INTERMEDIATE DEVELOPMENT
ECONOMICS (EC2303)
STOCKHOLM UNIVERSITY
FALL 2021

Natural Resources Rents and Quality of Institutions

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Motivation: Natural resources rents around the world

- The distribution of natural resources rents to alleviate poverty

- There has been considerable research regarding the relationship between natural resource abundance and economic growth, and association between natural resource abundance and prevalence of poverty. The abundance of natural resources is supposed to be a comparative advantage, but this is not enough to alleviate poverty. It is necessary for government entities to allocate this wealth to satisfy the basic needs of the population.

- This project examines the question whether natural resources rents have helped to reduce poverty in countries with natural resource abundance, while the second objective is to examine the long-run association between slavery and quality of institutions.

NO MATTER HOW GREAT POVERTY IS IN PERU, IT WILL ALWAYS BE DIFFICULT FOR PERUVIAN INSTITUTIONS TO DECIDE IN WHAT TO INVEST THE MINING CANON.

Peruvian case: The distribution of mining canon

- Local governments receive a mining transfer, called canon minero, funded with a share of the corporate taxes paid by the mine. The canon is distributed exclusively among local governments in the department where the mines are located (Aragon and Rud, 2013).

- "Peru is the second largest producer of copper and silver in the world. It is the leading gold, zinc, tin, lead and molybdenum producer in Latin America. Peru is of potential geological importance: it is the country with the largest silver reserves in the world, the second in molybdenum, copper and zinc reserves; and the sixth in gold reserves" (MINEM, 2016).

- Despite this comparative advantage in mineral resources, the inequality of opportunities significantly affects Peruvians who come from abundance mineral resource regions.

RESEARCH QUESTION:

- **Have natural resource rents contributed to improving the quality of life in countries with abundant natural resources?**

- **Is there a long-term consequence of Mining Mita forced labor on the quality of peruvian institutions?**

THE PERSISTENT EFFECTS OF PERU'S MINING MITA BY MELISSA DELL

Research question of the paper: What are the long-term consequences of colonial institutions in Peru?

The study focuses on studying the effect today of forced labor carried out by indigenous communities on colonial mining during the 16th and 19th centuries.

THE PERSISTENT EFFECTS OF PERU'S MINING MITA

By Melissa Dell

- The mining mita was a colonial institution that forced more than 200 communities, within the area outlined in black on the map, to send 1/7 of their adult population to work in mines such as those of Potosí and Huancavelica.

Methodology

- Taking into account that the geographical borders of the Mita were well-defined, Dell analyzed the effect of this institution using a spatial version of a discontinuous regression model.

The sample

- Dell focuses on communities located in the southern highlands of the country around the Arequipa, Ayacucho, Cuzco and Apurimac regions (gray border of the map) because the geographic conditions around this part of the border are reasonably similar.

