

The Long Arm of History?

The Impact of Colonial Labor Institutions on Long-Term Development in Peru

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Motivation & framework

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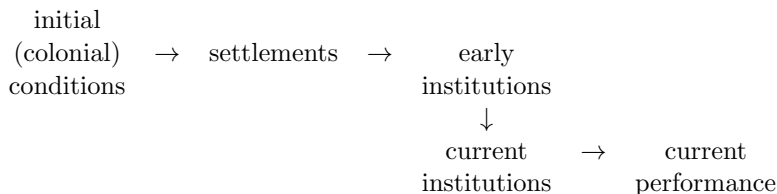
Two arguments dominate the current views of Latin American long-run institutional development.

1. Persistence (Acemoglu, Johnson, and Robinson; Dell; Engerman and Sokoloff)
2. Change (Arroyo Abad; Bulmer-Thomas; Coatsworth; Grafe and Irigoin)

Motivation & framework

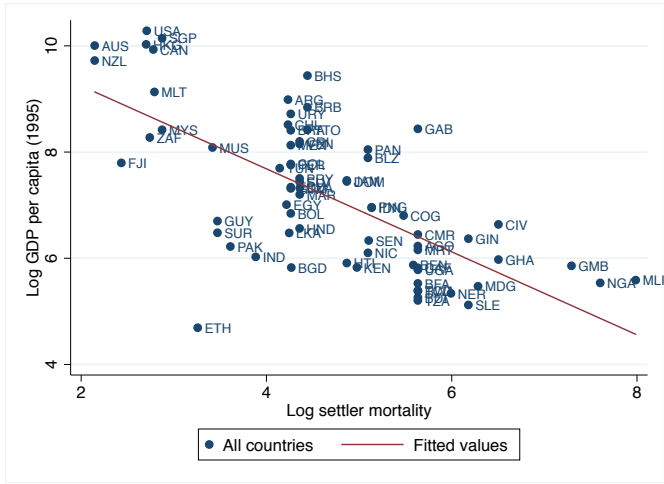
The case for *persistence*

- ▶ Hostile environment based on settler mortality (Acemoglu et al., 2001)
- ▶ Factor endowments and institutional creation (Engerman and Sokoloff, 1997)
- ▶ The *mita*'s detrimental effects on development (Dell, 2010)



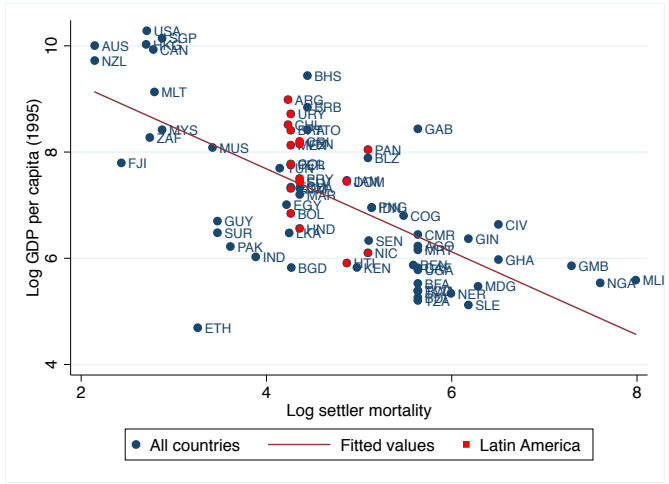
Source: Based on Acemoglu, Johnson, and Robinson (2001).

Colonial institutions and economic outcomes



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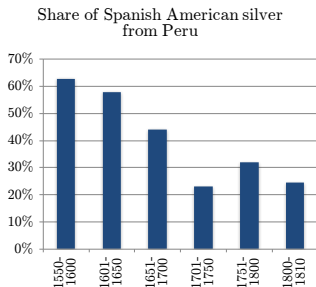
Source: Based on Acemoglu et. al (2001).

The case for change

- ▶ Colonial patterns of development (Coatsworth, 2011)
- ▶ Dynamism of the colonial economy (Arroyo Abad and van Zanden, 2012, 2017)
- ▶ Elite independence (Grafe and Irigoien, 2012)
- ▶ Integration to world markets (Arroyo Abad, 2013; Williamson, 2010)
- ▶ Compression of history (Austin, 2008)
- ▶ Multiple reversals of fortune (Musacchio et al., 2014)

The case for Peru

- ▶ Pillar of Spanish colonial empire
- ▶ Abundant indigenous labor and silver
- ▶ Endured the depth of Spanish colonial institutions



Source: Based on TePaske and Klein (1982).

