Slave Trade and Development

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Major paper presented to the
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in partial fulfillment of the requirements of M.A. Degree
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Ottawa, Ontario
December 2016

ABSTRACT

Using data for 38 countries, I estimate the impact of slave trades on individual components of GDP. I observe three important pieces of evidence that countries greatly affected by slave exports are less developed today. Firstly, I find that countries with more slave exports spend a smaller share of GDP on government purchases. This finding is consistent with Wagner's law in that more developed countries tend to allocate a larger share of GDP on government expenditure. I also find weak evidence that these countries spend less on health and education which implies low investment in human capital in these countries. Secondly, I find that countries that exported more slaves are more dependent on agriculture. These countries have not experienced structural transformation to the same extent as developed countries. Finally, I find no evidence that countries that exported more slaves are more dependent on aid.

SECTION ONE

INTRODUCTION

Various research has been conducted over time on the effect of historical events on certain factors today of which current economic development is of utmost interest. Africa's historical events, especially the slave trades and colonialism, have captured the interest of many researchers. Between 1400 and 1900, Africa as a continent experienced four different slave trades: the Trans-Atlantic, Trans-Saharan, Indian Ocean and Red Sea slave trades. During this period, slaves were exported from different parts of Africa to the locations of slave demand.

Using Nunn's paper "The Long-Term Effects of Africa's Slave Trades" (2008) as my major reference, I provide an empirical examination of the impact of Africa's slave trades on individual components of GDP. Nunn used shipping records and GDP data (Maddison, 2003) for 52 countries to estimate the impact of slave trades on economic development today. He also used an analysis of selection into slave trades and variation in sailing distances to the location of demand (instrumental variables) to better understand if this relationship is causal or spurious. He found that countries that had higher population density (which is an indicator of economic prosperity) in 1400 selected into the slave trades. Both the OLS and instrumental variables (IV) estimates suggested that the more slaves that were exported by a country the worse its economic performance today.

I extend the argument that countries that were greatly affected by slave exports are less developed today. I use data on some of the individual components of GDP from the World Bank as my dependent variables and use slave exports per land area and controls used by Nunn for independent variables, as well as reproducing his IV strategy. The dependent variables include

consumption, investment, government expenditure, health, education, agriculture, industry, services, manufacturing, total natural resources rents and net official development assistance (ODA), all of which are explained in detail in section III of this paper. My goal is to see how these individual components of GDP (beyond GDP alone) are affected by slave trades.

I link my findings to Wagner's law and structural transformation based on my findings. The development of an economy will be accompanied by an increased share of public expenditure in gross national product (GNP) states Wagner's law, and a shift from agriculture to other sectors of the economy (industry and services) according to the theories of structural transformation (Kuznets, 1957). Since my argument is that countries affected by more slave exports are less developed today, Wagner's law predicts that these countries spend a smaller share of GDP on government purchases (less government spending) and structural transformation predicts more dependence on agriculture in these countries. I also expect that more slave export countries are more dependent on aid.

Firstly, I observe very similar results to those of Nunn (a negative and significant effect of slave trades on current GDP per capita) despite the differences in the datasets used and in the number of countries used in my research. I also discover that countries that exported more slaves, which are less developed today, have a lower share of government spending. This is in line with the Wagner's law prediction that less developed countries spend a smaller share of GDP on government purchases. Estimating the impact of slave trades on public spending on health and education, I find weak evidence that countries affected by high slave exports spend less on health and education as a share of GDP. This connotes that these countries investment on human capital is low.

Another interesting finding is that countries that exported more slaves are more dependent on agriculture. I observe that the coefficient estimates for agriculture share of GDP is positive while for industry and services they are negative. Based on the expectation that countries with more slave exports are more agriculture dependent, this also means that these countries are less dependent on industry and services (the countries have not experienced structural change). It should however be noted that the coefficients for industry are not significant while services coefficients are only significant in two specifications.

Lastly, in contrast to what I expected, I find no relationship between slave trades and aid. Although countries that exported more slaves during the slave trades are less developed today, it does not seem to be true that these countries are more dependent on aid (official development assistance).

This paper is a contribution to the literature as it looks not only at the impact of slave exports on current development but also the impact of slave exports on key characteristics of economic development. There are similar studies on slave trades apart from the Nunn (2008) paper. Fenske and Kala (2015) estimated the impact of climate on slave exports. They found substantial evidence that the colder the weather, the more slaves were exported during the slave trades. Nunn and Wantchekon (2011) on the other hand found that less trusting people today are those whose ancestors were more affected by the slave trades.

The paper is structured as follows. Section II provides a summary of relevant empirical literature including past and present research. Section III gives detailed information about the data sources and definitions. Section IV describes the empirical specifications and Section V discusses the results. Section VI gives the conclusion.