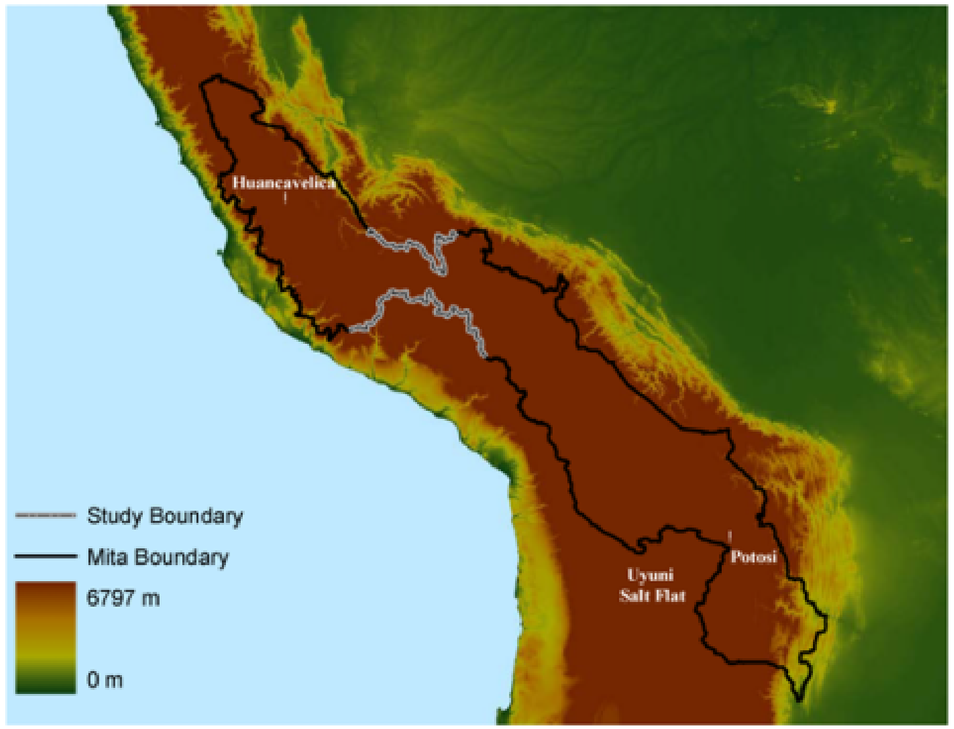

FIGURE 1.—The *mita* boundary is in black and the study boundary in light gray. Districts falling inside the contiguous area formed by the *mita* boundary contributed to the *mita*. Elevation is shown in the background.

Source: Dell (2010)

THE PERSISTENT EFFECTS OF PERU'S MINING MITA
By Melissa Dell

- The main idea is that at the time, the great difference between the communities around the border in that area was whether they were under the jurisdiction of the Mita. In other words, Dell compares 'statistically equal' communities, whose only difference in the past was the Mita.
- Dell tries several things, to measure the distance to the Mita apart from the distance to the edge: polynomial functions of latitude and longitude, distance to the mine in Potosí, etc.

Findings

- The areas within the Mita constituency have a long-term response (today: three centuries later): less infrastructure, less education, less consumption and income, greater social violence, stunting childish.
- History and institutions matter.
- The social, economic and political results in Peru today are strongly related to the colonial heritage.

ANALYSIS APPROACH:

Data

- The empirical analysis combines household data with municipality information about miningrents transfers to districts municipalities for the year period between 2008 and 2014. For households, we use repeated cross sections of the Peruvian Living Standards Survey (ENAHO), an annual household survey collected by the National Statistics Office (INEI). We use the dataset generated by Sebastian Sardons. The survey consists of a stratified household sample representative at the regional level. We focus on: Apurimac, Arequipa, Cusco, and Puno region, this regions are also included in Dell's paper. The geographic conditions around this regions are similar, districts of these regions receive mining canon transfers, and many of these districts were involved in the mining mita in the past. The main outcome variable is income, which has been deflated using the poverty line.

Observation:

- The database generated by Sebastian's Sardons contains all the variables of interest that we will use for the analysis at the household level.
- Municipality information about mining rents transfer, municipality income, and expenditure is collected from "Consulta Amigable" (MEF, Peru).

EXTENT THE ANALYSIS TO STUDY:

1. The Long-term effect of the Peruvian Mita on economic development.

2. The effect of mining rents in reducing inequality of opportunity amongn abundant mineral resources districts.

MAIN VARIABLES

To quantify quality of institutions perspective, we construct a “Trust in Government Index that goes from 0 to 1”. We propose Trust in Government Institutions Index, for which the following variables were considered to be the most relevant in determining the citizens' trust in all civic, public, political and governmental structures. The following variables were measured in Peru, and the “Transparency and Governance Survey” is generated by the INEI.

* p1_01: Trust in National Elections Jury
* p1_02: Trust in Elections
* p1_03: Trust in National registry of identification and civil status
* p1_04: Trust in Provincial municipality
* p1_05: Trust in Distrital municipality
* p1_06: Trust in National Police
* p1_07: Trust in Armed Forces
* p1_08: Trust in Regional Government
* p1_09: Trust in Judicial System
* p1_10: Trust in Ministry of Education
* p1_11: Trust in Defensoría del Pueblo
* p1_12 Trust in Congress of the republic
* p1_13: Trust in Political Parties
* p10_2: Respect for equality before the law
* p10_3: Respect for Political freedom
* p10_4: Respect for transparent elections

See BuildTrustIndex script for more details.

