

Is Extraction Bad? The Long-Run Effects of Encomienda on Development in Colombia

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Abstract

This paper evaluates the long term impact of the Encomienda –a forced labor institution applied by Spaniards throughout Latin America during the XVI, XVII, and XVIII centuries-- in Colombia. Our results show that municipalities that had Encomienda in 1560 are better off today than its neighbors. Despite being an extractive institution, the encomenderos started the colonial local state in those territories. Hence, we provide evidence that the Encomienda had a long term impact on Colombian municipalities through the persistence of the State. Finally, the results are not driven either by precolonial state or population persistence.

Keywords: Institutions, Forced labor, Colonialism, Economic Development, History, State Capacity

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1 Introduction

The seminal contributions of Engerman and Sokoloff (henceforth ES; 1997) and Acemoglu, Johnson and Robinson (henceforth AJR; 2001) sparked a resurgence in attempts to explain the vast discrepancies in contemporary levels of development across the world. This literature developed rapidly, with competing theses proposing geography (Diamond 1997, Gallup, Sachs and Mellinger 1999) vs. factor endowments (ES 1997, 2002; SE 2000) vs. institutions (AJR 2001, 2002, 2005) vs. education (Glaeser et al. 2004) as key causal variables. These contributions are amongst the best-known in a broader body of research; we do not review them again here.

Despite their merit in returning researchers' focus to some of the biggest and most important questions in economics, the empirical and conceptual limitations of such broad-brush approaches have become apparent the more these ideas have been tested with data. Empirically identifying the determinants of cross-country growth across 100+ countries and several centuries is notoriously difficult. The strategies that have been employed, from simple OLS to instrumental variables, are all problematic (Bardhan 2005, Glaeser et al. 2004; McArthur and Sachs 2001). And the construal of causal factors as national-level aggregates obscures sub-national variation on both the left and right-hand sides that is arguably of greater interest. Put another way, 'why is Brazil less developed than Germany' is an important question. But why do some Brazilian districts display European levels of income, human development, and public services, while others struggle to meet African levels, is at least as important – and more promising, combining similar disparities in outcomes with fewer problems of identification.

This paper adopts the institutionalist view, focusing on institutions as long-lived but remediable factors that have powerful, enduring effects on countries' development trajectories. In so doing, we acknowledge that the focus on institutions-as-national-aggregates is also problematic theoretically, collapsing analytically distinct features, such as type of electoral system, unitary vs federal states, the nature of civic and political rights, and the character

of the legal system – to name just a few – into high-level categories branded as, for example, “inclusive” vs. “extractive” (Acemoglu and Robinson 2012). While the net effect of a particular set of institutions may indeed tend towards inclusion of the population, or extraction of the many by the few, a theoretical approach that does not unpack its key features is of necessity lacking. It cannot succeed in understanding: which elements are active and which passive in producing a particular outcome of interest; whether and how these institutions cohere; why they do or do not persist; feasible reform path that might improve economic performance and human development outcomes, or any of a number of other issues that must be understood if we are to understand comparative development. Such an approach further obscures the significant variation between countries, as well as within them, in how key institutional features combine in different ways to produce different outcomes – sources of variation that the field should, instead, be exploiting.

Recent research into comparative development has begun to exploit the potential of subnational variation. We do likewise for Colombia, a country of striking heterogeneity in geographic, economic and development variables, and hence a natural setting for such research. Like ES, AJR, and many others, we use the shock of colonialism as a natural experiment to probe the determinants of comparative development. Unlike ES and AJR, we do so at the micro level, using an original database containing the institutional, political, social and economic characteristics of some 1200 present-day municipalities between the years 1560 and 2014. We analyze the effects of the *encomienda*, a forced-labor institution imposed by the Spanish in the wake of their conquests, and abolished only late in the 18th century. The *encomienda* obliged “indians” (indigenous people) to pay yearly tribute to Spanish *encomenderos* (*encomienda* holders) in money, labor, or kind, in exchange for their protection and instruction in the Catholic faith.