SECTION TWO

LITERATURE REVIEW

The aim of this section is to discuss Nunn's paper and other slave trade papers, history and development papers, papers on Wagner's law and structural transformation papers in detail. Nunn's paper is discussed because it is a major reference for my research and will be followed by other studies on slave trades. I will also continue to discuss the importance of history on today's development by looking at three major papers cited by Nunn 2009 (Acemoglu et al. (2001), La Porta et al (1997; 1998), and Engerman and Sokoloff (1997; 2002) and other research related to these. Finally, I will discuss government expenditure using Wagner's law and structural transformation in relation to agriculture in different subsections and other findings related to each of these.

Nunn (2008) and other slave papers

Africa as a continent experienced four major slave trades between 1400 and 1900 of which the largest was the trans-Atlantic slave trades. The other three slave trades in no specific order that were prior to the trans-Atlantic slave trades are the trans-Saharan, Red Sea and Indian Ocean slave trades. What made Africa's slave trades unique relative to other slave trades is the large number of slaves traded during that period and the fact that individuals of the same ethnicities enslaved one another (Nunn 2008).

Nunn (2008) in the introduction of his paper sought to answer the question of whether Africa's current performance can be explained by two main historical events: slave trades and colonialism. Focusing on slave trades, he used data from shipping records and historical documents reporting slave ethnicities to construct estimates of the number of slaves exported

from each country and real per capita GDP from Maddison (2003). He found a robust negative relationship between the number of slaves exported and subsequent economic performance.

To know if there is a causal effect on slave trades on income, he used two different approaches. The first approach was to use historical data and evidence from African historians to evaluate the importance and characteristics of selection into slave trades. He found that societies or countries that had higher population density in 1400, which is as an indicator of economic development, were the ones that selected into slave trades. The second approach he used was using sailing distance from each country to locations of demand for slaves as instruments for slave exports per area. The instrumental variables (IV) results confirm the OLS estimates, suggesting that more extraction of slaves during the slave trades resulted in worse economic performance.

Examining the channels of causality between slave exports and economic development, he documented that consistent with historical accounts, slave trades hindered the creation of broader ethnic groups which led to ethnic fractionalization and also resulted in the creation of weak and underdeveloped political structures. This is consistent with the findings of Alesina et al. (2003) that ethnic fractionalization variables are likely to be an important determinant of economic success and institutional quality. Similarly, Easterly and Levine (1997) found that ethnic diversity is very important in determining economic development as it is associated with low schooling, insufficient infrastructure and underdeveloped financial systems.

Slave exports created a culture of mistrust in Africa (Nunn and Wantchekon 2011). Combining individual-level survey data with historical data on slave shipments by ethnic group, Nunn and Wantchekon (2011) find that individuals whose ancestors were more affected by slave exports are less trusting today as slave trading adversely affected individuals' trust of those around them. They found a robust positive relationship between distance from the coast in Africa and trust. In

the words of Nunn and Wantchekon (2011), "the effects of slave trade penetrated deep into the social fabric of societies and eventually turned friends, families, neighbours against each other."

Did climate determine the number of slaves exported during the slave trade era? Fenske and Kala (2015) answered this question by examining the relationship between climate and slave trades. They used a combination of data on temperature, trans-Atlantic slave trade and agro-ecological zones which classify land into zones based on climate, elevation, soils and latitude. Using the histories of Whydah, Benguela, and Mozambique to support their interpretation, they found a large effect of climate change on slave exports; a one degree increase in temperature reduced annual exports by roughly 3000 slaves per port. An explanation for this given by the authors is that lower temperatures reduced mortality and raised agricultural yields thereby lowering slave supply costs and increasing number of slaves exported. They conclude that cold weather shocks at the peak of the slave trade (which caused slave exports to increase) predict lower economic activity today.

History and Development

Are historical events important to today's economic performance? Can these events explain why economic development in Africa has not improved over time? What are the actual effects of these events on current development? These questions and many more have been of utmost interest to historical and development authors and have been answered in various ways. The major African historical events were slave trades and colonialism.

Acemoglu et al. (2001) examined the effect of institutions on current economic performance using mortality rates faced by settlers as an instrument for current institutions. Not all colonies were conducive for colonists to settle as some colonies had disease environments causing death

of Europeans. In colonies where colonist could settle, replicas of European institutions were created with a great emphasis on private property and checks against power while in colonies with worse disease environments, extractive (bad) states were created. Extractive states do not provide much protection for private property nor checks and balances against government appropriation. Instead, the main purpose of creating the extractive state was to transfer as many resources as possible from the colony to the colonizer with minimum investment. They found that institutions where Europeans could settle do better in current economic performance than those in which the extractive states were created. Their estimates implied that differences in institutions account for roughly three-quarters of differences in income per capita.