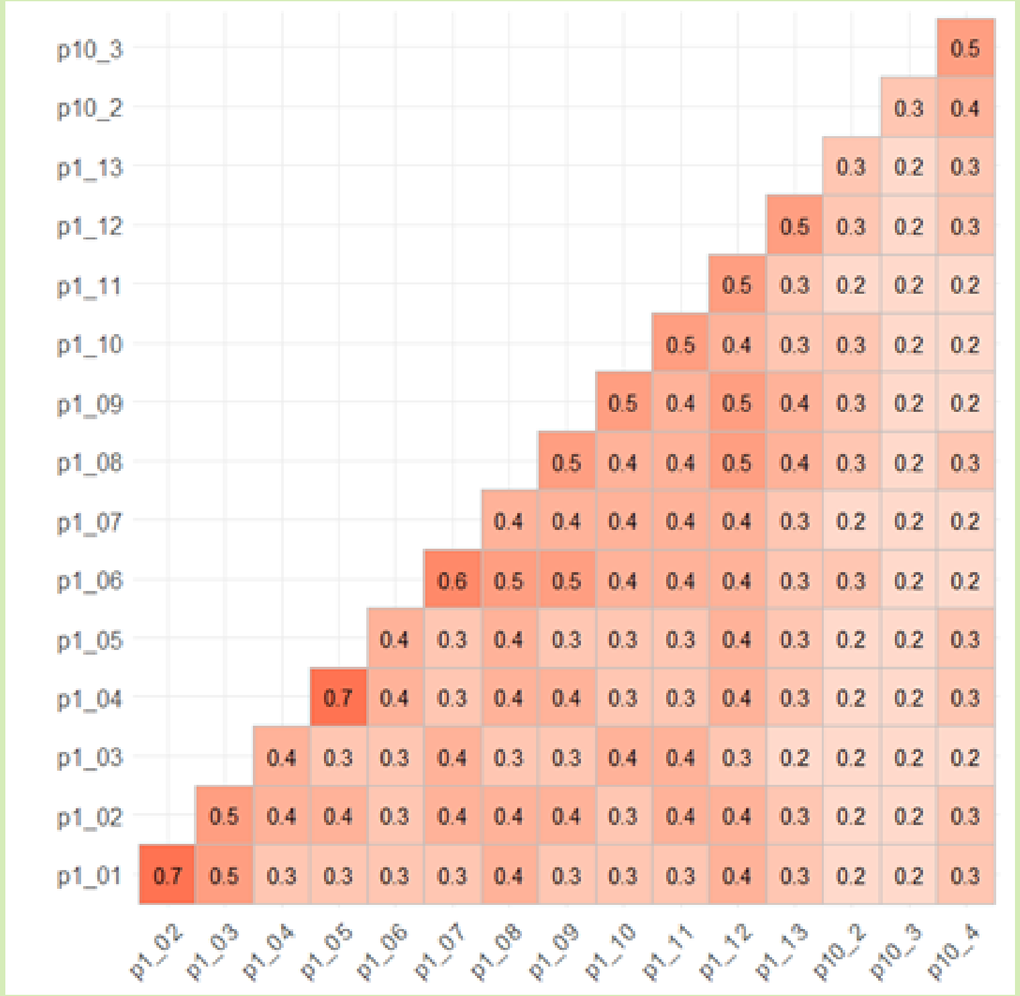

Figure: Correlation Matrix

MAIN VARIABLES AND ANALYSIS

Mining canon per capita : Canon_p = canon/population/1000 = $Canon_{it}$

- The amount of mining rent that the resident of a district receives on average in a given year.

Trust in gouvernent Indicator : govinst = $\boldsymbol{Inst_{it}}$

Years of Education : $\boldsymbol{educ} = \boldsymbol{Educ_{it}}$

-Years of individuals education.

Mita Dummy : mita = $Mita_{it}$

- It is an indicator equal to one if people live in a district that contributed to the mita and equal to 0 otherwise.

Native : born_here = $Native_{it}$

- It is an indicator equal to one if the individual was born in the district in which they currently live.

Poor : poor = $Poor_{it}$

- Poor is a dummy equal to one if household is poor.

CONTROL VARIABLES

Rural : $Rural_{it}$

- It is an indicator equal to one if the person lives in a rural district.

Experience: $Experience_{it}$

- Labor experience.

Electricity: $Electricity_{it}$

- If the household has electricity

Water : $Water_{it}$

-If the household has drinking water in their home.