Questions & answers

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3. What explains this erosion of persistence?

The coexistence of multiple labor arrangements and the response of indigenous populations to existing institutions. In this sense, these institutions lost their bite as the indigenous people challenged them.

Historical background

- ▶ The colonization of and settlement in the New World implied the definition of the relationship between Spaniards and indigenous populations.
- ▶ Different institutional arrangements adopted to exert control.
- ▶ We are interested in labor institutions manifested as the duties Spaniards demanded from the indigenous peoples.
 - ▶ These institutions were both a combination of Inca and Spanish practices.
 - ▶ *Encomienda*: the Spanish crown granted the new settlers the service of indigenous peoples
 - ▶ *Mita*: Compulsory draft to solve the labor shortage in the silver and mercury mines
 - ▶ *Tribute*: replaced *encomienda* in the late 17th century; paid to avoid mita duties.

▶ Encomienda ▶ Mita ▶ Tribute

Data, 1570s-1790s

- ▶ Spanish tribute population count data by settlement.
 - ▶ Tributary population defined as healthy adult males (15-60 years): from Mautua (1906), Vazquez de Espinosa (1948), Vollmer and Amerika (1967), Macera (1972), Medina (1974), Cook et al. (1975), Morner (1978), among others.
- ▶ Existence of labor service based on
 - ▶ *Encomienda* settlements: Cook (1965), Puente Brunke (1992), and Cook (2004).
 - ▶ *Mita* : Viceroy memoirs by Amat y Junient (1947), Sanchez Albornoz (1983), Saignes (1984), and Cole (1984).
- ▶ Distance to the nearest urban center and to Cuzco: estimates using the Inca road with cities defined in Arroyo Abad and van Zanden (2017).
- ▶ Importance of main urban centers: based on Hardoy (1967).
- ▶ Tribute per capita: actual tribute collected per settlement and per tributary from Mansilla (1979) for 1570s.
- ▶ Literacy in 1876 and 1940: from Peruvian Censuses (1876, 1940) Matching colonial and contemporary districts based on historical geographical dictionaries and INEI.
- ▶ Controls include: altitude, soil type conducive to agriculture, and steepness.

Empirical strategy

- ▶ Exploit variation of labor institutional arrangements in 500 settlements in colonial Peru.
- ▶ Settlement i could be subject to a coercive labor institutions (*mita* + labor-based *encomienda*).
- ▶ Assess effect on (colonial) tributary population (males, 15-50 years old) over time (1570s-1790s)

$$Tributaries_{it} =$$

$$\beta_1 + \beta_2 institution_i + X_i' \beta_3 + \epsilon_{it}$$

- ▶ Assess persistent effect of institution on postcolonial outcomes (e.g. education)

Unlike other studies, we chose to incorporate not only the *mita* service but also the labor-based *encomienda* as coercive labor institutions.

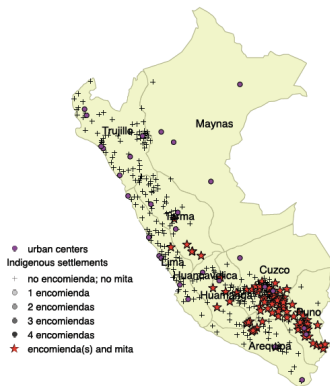


Figure: Location of indigenous settlements by type

Colonial outcomes

Table: Effect of colonial coercive labor institutions on tributary population - OLS estimates
The dependent variable is Total tributary population of settlement i and year t

	(1)	(2)	(3)
Institution	-164.224 (110.922)	-392.336** (179.783)	63.887 (57.511)
R^2	0.070	0.105	0.042
N	2008	1004	1004
<i>Controls</i>			
Geographic	✓	✓	✓
Year	✓	✓	✓
Province	✓	✓	✓
Period	All	1570-1620	1740-1790

Robust standard errors clustered by province. Province and year fixed effects included. The geographic controls are (average) elevation, (average) elevation square, and district area. Coefficients that are significantly different from zero are denoted as *10%, **5%, and ***1%. The dependent variable is *total tributary population*. Coercive labor *institution* refers to *mita* and labor-based *encomienda* settlements. Other controls include: *Distance* to the nearest colonial city over 5,000 people, *Agriculture*, an indicator variable with value of 1 when the soil type is conducive to agriculture, and *Not steep* that takes into account steepness of terrain.