Consistent with the findings of Acemoglu et al. (2001) on the impact of institutions on current economic performance, Banerjee and Iyer (2005) examined the impact of the colonial land revenue system set up by the British in India. Land revenues were a major source of income for all governments of India including the British at that time. In some areas, "landlords" were in charge of collecting revenues from individual cultivators and thereafter, the revenues were remitted to the British. In some other areas, revenue arrangements were made directly with the individual cultivator. They found that areas in which property rights were originally given to the landlords have significant lower investments and productivity in agriculture than areas whose property rights were historically given to individual cultivators.

Observing 49 countries that have publicly traded companies, La Porta et al. (1997; 1998) examined the effect of the strength of legal rules protecting investor rights on financial development using historical differences between the British common law, Roman civil law, German civil law and Scandinavian civil law. They hypothesized that differences in the type and success of financial systems around the world could be traced in part to the differences in

investor protections against expropriation by insiders. Their result showed that countries with common law system have greater investor (shareholders and creditors) protection relative to countries with civil law, French civil law being at the bottom of the scale (that is, providing the weakest legal protections of investors). They also stated that public and private institutions are less effective in countries displaying low levels of trust among citizens.

The argument of Engerman and Sokoloff (1997; 2002) was that different development experiences of the countries in the Americas can be explained by initial differences in land endowments and geography suitable for growing crops that can be traded globally. These crops like sugar are best grown on large-scale plantations using slave labour, leading to inequality. Former Spanish colonies in Mexico and Peru had rich endowments of mineral resources, however this further strengthened the tendency towards political and economic inequality. Severe economic and political inequality resulted in the eventual evolution of domestic institutions that preserved the rights of the gentry and constrained the participation of the remaining population.

Government spending and Wagner's Law

The development of an industrial economy will be accompanied by an increased share of public expenditure in gross national product (GNP) states Wagner's law. In other words, the more an economy develops the higher the share of government spending in that economy.

Using Government Financial Statistics data from IMF that covered over 100 countries from 1970-2000, Shelton (2007) looked at cross-sectional and intertemporal variation in government expenditures and both individual categories of expenditure and different levels of government. One of the interesting results found was that Wagner's law was shown to be driven by

demographics in that richer countries are older and spend more on social security than poorer countries.

However, Durevall and Henrekson's (2011) findings were not consistent with Wagner's hypothesis. They carried out a critical appraisal of two contending theories intending to explain long-run government spending: Wagner's law and various versions of the ratchet effect (the idea that government expenditure declines more slowly during a crisis than per capita income so that government spending per unit output rises). Analysing data for two countries, Sweden and the UK, they found that Wagner's law was not a stylized fact for how economies behaved in the long-run although the law seemed to hold reasonably well over a period when the economy goes through a process of modernization.

Mohammadi et al. (2008) using annual data for Turkey over 1950 to 2005 provide strong support for the validity of Wagner's law. They further explain that the law applies primarily to the period of emerging societies and that the underlying premise of the law is based on the role of government as a provider of public goods. From their results, the predictions were clearly reflected in the role of government in Turkey as the Turkish government embarked on a new development strategy designed to improve the infrastructure of the country through an increase in the level of public investment in 1983.

Structural Transformation

Agriculture as a sectoral component of GDP tends to be more important in developing countries as compared to other sectors (industry and services). This could be explained as a result of structural transformation (when a country changes from subsistence agriculture to urban manufacturing and services). Kuznets (1957) explains structural transformation as a shift from

agriculture to other sectors (as a form of urbanization) and a numerous corollaries which the change in mode of life implies; it could also mean a shift from small, individually managed enterprises, to large-scale productive units, often organized in even larger economic management units.

Uniting Kuznets structural transformation idea to the Kaldor stylized facts in that a massive reallocation of labor from agriculture into manufacturing and services will accompany the growth process of a country, Kongsamut, Rebelo and Xie (2001) find that the generalized balanced growth model proposed by them is not consistent with the regularity of this growth process. Although they find evidence of sectoral reallocation of employment out of agriculture into services for all growing countries, they mention that this reallocation of labor out of agriculture has been limited since the 1970's and that the expansion of service employment has slowed down.

In contrast to the results obtained by Kongsamut, Rebelo and Xie (2001), Ngai and Pissarides (2007) found results that are consistent with the long-run evidence of Kuznets. Given the assumption that final goods produced by each sector are not easily substitutable, the differences in total factor productivity (TFP) growth rates across sectors predict sectoral employment changes. Their model predicted that labour would move from the sector with low TFP growth to sectors with high TFP growth.

Duarte and Restuccia (2010) measure sectoral labour productivity across countries using a model of structural transformation. They found productivity differences across countries to be large in agriculture and services and smaller in manufacturing and that production gaps have substantially reduced over time in agriculture and industry but not so much in services. They also found that productivity catch-up in industry explained about 50% of gains in aggregate

productivity across countries but the catch-up in services is low. They stated that the lack of catch-up in services explain all the experiences of slowdown, stagnation and decline observed across countries.