Isfemale: $Female_{it}$

-It is an indicator equal to one if the district resident is a woman.

EMPIRICAL EXCERSISE:

- The aim of the empirical exercise is to evaluate the long-term effect of the mita on measures of living standards, such as real income, or nominal income. While the second objective is to examine the interaction effect between natural resources rents and institutions on real or nominal income.

We follow Mohtadi (2020) model :

$$QAHC_{it} = a + \beta_1.Rent_{it} + \beta_2.Inst_{it} + \beta_3 Z_{it} + \beta_4\,(Rent_{it} * Inst_{it}) + \delta + \varepsilon_{it}$$

- Where, QAHC is the quality-adjusted human capital, Rent is the share of total natural resources rents in GDP, Inst is the average quality of institutional indicators, and Z stands for the vector of control variables including GDP per capita, population growth, GDP growth, total government expenditure and Gini index.
- **Prediction:** natural resources rents are harmful to human capital only when the institutional quality is poor.
- **Limitations:** We do not have a proxy variable for human capital, our approach is to use a measure of living standards, such as nominal income per capita as a dependent variable.

THE FOLLOWING EMPIRICAL STRATEGY IS ESTIMATED:

Model 1: Ln Nominal Income Per Capita as dependant variable

$$Ln(Y) = a + B_1 Canon_{it} + B_2 Inst_{it} + B_3 Z_{it} + B_4 (Canon_{it} * Inst_{it}) + B_5 Educ_{it} + B_6 Educ_{it} * Mita_{it} + \delta + \varepsilon$$

- **Hypothesis 1:** $B_4 < 0$ (natural resources rents negatively affects districts population development when the institutional quality is not good enough) .

- **Hypothesis 2:** $B_6 < 0$ (Mita mining slavery negatively affect districts population income)

Model 2 : Ln Nominal Income Per Capita as dependant variable

$$Ln(Y) = a + B_1 Rent_{it} + B_2 Inst_{it} + B_3 Z_{it} + B_4 (Rent_{it} * Inst_{it}) + B_5 Educ_{it} + B_6 (Educ_{it} * Native_{it}) + \delta + \varepsilon$$

- Hypothesis 3: $B_6 < 0$ (The sample selected by Melissa Dell only includes districts rich in mineral resources. Due to the negative effects of mining, we expect low educational mobility for people who were born in those districts.)

Model 3 : Ln Real Income Per Capita as defendant variable

$$Ln(Y) = a + B_1 Rent_{it} + B_2 Inst_{it} + B_3 Z_{it} + B_4 (Rent_{it} * Poor_{it}) + B_5 Educ_{it} + B_6 (Educ_{it} * Native_{it}) + B_7 (Inst_{it} * Mita_{it}) + \delta * \varepsilon$$

Hypothesis 5: $B_7 < 0$ (We expect a negative effect of the Mita on the institutions of the districts that were subjected to forced labor in the past.)

TABLE 1

- Relation between education years and nominal income is positive and significant at 1% percent level.
- Relation between poor households and nominal income is negative and significant at 1% in all the models.
- The education has a negative effect in nominal income if the individual lives in a district that contributed to the mita. The coefficient is significant at 5%.
- Relation between rural household and income is negative. The coefficient is significant at 1%
- The education has a negative effect in nominal income if the individual born in the district in which they currently live

Notes: All regressions include year and district fixed effects. The full set of control variables includes household head's labor experience, gender, plus household access to water, electricity, and an indicator of rural household.. Standard errors are clustered at district level.