Encomiendas were imposed by the crown in some areas of Colombia but not others; some were relatively brief whereas others lasted for centuries. We exploit this variation to explore the effects of this extractive institution on the following middle and long-term development

outcomes: economic output, poverty, human capital, inequality, and state presence. Using a Neighbor-Pair Fixed Effects (NP-FE) strategy, to which we also add instrumental variables (NP-FE IV) to account for endogeneity in encomienda location, we find that encomienda is associated with higher levels of current municipal GDP and GDP/capita, lower levels of poverty and infant mortality, higher secondary school enrolments, and higher indicators of state presence today, but appears to have no effect on current inequality measures.

Further probing using intermediate-term outcome data from 1794, 1853, 1912 and 1918 indicates that encomienda is strongly and positively associated with state capacity and population. The causal channel from encomienda to improved present-day economic and development outcomes appears to run through the strengthened local presence of a more capable state. Our results show the benefits of exploiting the finer grain of subnational variation to explore the subtleties of institutions' effects on development. They also highlight the importance of disaggregating our understanding of "institutions" into conceptually distinct elements, and then investigating each carefully and in isolation. That the Spanish encomienda was an extractive institution is beyond doubt, and objectionably so. But our evidence implies that it played an important role in building the state in Colombia, and the state in turn spurred development. Areas that did not suffer the encomienda are worse off today, a finding that complicates our understanding of institutions and challenges the meaning of "extraction".

2 Literature Review

The conceptual unpacking of "institutions" as national aggregates has made important strides in recent years. Researchers have proceeded along several lines, three of which we focus on here: centralized vs. fragmented pre-colonial institutions, culture, and state capacity. Although the first and third threads are conceptually similar, they are empirically and referentially distinct, and so we treat them separately.

2.1 Centralized pre-colonial institutions

One of the first studies to examine the long-run effects of subnational ethnic groups' pre-colonial characteristics is Gennaioli and Rainer (2007). Using detailed anthropological data from Africa, they find that more centralized political institutions are associated with better provision of public goods such as health, education, and infrastructure today, a result they attribute to the greater coordination and upward accountability such systems are able to exert on local leaders. In fragmented groups, by contrast, local leaders are freer to exploit resources for their personal gain. Dell, Lane and Querubin (2015) show broadly similar results, using a regression discontinuity design on villages either side of a gradually advancing border in Vietnam. These findings echo the views of influential political scientists such as Bates (1983) and Boone (2003), who stress the importance of the existing institutions Europeans found during colonization.

Michalopoulos and Papaioannou (2013) push this analysis further, combining anthropological characteristics with night-light data to explore the effects of different ethnicities' pre-colonial institutions on a broader measure of regional development in Africa. Exploiting within-country variation, they find that current development levels are significantly higher in regions whose ethnic groups developed more hierarchical, more centralized institutions prior to colonization. These results are robust to an extensive set of controls, and also hold for pairs of ethnic homelands within the same country, but with different pre-colonial institutions.

2.2 Culture

A second line of research focuses on cultural transmission and the interplay of cultural characteristics with institutional context. Motivating this research is the observation that institutions rely not just on formal rules, structures and incentives, but on the values, beliefs and understandings of the individuals and groups that interact with and through them. We cannot fully understand how institutions operate if we ignore such cultural factors.

This inspires a definition of culture – always tricky for economists – as “decision-making heuristics or ‘rules of thumb’ that have evolved given our need to make decisions in complex and uncertain environments” (Nunn 2012: S109). The benefit of these gut feelings, emotions or unconscious cues is that they are “fast and frugal”, which in many circumstances will outweigh their costs of imprecision (Gigerenzer and Goldstein 1996, cited in Nunn 2012).