SECTION THREE

DATA

I use data from the World Bank's "World Development Indicators" and Nathan Nunn's "The Long-term Effects of Africa's Slave Trades (2008)" for the purpose of this major research paper.

Data used to construct the dependent variables, which is sourced from the World Development Indicators (WDI) for the year 2000, are grouped into three categories. Before stating the variables used in each category, I first note that I use total GDP per capita adjusted for purchasing power parity (PPP). I use GDP per capita itself in order to compare this paper's result to Nunn's. The first category of dependent variables not studied by Nunn is the expenditure components of Gross Domestic Product (GDP) which consist of household consumption expenditure, government expenditure, and gross fixed capital formation (investment).

The second category is the sectoral components of GDP, consisting of agriculture, industry and services, along with separate variables for manufacturing and total natural resource rents. I also include variables for government spending on health and education as a share of GDP. Total natural resources rents as defined by WDI is the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents and forest rents, calculated as the difference between the price of a commodity and the average cost of producing it.

The last category which consists of only one variable is the net official development assistance (ODA) received as a percentage of Gross National Income (GNI). The net ODA received as described by WDI consists of disbursements of loans made on concessional terms and grants by official agencies of members of Development Assistance Committee (DAC), by multilateral

institutions and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients.

I used the same data for independent variables and the same set of controls used by Nathan Nunn in The Long-term Effects of Africa's Slave Trades (2008). The independent variable is the natural log of the total number of slaves exported between 1400 and 1900 normalized by land area.

The controls include colonizer country fixed effects and other variables that capture country differences such as distance from the equator, longitude, minimum monthly rainfall, average maximum humidity, average minimum temperature, proximity to the ocean measured by the natural log of coastline divided by land area, island and North African country dummies, percentage of Islamic population in a country, French legal origin and country endowment differences (which includes the natural log of the annual average per capita production between 1970 and 2000 of gold, oil and diamonds). Other variables taken from Nathan Nunn's paper include distances from each African country to where slaves were demanded (via the Atlantic, Indian Ocean, Red Sea, and Trans-Saharan slave trades) which are used as instruments.

Although 52 countries were represented in Nathan Nunn's paper, I consider a smaller sample due to insufficient data for the dependent variables. Specifically, data is available for the expenditure, sectoral components of GDP, health spending and net ODA for only 38 countries, and data on education spending is available for only 24 countries.

SECTION FOUR

EMPIRICAL SPECIFICATIONS

I examine the relationship between different components of income and slave exports. The goal of this research is to reproduce the main specifications in Nunn's paper, but with a set of different dependent variables. Therefore, I will introduce four OLS and IV specifications as these are the specifications I use for each dependent variable.

OLS Specification

$$y_i = \beta_0 + \beta_1 \ln(exports_i/area_i) + C_i'\delta + \varepsilon_i \quad (1)$$

$$y_i = \beta_0 + \beta_1 \ln(exports_i/area_i) + C_i'\delta + X_i'\gamma + \varepsilon_i \quad (2)$$

Equations 1 and 2 are the OLS specifications I use in the paper. From the equations, *i* represents individual countries; y_i represents the dependent variables which will later be discussed in detail. $ln(exports_i/area_i)$ is the natural log of the total number of slaves exported between 1400 and 1900 normalized by land area. C_i is a vector of dummy variables that denote the origin of the colonizer before country *i's* independence. X_i is a vector of control variables that are meant to capture differences in countries' geography and climate which were discussed in the previous section. Slave exports per area and all controls in the above equation are as defined in Nathan Nunn's paper. The major difference between specification (1) and (2) is the inclusion of the controls that capture differences in countries' geography and climate.

Instrumental Variable Specification

$$ln(exports_i/area_i) = \vartheta_0 + \vartheta_1(sailing\ distance) + \varepsilon_i \quad (3)$$

$$y_i = \theta_0 + \theta_1 \ln(exports_i/area_i) + \varepsilon_i \quad (4)$$

$$ln(exports_i/area_i) = \vartheta_0 + \vartheta_1(sailing\ distance) + C_i'\varphi + X_i'\mu + \varepsilon_i \quad (5)$$

$$y_i = \theta_0 + \theta_1 \ln(exports_i/area_i) + C_i'\varphi + X_i'\mu + \varepsilon_i \quad (6)$$