Variables	(1)	(2)	(3)
	Ln Nominal Income Per Capita		
Canon	0.0928	0.0921	0.0363
	(0.107)	(0.107)	(0.0556)
GovInst	0.0966	0.0871	0.0264
	(0.0830)	(0.0829)	(0.129)
Canon x GovInst	-0.169	-0.172	
	(0.376)	(0.377)	
Educ	0.0622***	0.0579***	0.0579***
	(0.00617)	(0.00453)	(0.00455)
Educ x Mita	-0.0135**		
	(0.00623)		
Poor	-0.839***	-0.832***	-0.835***
	(0.0413)	(0.0413)	(0.0459)
Rural	-0.280***	-0.259***	-0.258***
	(0.0506)	(0.0482)	(0.0483)
Experience	0.00654***	0.00648***	0.00650***
	(0.00120)	(0.00120)	(0.00120)
Electricity	0.0733	0.0701	0.0705
	(0.0666)	(0.0658)	(0.0657)
Water	0.0268	0.0266	0.0267
	(0.0496)	(0.0491)	(0.0492)
Female	-0.0445	-0.0400	-0.0394
	(0.0314)	(0.0317)	(0.0321)
Educ x Native		-0.00873***	-0.00875***
		(0.00321)	(0.00322)
Canon x Poor			0.0332
			(0.140)
GovInst x Mita			0.0726
			(0.160)
Constant	5.217***	5.222***	5.226***
	(0.101)	(0.0981)	(0.0980)
Observations	7,231	7,231	7,231
R-squared	0.563	0.565	0.565
Districts FE	YES	YES	YES
Year FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

DEPENDANT VARIABLE: LN REAL INCOME PER CAPITA

Model 1 :

$$Ln(Y) = a + B_1 Canon_{it} + B_2 Inst_{it} + B_3 Z_{it} + B_4 (Canon_{it} * Inst_{it}) + B_5 Educ_{it} + B_6 (Educ_{it} * Mita_{it}) + \delta + \varepsilon$$

Model 2 :

$$Ln(Y) = a + B_1 Canon_{it} + B_2 Inst_{it} + B_3 Z_{it} + B_4 (Canon_{it} * Poor_{it}) + B_6 (Inst_{it} * Mita_{it}) + B_7 Educ_{it} + B_8 Educ_{it} * Mita_{it} + \delta + \varepsilon$$

TABLE 2

- Relation between mining rents and real income is not significant.
- The education has a negative effect in real income if the individual lives in a district that contributed to the mita. The coefficient is significant at 5%.
- Relation between rural household and income is negative. The coefficient is significant at 1%
- The education has a negative effect in real income if the individual born in the district in which they currently live.
- Relation between labor experience and real income is positive. The coefficient is significant at 1%

Notes: All regressions include year and district fixed effects. The full set of control variables includes household head's labor experience, gender, plus household access to water, electricity, and an indicator of rural household. Standard errors are clustered at district level.

Variables	(1) Ln Real Income per capita	(2) Ln Real Income per capita
Canon	0.0957	0.0367
	(0.108)	(0.0566)
GovInst	0.0981	0.0300
	(0.0828)	(0.129)
Canon x Poor		0.0338
		(0.137)
GovInst x Mita		0.0680
		(0.160)
Education	0.0618***	0.0574***
	(0.00620)	(0.00452)
Education x Native		-0.00850***
		(0.00319)
Poor	-0.840***	-0.837***
	(0.0410)	(0.0455)
Rural	-0.159***	-0.138***
	(0.0477)	(0.0456)
Experience	0.00651***	0.00647***
	(0.00118)	(0.00119)
Electricity	0.0817	0.0787
	(0.0650)	(0.0641)
Water	0.0242	0.0241
	(0.0497)	(0.0492)
Female	-0.0459	-0.0409
	(0.0312)	(0.0319)
Canon x GovInst	-0.177	
	(0.368)	
Education x Mita	-0.0134**	
	(0.00625)	
Constant	-0.142	-0.132
	(0.100)	(0.0977)
Observations	7,231	7,231
R-squared	0.519	0.521
Districts FE	YES	YES
Year FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Discussion

- We expected the effect of institutional quality to be negative for the districts subjected to the mita. The opposite happens, we find a positive relationship between the interaction $GovInst_{it} * Mita_{it}$. Although, the coefficient is not significant.

- We find that the effect of mining rents is negative for income when interacting with the quality of the institution. However, the effect is not significant in any of the models.
- In table 2 we can perceive the significant effect of education on real per capita income. This variable has a negative effect not only through forced labor "mita", but when interacting with the variable "Native" that indicates whether the individual is originally from any of the districts of the sample, a negative effect is perceived in the income. This reflects inequality of opportunities in the 5 regions of the sample.