Endogeneity concerns I

- ▶ Settlement allocation in *mita* and labor-based *encomienda* may not have been randomly allocated.
- ▶ Spaniards may have chosen (or lobbied for) settlements with better “possibility of extraction”.

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 - ▶ The absence of labor coercion in some settlements may be compensated by more extraction in the form of tribute –*equalization of extraction*: settlements with extractive institutions should pay *less* tribute per capita.
 - ▶ Identify a source of exogenous variation, not correlated with outcome but correlated with existence of the extractive institution –*instrumental variable approach*

Endogeneity concerns II

Table: Effect of coercive labor institutions on tribute per capita - OLS estimates
The dependent variable is Tribute in settlement i in 1570s

	Tribute per capita		Share of total tribute
	total	in silver & gold	in silver and gold
	(1)	(2)	(3)
Institution	0.635*	0.378	0.045
	(0.348)	(0.330)	(0.053)
R^2	0.121	0.043	0.057
N	252	252	252
<i>Controls</i>			
Geographic	✓	✓	✓
Province	✓	✓	✓

Robust standard errors clustered by province. Province fixed effects included. The geographic controls are (average) elevation, (average) elevation square, and district area. Coefficients that are significantly different from zero are denoted as *10%, **5%, and ***1%. The dependent variable is (1) *total tribute per capita*, (2) *total tribute per capita in silver and gold*, (3) *share of total tribute in silver and gold*.

Coercive labor *institution* refers to *mita* and labor-based *encomienda* settlements. Other controls include: *Distance* to the nearest colonial city over 5,000 people, *Agriculture*, an indicator variable with value of 1 when the soil type is conducive to agriculture, and *Not steep* that takes into account steepness of terrain.

Endogeneity concerns III

Exogenous source of variation: the Spanish Crown established that settlements near the regional capitals (*cabeceras*) were supposed to be allocated to the Crown and thus not subject to labor service.

Instrument: indicator variable for settlements outside the “exclusion zone” defined as 50-km from nearest regional capital. (Zone equivalent to half the distance established by Viceroy Toledo as the reach for *mita*.) We call them “*anticabecera*”.

In 1533, the Crown established that settlements near the regional capitals –*cabeceras*– would be reverted to or reserved for the Crown to avoid abuse from Spanish settlers (Puente Brunke, 1992, pp. 120-130).

Endogeneity concerns IV

Table: Effect of colonial coercive labor institutions on tributary population - IV estimates, second stage

The dependent variable is Total tributary population of settlement i and year t

	(1)	(2)	(3)
Institution	-675.267 (304.090)	-1055.239** (422.403)	-295.294 (282.404)
N	2004	1002	1002
F		40.09	
<i>Controls</i>			
Geographic	✓	✓	✓
Year	✓	✓	✓
Province	✓	✓	✓
Period	All	1570-1620	1740-1790

Robust standard errors clustered by province. Province and year fixed effects included. The geographic controls are (average) elevation, (average) elevation square, and district area. Coefficients that are significantly different from zero are denoted as *10%, **5%, and ***1%. The dependent variable is *total tributary population*. Coercive labor *institution* refers to *mita* and labor-based *encomienda* settlements. Other controls include: *Distance* to Cuzco, *Agriculture*, an indicator variable with value of 1 when the soil type is conducive to agriculture, and *Not steep* that takes into account steepness of terrain.

Endogeneity concerns V

Table: Selection based on economic significance

Dependent variable: Existence of coercive institution

	(1)
not near main city	0.022
	(0.071)
R^2	0.005
N	501

Robust standard errors clustered by province. Province fixed effects included. The geographic controls are (average) elevation, (average) elevation square, and district area. Coefficients that are significantly different from zero are denoted as *10%, **5%, and ***1%. Coercive labor institution refers to *mita* and labor-based *encomienda* settlements. Other controls include: Distance to Cuzco, *Agriculture*, an indicator variable with value of 1 when the soil type is conducive to agriculture, and *Not steep* that takes into account steepness of terrain.