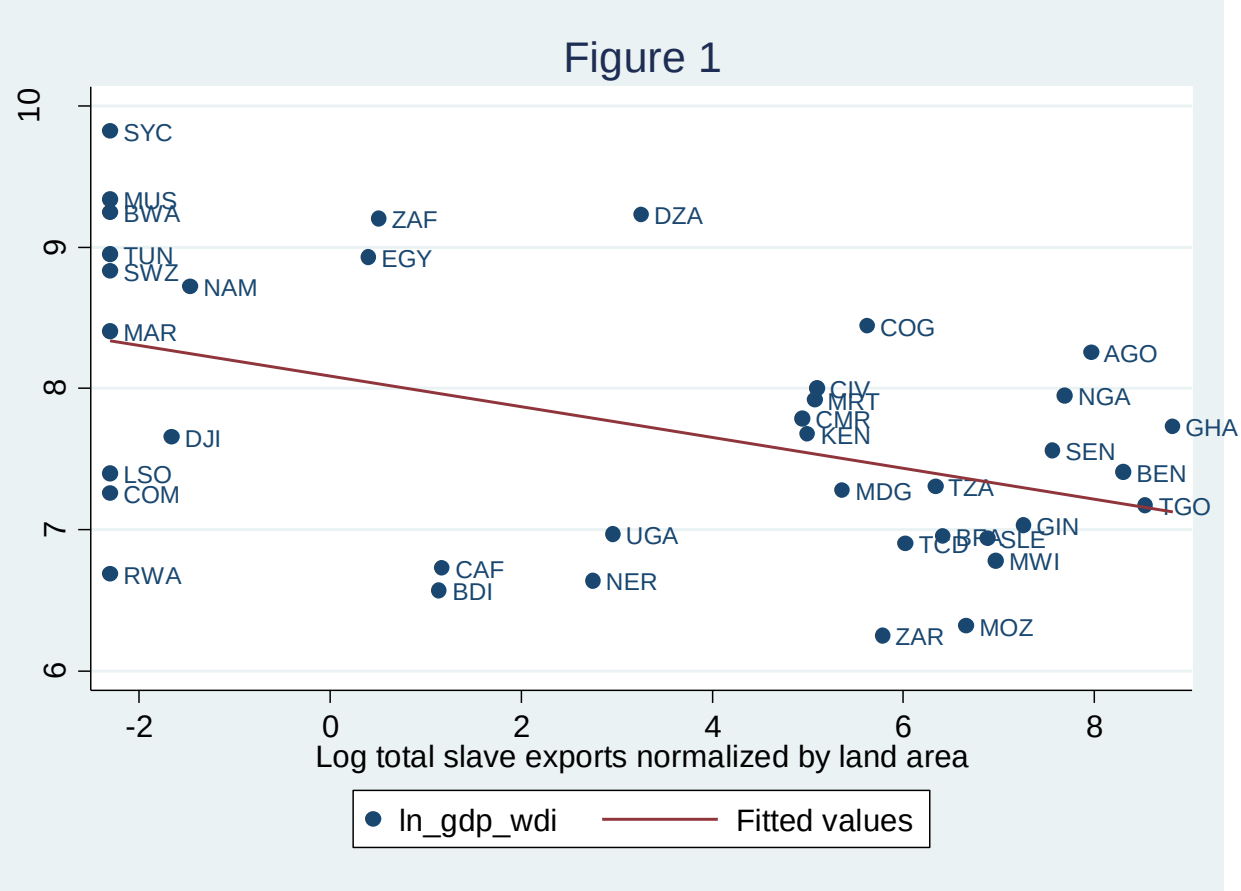
The above equations are instrumental variable (IV) specifications. The first-stage equations are (3) and (5) while equations (4) and (6) are the second-stage specifications.

Sailing distance is the instrument for exports per area. The instruments measure the distance from each country to the most important destinations in each of the slave trades (Atlantic, Indian Ocean, trans-Saharan, and Red Sea slave trades). The exclusion restriction is that sailing distance does not appear in equations (4) and (6) because it does not directly affect income except through slave exports. Nunn's argument was that the location of demand for slaves influenced the location of supply but the location of supply did not influence the location of demand for slaves. Using various examples to back up his argument, he noted that the demand for slaves in Africa were determined by a number of factors, all unrelated to slave supply.

The dependent variables are expenditure components of GDP (consumption, government spending and investment), sectoral components of GDP (agriculture, industry and services along with separate variables for manufacturing and total natural resources rents), health and education spending, and net ODA. OLS and IV regressions will be estimated in log levels and in shares for all dependent variables except health and education spending, for which I only use shares. All dependent variable data are sourced from World Bank as discussed in the previous section.

SECTION FIVE

RESULTS



The figure above shows the relationship between income and slave exports for the 38 countries in my main sample. The y-axis is the natural log of GDP per capita while the x-axis is the natural log of slave exports per area. I use GDP data from World Bank, differently from Nunn who used income data from Maddison (2003). I also consider a smaller sample (38 countries) relative to the 52 countries used by Nunn in his paper. Despite these differences, the graph shows a negative relationship between income and slave exports as seen in Nunn's paper.