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Districts FE	YES	YES
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Robust standard errors in parentheses
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THE BLESSING OF BAD GEOGRAPHY IN AFRICA BY NATHAN NUNN AND DIEGO PUGA

Power of borders and bureaucracy

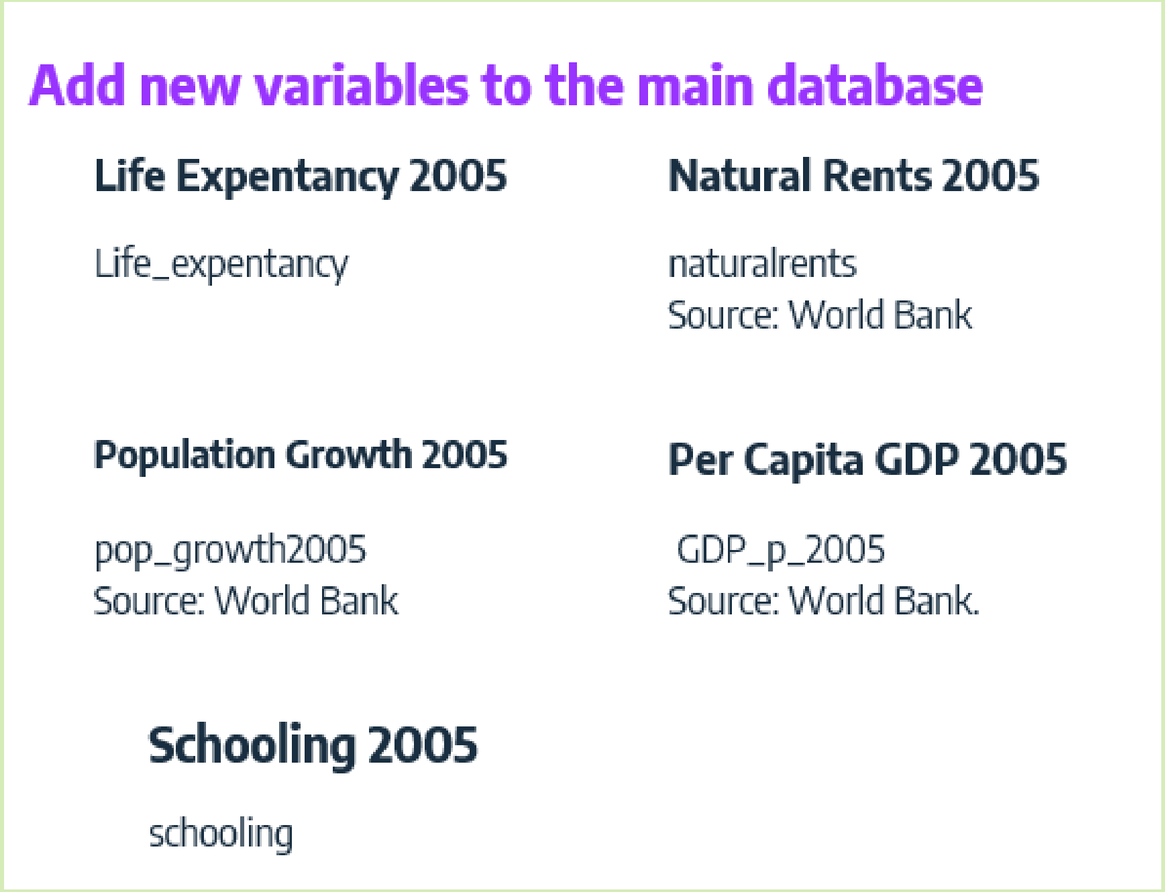
- The concept of institutional friction, also known as path dependency, refers to a phenomenon that takes place within institutions, causing them to behave in a set manner. This is due to the fact that institutions evolve into self-sustaining systems, that maintain a set of functions that it has defined for itself. As such institutions tend not to be prone to natural change, but rather a disruption of its continuity must take place, a phenomenon known as a window of change, that is capable of defining a new path for the institution.

- Nunn and Puga hypothesize that if the environment is not suited for assimilation into the slave markets of Africa, such institutions that serve in the enslaving of the populace would not have been crafted as such, heightening the quality of domestic institutions of such areas today. And if difficult terrain were to make acquiring slave economically unsound, such areas should be better of than their counterparts

Analysis Approach

We select 2005 period to study the long-term effects of ruggedness in the life expectancy. It is necessary to download other development indicators variables: GDP per capita, and population growth.

