Year fixed effects", "Document Language fixed effects", "Document Type fixed effects", temperature and temperature squared. Standard errors are clustered at the country level. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

Table D10: Before and After the Act Prohibiting Importation of Slaves in the United States

	Ln(Slave Price)			
	Before the Ban		After the Ban	
	(1)	(2)	(4)	(5)
Malaria Stability	0.027	0.050	0.160***	0.195***
	(0.022)	(0.031)	(0.017)	(0.020)
Male Slave	Yes	Yes	Yes	Yes
Slave Age	Yes	Yes	Yes	Yes
Slave Age Squared	Yes	Yes	Yes	Yes
Voyage Length		Yes		Yes
Distance Atlantic Markets		Yes		Yes
Land Suitability		Yes		Yes
Average Rice Suitability		Yes		Yes
Observations	2030	2030	1145	1145
R-squared	0.405	0.409	0.478	0.480

Notes: The table reports OLS estimates. The unit of observation is the individual slave transaction. The dependent variable is the natural logarithm of the selling price of the enslaved individual. Malaria Stability is an index measuring the force and stability of malaria transmission in the African country of birth of the individual enslaved, standardized to have 0 mean and unit standard deviation. All the regressions also control for the age, the square of the age, the sex, "Region" fixed effects, "Year" fixed effects, "Document Language" fixed effects, "Document Type" fixed effects. Standard errors are clustered at the country level. P-values for the null hypothesis, i.e. Malaria Stability = 0, computed with wild bootstrap standard errors are reported in italics. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

D.4 Additional Results

This section presents additional results that are useful to further verify and qualify the hypothesis. Section D.4.1 explores how the correlation between malaria in the country of origin and slave prices varied over time, and in particular after the approval of the Act prohibiting the importation of slaves in the United States. Section D.4.2 explores whether the higher prices for slaves born in countries with higher malaria were common in plantations independently of the origin of the slaveholders. Section D.4.3 looks at the total quantity of individuals raided and correlates it with malaria in the country of origin.

D.4.1 Before and After the Ban on Importation of Slaves

In March 1807 a federal law prohibited the importation of slaves to the United States, the prohibition was to take effect in 1808. While before 1808 slave traders could adjust to demands of slaveholders, to import individuals from Africa to the United States became illegal, and therefore much less likely after that date. Interestingly, results in Table D10 reveal that the effect is much stronger in the years after the ban, when the supply of individuals with higher malaria resistance was likely less elastic. Before the ban, we still observe a positive coefficient but much smaller than the baseline one. This is consistent with the idea that up to 1808 slave trades could partially adjust to meet the demand of planters.

Table D11: French, English and Spanish Slaveholders

	Ln(Slave Price)					
	French		Spanish		English	
	(1)	(2)	(4)	(5)		
Malaria Stability	0.069***	0.086***	0.052	0.088	0.183**	0.176*
	(0.012)	(0.018)	(0.055)	(0.087)	(0.057)	(0.085)
Male Slave	Yes	Yes	Yes	Yes	Yes	Yes
Slave Age	Yes	Yes	Yes	Yes	Yes	Yes
Slave Age Squared	Yes	Yes	Yes	Yes	Yes	Yes
Voyage Length		Yes		Yes		Yes
Distance Atlantic Markets		Yes		Yes		Yes
Land Suitability		Yes		Yes		Yes
Average Rice Suitability		Yes		Yes		Yes
Observations	2512	2512	596	596	67	67
R-squared	0.475	0.475	0.419	0.429	0.561	0.564

Notes: The table reports OLS estimates. The unit of observation is the individual slave transaction. The dependent variable is the natural logarithm of the selling price of the enslaved individual. Malaria Stability is an index measuring the force and stability of malaria transmission in the African country of birth of the individual enslaved, standardized to have 0 mean and unit standard deviation. All the regressions also control for the age, the square of the age, the sex, "Region" fixed effects, "Year" fixed effects, "Document Language" fixed effects, "Document Type" fixed effects. Standard errors are clustered at the country level. P-values for the null hypothesis, i.e. Malaria Stability = 0, computed with wild bootstrap standard errors are reported in italics. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

D.4.2 French, English and Spanish Slaveholders

The "Louisiana, Slave Records, 1719-1820" database assembles documents from 1719 to 1820 related to transactions taking place during the French, the Spanish and the British (American) domination of Louisiana. As a way to evaluate whether preferences for slaves with higher malaria resistance were only prevalent during a specific period of domination, we look at the baseline results splitting the sample into records of transactions taking place in French, Spanish and English. Results, summarized in Table D.4.2, show that the coefficient is close to the baseline one for French and Spanish documents (while for Spanish records is not precisely estimated), and much bigger for English documents (which however represents a small fraction of the total).

D.4.3 Malaria Resistance and Total Slaves Raided

If slave-owners preferred individuals with higher malaria-resistance, we should observe higher prices and a higher quantity of people taken from countries with more malaria transmission. Using data from Nunn (2008) mapping the total amount of individuals enslaved by country during the African slave trade, we show that indeed there is a sizable and significant correlation between the malaria intensity of the country and the total number of individual enslaved from that country. A one standard deviation increase in malaria stability brings about an almost 15 percent increase in the total number of individual enslaved.

Table D12: Malaria and Slave Exports in Africa

	Ln(Slaves Exported over Total Area)				
	(1)	(2)	(3)	(4)	(5)
Malaria Stability	0.262***	0.205***	0.217***	0.162**	0.136**
	(0.030)	(0.049)	(0.044)	(0.064)	(0.065)
Ruggedness	No	Yes	No	Yes	Yes
Temperature	No	Yes	No	Yes	Yes
Humidity	No	Yes	No	Yes	Yes
Near Coast	No	No	Yes	Yes	Yes
Distances Slave Markets	No	No	Yes	Yes	Yes
Ln Pop Density 1400	No	No	No	No	Yes
Observations	57	47	57	47	47
R-squared	0.471	0.483	0.560	0.526	0.604

Notes: The table reports OLS estimates. The unit of observation is the African Country. The dependent variable is the natural logarithm of the total number of slaves exported over the total land area. Malaria Stability is an index measuring the force and stability of malaria transmission. Robust standard errors in parenthesis. ***, **, * indicate significance at 1%, 5%, and 10% levels respectively.

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