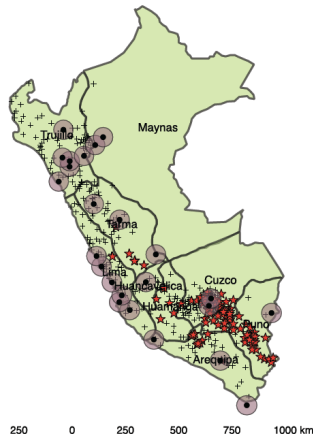


Figure: 50-km buffer around main cities

Postcolonial outcomes

Table: Effect of coercive labor institutions on postcolonial outcomes - OLS estimates
The dependent variables are Literacy rate in 1876 and 1940 and Urbanization rate in 1876

	<i>in district</i>		
	Literacy rate		Urbanization rate
	1876	1940	1876
	(1)	(2)	(3)
Institution	-0.001	0.010	0.036
	(0.010)	(0.012)	(0.031)
R^2	0.108	0.136	0.060
N	404	406	406
<i>Controls</i>			
Geographic	✓	✓	✓
Province	✓	✓	✓

Robust standard errors clustered by province. Province fixed effects included. The geographic controls are (average) elevation, (average) elevation square, and district area. Coefficients that are significantly different from zero are denoted as *10%, **5%, and ***1%. Coercive labor *institution* refers to *mita* and labor-based *encomienda* settlements. Other controls include: *Distance* to the nearest colonial city over 5,000 people, *Distance to Cuzco*, *Agriculture*, an indicator variable with value of 1 when the soil type is conducive to agriculture, and *Not steep* that takes into account steepness of terrain.

Mechanisms

- ▶ The presence of extractive labor institutions appears to have detrimental effects until the 17th century. Why did the detrimental effects of colonial labor institutions fade over time?

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- ▶ The indigenous populations frequently challenged these coercive institutions through insurrection, negotiation, and migration.
 - ▶ *Mita* service was negotiable: from half to 70% of the labor used in mines was free labor.
 - ▶ Most radical strategy to avoid any of these services was migration: “Indian migration was the mita’s main legacy.” (Cole, 1984, 27)

Migration throughout colonial times

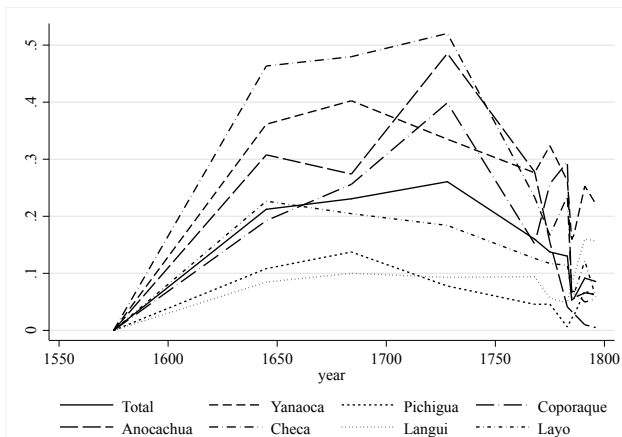


Figure: *Forasteros* as a share of adult males (15-50 years) in Canas province

Source: Based on Glave (1992).

► Mita drafts

► Migration by province



Mechanisms

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 - ▶ Most radical strategy to avoid any of these services was migration: “Indian migration was the mita’s main legacy.” (Cole, 1984, 27)
- ▶ These results are consistent with the large literature depicting a range of coexisting labor arrangements with increasing importance of wage labor.

Conclusions

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The presence of extractive labor institutions does not appear to have an effect on later economic outcomes such as education.

Future work

- ▶ Match with similar districts without colonial labor arrangements in post-colonial times.
- ▶ Look at other postcolonial outcomes
 - ▶ Rebellions in late colonial times (e.g. Tupac Amaru rebellion)
 - ▶ Political participation (ca. 1930s)

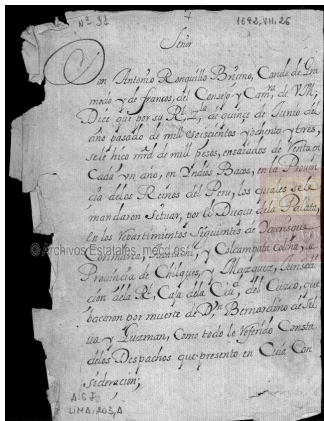
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- ▶ Incorporate your insightful comments
- ▶ Address other sources of endogeneity that you will point out.