Nunn and Wantchekon (2011) employ this definition to explore the effects of a particular institution, the African slave trade, on a specific aspect of culture, mistrust in society. Observing that heuristics do not develop in a vacuum, but rather evolve and even compete according to the payoffs they yield, they find individuals from ethnic groups heavily exposed to the slave trade a century or more earlier exhibit lower levels of trust in their relatives, neighbors, co-ethnics, and local government today. By the end of the slave trade, individuals were often sold into slavery by neighbors, friends, and even family. Hence mistrust can be understood as a successful adaptation in an environment in which trust in others carried high risk.

Cultural norms that persist over long periods of time can have concrete effects in the present. Becker et al. (2014) use a regression discontinuity design to investigate the effects of Habsburg rule on either side of a historical border running through present-day Poland, Ukraine, Romania, Serbia, and Montenegro. They find that people living in former Habsburg lands have greater trust in, and pay fewer bribes to, the police and courts today; this is a within-current-country effect, and one that survived the upheavals and oppression of two world wars and Soviet communism. Lowes et al. (2016) find a similar but opposite effect of the highly-developed Kuba Kingdom in central Africa, which had many of the characteristics of a modern state. In two sets of behavioral experiments, they show that a legacy of centralized formal institutions is associated with more rule breaking, more theft, and more cheating, which they explain as the ancient Kuba state crowding out internalized norms of rule following to this day.

The effects of culturally-transmitted norms may be not only highly persistent and con-

crete, but big and even devastating. Heldring (2016) shows that historical exposure to the sophisticated Nyiginya state and bureaucracy created long-lasting norms of obedience to political authority amongst affected populations within Rwanda. This rule-following led to higher levels of violence when the government mobilized the population for genocide, and lower levels of violence when a new government pursued peace and rebuilding few months later. A field experiment in rule breaking shows similar findings.

Although convincing for these African cases, neither pre-colonial institutions nor cultural transmission is likely to be important in Colombia. While European colonialism in Africa lasted only about 80 years, the Spanish and Portuguese were established throughout Latin America from 1550 onwards, and governed Colombia for almost three centuries. The Spanish settled in much greater numbers in Colombia, and made far greater efforts to remake society in their own Catholic, urban image. The Muisca, Tairona, and other peoples they found were comparatively less developed politically than the Incas to the south or the Aztecs to the north, or African kingdoms such as the Luba or Buganda (Murdock 1967). And unlike Africa, where European rule was mostly indirect via existing authorities, the Spanish deliberately broke up larger chieftaincies and subsumed the population into a new political and administrative order.

Perhaps more powerfully, the Spanish interbred with indios to a much greater extent than Europeans in Africa, creating a new Colombian mestizo identity that had not existed before. In the wake of the Great Death, which killed large swathes of the indigenous population, mestizos quickly grew to become the majority. It is difficult to imagine how institutions that were forcibly broken up and reorganized, or a culture that was mostly extinguished, could exert effects on development outcomes several centuries later.

2.3 State antiquity and state capacity

A third line of research focuses on state capacity and its close correlate, state antiquity. Perhaps the most influential work in this thread is Bockstette, Chanda and Putterman

(2002), who develop a state antiquity index covering the past two millennia for 119 present-day countries. They find that greater historical experience of an encompassing polity and large-scale administration is associated with more effective government and faster economic growth today. They conjecture that this may be due to a larger pool of experienced public servants, and the development of attitudes in the population consistent with effective public authority.

Borcan, Olsson and Putterman (2015) extend the database on which this research is based a further 3500 years into the past, when the earliest states emerged in Mesopotamia. This much longer series allows them to identify a non-linear, inverted-U relationship between accumulated state history and current economic development. They find a “sweet spot” of state history around 2000 years, with declining performance amongst both younger and older states. They conjecture that accumulated state history implies the accretion of public authority and capacity, fiscal capacity, and public goods, which in turn promote economic growth. But beyond a certain point, greater experience of the state may be conducive to the development of powerful elites, extractive institutions, and abusive practices that serve to appropriate public resources and undermine public goods, and hence growth. Depetris-Chauvin (2013) disaggregates state history data to the subnational level for years 1000-1850, and finds a within-country, robust negative relationship between state antiquity and the prevalence of contemporary conflict.