TABLE I
COMPARISON BETWEEN NUNN'S RESULT AND THIS PAPER'S

	DEPENDENT VARIABLE: GDP	
	NUNN	THIS PAPER
PANEL A: OLS *with colony controls*		
ln (export/area)	-0.112	-0.116
	[0.024]	[0.033]
PANEL B: OLS *with full controls*		
ln (export/area)	-0.103	-0.103
	[0.034]	[0.043]
PANEL C: IV		
ln (export/area)	-0.208	-0.2
	[0.053]	[0.053]
PANEL D: IV *with full controls*		
ln (export/area)	-0.286	-0.321
	[0.153]	[0.194]

Notes. OLS and IV estimates reported. The dependent variable is the natural log of GDP per capita in 2000. Nunn's paper used 52 countries which data was sourced from Maddison (2003) but this paper uses 38 countries, data sourced from WDI. The figures in brackets are robust standard errors.

Table I presents the results generated by Nunn and this paper. For all tables, Panels A and B are OLS estimates and Panels C and D are IV estimates. Panel A estimates are inclusive of colonizer fixed effects. Panel B estimates includes the full controls (colonizer fixed effects and other controls that capture differences in countries' geography and climate). Panel C estimates have no controls while Panel D estimates use full controls.

Despite the differences between the datasets used, I find similar results to Nunn's in terms of both coefficient estimates and standard errors. As shown by the results, there is a negative and significant relationship between slave trade and current economic performance. However it should be noted that for this paper, the IV estimate becomes insignificant when all controls are introduced in Panel D.

TABLE II

RELATIONSHIP BETWEEN SLAVE EXPORTS AND COMPONENT LEVELS OF GDP

	DEPENDENT VARIABLES		
	CONSUMPTION	GOVERNMENT	INVESTMENT
PANEL A: OLS *with colony controls*			
ln (export/area)	-0.102	-0.19	-0.153
	[0.023]	[0.038]	[0.051]
PANEL B: OLS *with full controls*			
ln (export/area)	-0.084	-0.247	-0.099
	[0.034]	[0.061]	[0.071]
PANEL C: IV			
ln (export/area)	-0.17	-0.283	-0.251
	[0.043]	[0.058]	[0.073]
PANEL D: IV *with full controls*			
ln (export/area)	-0.202	-0.512	-0.364
	[0.116]	[0.244]	[0.234]

Notes. OLS and IV estimates are reported for the component levels of GDP. The dependent variables are natural log of consumption expenditure, government expenditure and investment for the year 2000 for 38 countries. The figures in brackets are robust standard errors.

Table II shows the relationship between slave exports and expenditure component levels of GDP which is the natural log of consumption expenditure, government expenditure and investment. The result above is in line with the basic Nunn results in that the OLS and IV estimates show a negative relationship between each of the expenditure components of GDP and slave exports. The OLS and IV estimates for all variables are statistically significant with the exception of investment which becomes insignificant when all controls are added in the OLS and IV estimates (Panel B and Panel D).

TABLE III

RELATIONSHIP BETWEEN SLAVE EXPORTS AND COMPONENT SHARES OF GDP

	DEPENDENT VARIABLES		
	CONSUMPTION	GOVERNMENT	INVESTMENT
PANEL A: OLS *with colony controls*			
ln (export/area)	0.784	-1.145	-0.529
	[0.910]	[0.346]	[0.374]
PANEL B: OLS *with full controls*			
ln (export/area)	0.496	-2.022	-0.46
	[0.984]	[0.462]	[0.472]
PANEL C: IV			
Slave export/area	1.674	-1.434	-0.636
	[1.089]	[0.464]	[0.452]
PANEL D: IV *with full controls*			
ln (export/area)	6.058	-3.142	0.588
	[4.688]	[1.434]	[1.057]

Notes. OLS and IV estimates are reported for the component shares of GDP. The dependent variables are component (consumption expenditure, government expenditure and investment) share of GDP for the year 2000 for 38 countries. The figures in brackets are robust standard errors.

The fact that the results in Table II follow straightforwardly from the basic Nunn results hides a more nuanced picture in terms of composition (shares). For this reason, Table III examines the effects of slave trades on expenditure component shares of GDP. From these estimates, the effect on consumption expenditure share and investment share are not significant, but for government expenditure share the effect is statistically significant and negative. This result suggests that countries that were more involved in slave exports have lower government expenditure shares. When slave exports per land area are instrumented by sailing distances in Panel C and D, the results generated are similar to the OLS estimates. With and without controls, the effects on consumption expenditure share and investment share are not significant, but the impact on government expenditure share remains significant and negative in both cases.

A one percent increase in slave exports yields approximately a 1.15 percentage point decrease in government expenditure share in Panel A, 2.02 percentage point decrease in Panel B, 1.43 percentage point decrease in Panel C and 3.14 percentage point decrease in Panel D. It should be noted that all the estimates for government expenditure shares above are statistically significant. Since my argument is that countries affected greatly by slave trades are less developed today, this result is consistent with Wagner's law that less developed countries spend a smaller share of GDP on government purchases.