Also, we are interested on the natural rents effect. If through the income of natural resources, the quality of life of people can be improved.



Is the association between natural rents and life expectancy negative due to slavery in the past?

Model 1

$$LifeExpentancy_i = a + B_1 Rents_i + B_2 Inst_i + B_3 (Rents_i * ContAfrica_i) + B_5 Z_i + \varepsilon_i$$

Hypothesis 1: $B_3 < 0$ (Natural Resources have a negatively affects life expentancy only for Africa continent) .

IS THE ASSOCIATION BETWEEN NATURAL RENTS AND LIFE EXPECTANCY NEGATIVE DUE TO SLAVERY IN THE PAST?

Model 2:

$$LifeExpentancy_i = a + B_1 Rents_i + B_2 Inst_i + B_3(Rents_i * ContAfrica_i) + B_4(Rents_i * Inst_i) + B_5 Z_i + \varepsilon_i$$

- **Hypothesis 2**: $B_4 < 0$ (Natural resource rents negatively affect the life expectancy of a country when the quality of institutions is very poor.) .

TABLE 3

"Our results show a negative association between natural resource rents and life expectancy."

VARIABLES	(1) Life Expectancy	(2) Life Expectancy	(3) Life Expectancy
Natural Rents	-0.0695***	-0.0549**	-0.0531**
	(0.0212)	(0.0218)	(0.0213)
Rule of Law	0.436	0.920	0.844
	(0.774)	(0.822)	(0.816)
NaturalRents x ContAfrica	-0.0101	0.0497	0.0595
	(0.106)	(0.103)	(0.111)
Naturalrents x Rule of Law		-0.00871	
		(0.0184)	
Slave export intensity	-0.0600	-0.359	-0.350
	(0.475)	(0.453)	(0.425)
Schooling	0.108	0.0639	0.0621
	(0.146)	(0.143)	(0.145)
LnGDP	3.004***	2.557***	2.569***
	(0.583)	(0.637)	(0.643)
Population Growth 2005	-0.120	-0.132	-0.148
	(0.143)	(0.153)	(0.145)
Rugged	0.308	0.285	0.279
	(0.255)	(0.266)	(0.263)
Rugged x Africa	-0.472	-1.210	-1.200
	(1.477)	(1.401)	(1.403)
Cont Africa	-8.155*	-4.866	-4.887
	(4.157)	(4.202)	(4.188)
Distance to Coast		-1.745**	-1.706**
		(0.825)	(0.819)
Distance to coast x Africa		-5.348*	-5.375*
		(3.209)	(3.175)
Rule of Law x Cont Africa			0.129
			(1.909)
Constant	46.11***	50.84***	50.79***
	(4.398)	(4.894)	(4.940)
Observations	150	150	150
R-squared	0.777	0.795	0.795

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

RESULTS:

- In all 3 models, the income from natural resources negatively affects the life expectancy of the population of a country. Although the level of significance is reduced when controlling for country characteristics. We interpret this result as purely correlational.

- As expected, the variable that indicates the intensity of the slave trade negatively affects life expectancy, although the coefficient turns out to be not significant in all the models.

- Although, the coefficient of the interaction between ruggedness and the dummy variable that indicates whether the country belongs to the continent of Africa is not significant. Even controlling for the intensity of the slave trade, we find that the roughness effect negatively affects life expectancy only when it comes to a country that belongs to the continent of Africa. For the other countries, the coefficient is positive and not significant.

- In the 3 models, the Ln of GDP per capita has a positive and significant effect.

DISCUSSION:

- From table 3 we obtain that natural resource rents have a negative effect on life expectancy in a country. Which is a very extreme result, it is not very clear if this negative effect is due t institutional quality or ruggedness.

- Nunn and Puga (2012), found that without controlling for the slavery intensity, the effect of ruggedness had a different effect between Africa and other territories.

- Even controlling for the slavery intensity in our models, we found that ruggedness has a negative relationship with life expectancy for the African continent.

- On the other hand, for other countries, the effect of ruggedness on life expectancy is positive. Although, it is not significant.

- This result has is explained by slavery in the past, since Africa was the most affected in the history of the slave trade. Ruggedness today continues to have a negative impact on people's quality of life

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