Figure: Encomienda of Yaurisque, 1683



Source: Archivo General de Indias, LIMA, 203A, N.31

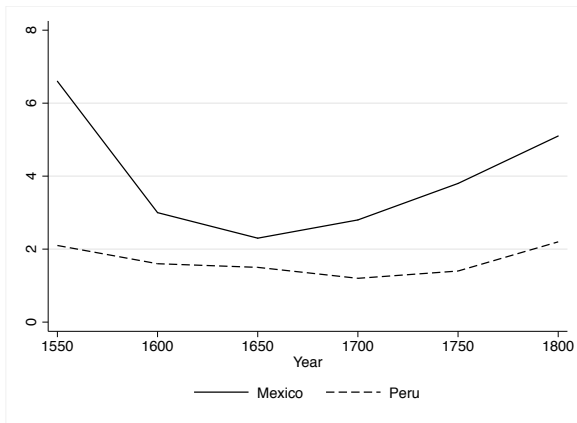
The case for persistence

“After an initial phase of looting, and gold and silver lust, the Spanish created a web of institutions designed to exploit the indigenous people. The full gamut [of institutions] was designed to force indigenous peoples living standards down to a subsistence level and thus extract all income in excess of this for Spaniards. This was achieved by expropriating their land, forcing them to work, offering low wages for labour services, imposing high taxes, and charging high prices for goods that were even voluntarily bought. Though these institutions generated a lot of wealth for the Spanish crown and made the conquistadores and their descendants very rich, they also turned Latin America into the most unequal continent in the world and sapped much of its economic potential.”

Acemoglu and Robinson (2012), pp. 18-19

[▶ Back](#) Population: evolution

Figure: Population, in millions



Source: Arroyo Abad and van Zanden (2017)

▶ IV First stage

Table: Effect of colonial coercive labor institutions on tributary population - IV estimates, first stage

The dependent variable is Institution in settlement i and year t

(1)	
<i>Anticabecera</i>	0.309*** (0.489)
N	2004
F	40.17
<i>Controls</i>	
Geographic	✓
Year	✓
Province	✓
Period	All

Robust standard errors clustered by province. Province and year fixed effects included. The geographic controls are (average) elevation, (average) elevation square, and district area. Coefficients that are significantly different from zero are denoted as *10%, **5%, and ***1%. The dependent variable is coercive labor *institution* refers to *mita* and labor-based *encomienda* settlements. Other controls include: *Distance* to the nearest colonial city over 5,000 people, *Agriculture*, an indicator variable with value of 1 when the soil type is conducive to agriculture, and *Not steep* that takes into account steepness of terrain.

▶ Back

The extent of migration towards the end of colonial times

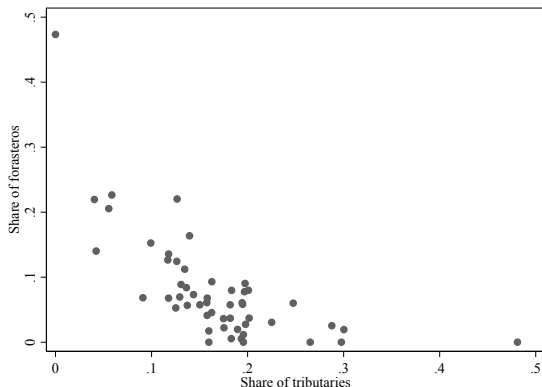


Figure: Tributaries and *Forasteros* as share of total population by province, 1752

Source: Based on Amat et al. (1959).

The long arm of history

The dependent variable is Total tributary population of settlement i and year t

	(1)	(2)	(3)
Institution	-160.333 (110.991)	-387.354** (180.234)	66.688 (57.161)
Distance to Cuzco	0.151** (0.066)	0.193** (0.093)	0.109* (0.065)
R^2	0.073	0.112	0.044
N	2004	1002	1002
<i>Controls</i>			
Geographic	✓	✓	✓
Year	✓	✓	✓
Regional	✓	✓	✓
Year#Regional	✓	✓	✓
Period	All	1570-1620	1740-1790

Robust standard errors clustered by province. Province and year fixed effects included. The geographic controls are (average) elevation, (average) elevation square, and district area. Coefficients that are significantly different from zero are denoted as *10%, **5%, and ***1%. Coercive labor *institution* refers to *mita* and labor-based *encomienda* settlements. Other controls include: *Distance* to the nearest colonial city over 5,000 people, *Agriculture*, an indicator variable with value of 1 when the soil type is conducive to agriculture, and *Not steep* that takes into account steepness of terrain.

Summary statistics

Variable	All		Institution = 1		Institution = 0	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Tributaries	458.229	786.697	426.7	751.343	605.128	921.018
Institution	0.823	0.382	1	0	0	0
Elevation (m)	3061.116	1380.888	2973.332	1442.31	3470.111	948.049
Distance (km)	112.902	91.056	109.696	89.198	127.837	98.016
Distance to Cuzco (km)	1853.653	1649.817	1894.635	1659.568	615.358	605.659
Observations	2008		1360		352	