TABLE IV
RELATIONSHIP BETWEEN SLAVE EXPORTS AND PUBLIC EXPENDITURE ON HEALTH AND EDUCATION (SHARE)

	DEPENDENT VARIABLES	
	HEALTH	EDUCATION
PANEL A: OLS *with colony controls*		
ln (export/area)	-0.126	-0.299
	[0.045]	[0.162]
PANEL B: OLS *with full controls*		
ln (export/area)	-0.075	-0.116
	[0.077]	[0.288]
PANEL C: IV		
ln (export/area)	-0.274	-0.482
	[0.097]	[0.152]
PANEL D: IV *with full controls*		
ln (export/area)	-0.265	-0.283
	[0.220]	[0.357]

Notes. OLS and IV estimates are reported for public expenditure on health and education shares. The dependent variables are public expenditure of health and education as a percentage of GDP for the year 2000. 38 countries are represented in the Health column while only 24 countries are represented in Education. The figures in brackets are robust standard errors.

The negative relationship between slave exports and government spending shares is reflected in the share of government expenditure on health and education. Table IV reports estimates of the relationship between slave exports and public expenditure shares of health and education. It

should be noted that data for 38 countries was available for public spending on health as a share of GDP but data for only 24 countries was available for public expenditure on education as a share of GDP.

The estimates in Panels A and C (OLS and IV) of Table IV are statistically significant and negative. However, when full controls are introduced, the OLS and IV estimates in Panels B and D become insignificant. A one percent increase in slave exports reduces government expenditure on health by approximately 0.13 percentage points (OLS) or 0.27 percentage points (IV). Also, a one percent increase in slave exports decreases government spending on education by approximately 0.3 percentage points (OLS) or 0.48 percentage points (IV).

The result above provides weak evidence that countries affected by high slave exports spend less on health and education as a share of GDP. Health and education are very important in the quality of human capital in a country. Less spending on health and education by the government in a country means less spending on human capital investment by the government of that country.

TABLE V

RELATIONSHIP BETWEEN SLAVE EXPORTS AND SECTORAL COMPONENT LEVEL OF GDP

	DEPENDENT VARIABLES				
	AGRICULTURE	INDUSTRY	SERVICES	MANUFACTURING	RENTS
PANEL A: OLS *with colony controls*					
ln (export/area)	0.005	-0.117	-0.16	-0.148	0.119
	[0.027]	[0.046]	[0.036]	[0.056]	[0.061]
PANEL B: OLS *with full controls*					
ln (export/area)	0.046	-0.143	-0.112	-0.082	0.033
	[0.038]	[0.055]	[0.057]	[0.075]	[0.079]
PANEL C: IV					
ln (export/area)	-0.006	-0.23	-0.256	-0.253	0.067
	[0.046]	[0.075]	[0.054]	[0.082]	[0.094]
PANEL D: IV *with full controls*					
ln (export/area)	-0.055	-0.488	-0.295	-0.255	-0.424
	[0.117]	[0.303]	[0.162]	[0.190]	[0.398]

Notes. OLS and IV estimates are reported for the sectoral components levels of GDP. The dependent variables are natural log of agriculture, manufacturing, industry, services and total natural resource rents for the year 2000 for 38 countries. The figures in brackets are robust standard errors.

Table V shows the relationship between slave exports and sectoral component levels of GDP which is the natural log of agriculture, industry and services production along with separate variables for manufacturing and services. Industry and services estimates are in line with the basic Nunn results in that the OLS and IV estimates show a negative relationship between slave exports and production in industry and services. The OLS and IV estimates for industry and services are statistically significant with the exception of industry becoming insignificant in Panel D when full controls are used in the IV estimates. Manufacturing which is a component of industry also has a negative relationship with slave exports. Its coefficient estimates are significant in Panels A and C but become insignificant when all controls are included in Panels B and D.

However, agriculture does not show a particular pattern looking at both OLS and IV estimates. The estimates for agriculture are also not significant indicating that the size of the agricultural sector in these countries is unrelated to slave exports. Total natural resources rents on the other hand have a positive relationship with slave trades (except that it becomes negative in the IV estimates in Panel D). This means that more slave exports leads to more rents from total natural resources. However, it should be noted that the estimates for total natural resources rents are only significant in Panel A.

TABLE VI
RELATIONSHIP BETWEEN SLAVE EXPORTS AND SECTORAL COMPONENT SHARE OF GDP

	DEPENDENT VARIABLES				
	AGRICULTURE	INDUSTRY	SERVICES	MANUFACTURING	RENTS
PANEL A: OLS *with colony controls*					
ln (export/area)	1.88	-0.02	-1.86	-0.551	1.294
	[0.537]	[0.501]	[0.487]	[0.388]	[0.489]
PANEL B: OLS *with full controls*					
ln (export/area)	2.158	-1.18	-0.978	-0.265	-0.239
	[0.963]	[0.743]	[0.904]	[0.595]	[0.937]
PANEL C: IV					
ln (export/area)	3.328	-0.852	-2.475	-0.797	1.002
	[0.737]	[0.811]	[0.731]	[0.484]	[0.696]
PANEL D: IV *with full controls*					
ln (export/area)	4.595	-5.211	0.616	-0.178	-2.854
	[2.759]	[4.002]	[2.350]	[1.256]	[3.824]

Notes. OLS and IV estimates reported for the sectoral components share of GDP. The dependent variables agriculture, manufacturing, industry, services, and total natural resource rents as a share of GDP for the year 2000 for 38 countries. The figures in brackets are robust standard errors.

As explained when interpreting Table III, log level hides a more nuanced picture in terms of composition (shares). Table VI examines the effects of slave exports on sectoral component

shares of GDP. An interesting finding here is that the effect on the agriculture share in GDP is positive and significant in all panels with the exception of Panel D (with a p-value of 0.108). So the share of agriculture in GDP is larger when slave exports increases. Since my argument is that countries greatly affected by slave exports are less developed today, it follows that countries with more slaves exported are more agriculture dependent which seems to be the true picture across African countries. Countries with fewer slave exports, on the other hand, are experiencing structural transformation explained by Kuznets (1951) as a shift from agriculture to other sectors (industry and services).

This means that we should also expect a negative relationship between slave exports and the share of industry and services in GDP. The coefficient for industry remains negative but insignificant in all panels. The coefficient for services is negative in Panels A to C but becomes positive in Panel D. However, the estimates are only significant in Panels A (OLS) and C (IV) but become insignificant when all controls are added in Panels B and D. Manufacturing estimates are also negative and insignificant like the industry estimates in all panels. Total resources rents however do not show any particular pattern looking at all panels and the estimated effect is only significant in Panel A.

TABLE VII

RELATIONSHIP BETWEEN SLAVE EXPORTS AND AID (SHARE AND LEVEL)

	DEPENDENT VARIABLES	
	LEVEL	SHARE
PANEL A: OLS *with colony controls*		
ln (export/area)	-0.009	0.541
	[0.046]	[0.315]
PANEL B: OLS *with full controls*		
ln (export/area)	-0.08	0.239
	[0.076]	[0.615]
PANEL C: IV		
ln (export/area)	-0.024	0.727
	[0.051]	[0.365]
PANEL D: IV *with full controls*		
ln (export/area)	-0.234	0.526
	[0.139]	[1.144]

Notes. OLS and IV estimates reported for net official development assistance in log levels and as a percentage of GNI. The dependent variable is the share and log level of net ODA for the year 2000 for 38 countries. The figures in brackets are robust standard errors.

Table VII shows the relationship between slave exports and net official development aid (ODA) received by a country in both log levels and shares. Based on my hypothesis, I expect that countries with more slave exports which are less developed today, should be more dependent on aid. The coefficient estimates for the levels in natural logs are insignificant in all panels. The coefficient estimates for the shares of net ODA are only significant at the 10% levels in Panels A and C and insignificant in Panels B and D. The results are in opposition to my hypothesis that more slave export countries, which are less developed today, are more dependent on aid because I find no relationship between slave trade and aid.

SECTION SIX

CONCLUSION

Combining data from World Bank's "World Development Indicators' and Nunn's "The Long-Term Effects of Africa's Slave Trades" (2008), I estimate the impact of Africa's slave trades on current development in 38 countries using Nunn's paper as my major reference. I find a robust negative and significant relationship between slave exports and current development in the OLS and IV estimates despite the differences in data source and number of countries used in my paper compared to Nunn's.

I estimate regressions with three categories, two of which are made up of different components of GDP. The first category which consists of household consumption expenditure, government expenditure and investments is the expenditure components of GDP. I also include variables for government spending on health and education. The second category is the sectoral components of GDP and it consists of agriculture, industry and services along with separate variables for manufacturing and total natural resources rents. The third category consists of only the net official development assistance (ODA) to a country.

I find three main results supporting the argument that countries that were largely affected by slave exports are less developed today. Firstly, countries with more slaves exported during the slave trades spend a smaller share of GDP on government purchases. This is a prediction of the Wagner's law which states that the development of a country is accompanied by an increased share of public spending. I also find weak evidence that public expenditure on health and education is low which indicates low investment in human capital. Secondly, I find that countries more affected by slave exports are more agriculture dependent. These countries have not

experienced structural transformation defined by Kuznets (1957) as a shift from agriculture to other sectors (industry and services) of the economy. Lastly, I find no evidence that countries that experienced more slave exports, which are less developed today, are more dependent on aid (official development assistance).

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