Such evidence suggests that a build-up of state capacity is conducive to development. But in what exactly does state capacity consist? Dinecco and Katz (2014) explore this question for 11 European countries over the period 1650-1913. In medieval Europe, states were functionally more like mosaics than dictatorships, built upon a patchwork of strong local polities with which they competed fiscally, and that tended to resist the center’s authority. Two political transformations resolved these state capacity problems: (i) uniform tax systems at the national level, which they term “fiscal centralization”, from 1789 onwards; and (ii) the establishment of national parliaments capable of monitoring state expenditures regularly,

which they term “limited government”, during the 1800s. Together these reforms hugely increased governments’ capacity to extract taxes; France, for example, raised nine times more revenue after the reforms than before. More fiscal resources then allowed European states to invest in public services and develop more sophisticated administrative capabilities, further benefiting the economy.

Acemoglu et al. (2011) explore state capacity through the natural experiment of the sweeping reforms imposed by Napoleon on the territories he conquered in the immediate aftermath of the French Revolution. These included the imposition of civil law (the Code Napoléon), the abolition of medieval guilds and other remnants of feudal power, the undermining of aristocratic privileges, and the introduction of equality before the law. These institutional reforms increased growth in affected German states for the remainder of the 19th century, leaving them richer than unaffected states.

The most similar study to ours is Dell (2010), which explores the long-run effects of Peru’s mining mita, an extractive forced-labor institution instituted by the Spanish in 1573 and abandoned only at independence in 1812. The mita required one-seventh of adult males from indigenous highland communities to work in the mines of Potosí and Huancavelica for a year, in rotation. The 200+ affected communities occupied a distinct region, on the other side of which border otherwise similar communities were exempt. Using a regression discontinuity design, Dell shows that a history of mita two or more centuries ago lowers household consumption in affected districts by about 25 percent today, increases the prevalence of childhood stunting by about six percentage points, decreases educational attainment, and reduces integration into road networks. She attributes these surprisingly persistent effects not to the transmission of culture, nor to the legacy of extraction per se, but rather to the mita’s effects on investments in public goods. Seeking to guarantee a supply of indigenous workers for colonial mines, the Spanish prohibited the formation of haciendas – large rural estates with attached labor – in mita areas, promoting communal land tenure instead. Data from 1689 and 1940 confirm that haciendas developed primarily in non-mita areas. Hacienda

owners had both stronger incentives to provide public goods, and greater political influence required to extract investment from government. Hence it was the non-mita areas, where returns to public investment were higher, that received more public investment, provided more primary services, and improved their economic and human development – not just during the mita, but for centuries after. This contradicts the theses of Engerman and Sokoloff (1997) and Acemoglu, Johnson and Robinson (2001) that historical inequalities in land tenure, and extractive institutions, are deep causes of underdevelopment in Latin America today.

Dell does not emphasize it, but it must additionally be true that the demand for public investments by hacienda owners spurred the development of the state differentially in mita and non-mita areas. Through their influence, hacenderos drove the colonial and then republican state to increase its ability to mobilize tax revenue, and plan and execute public investments of increasing complexity over time (Faguet 2012, Faguet and Pöschl 2015), thereby catalyzing increases in state capacity in some areas but not others. This complicates the inequality and extraction theses considerably, and interestingly. While one extractive institution, the mita, repressed the development of state capacity in Peru, another, the hacienda, promoted it.

3 Historical Context of Encomienda in Colombia

3.1 Historical context

Huge areas of the Americas were granted to the Kingdom of Castile by papal bull in 1493 and the Treaty of Tordecillas (1494). Lacking the resources to explore and conquer a space many times larger than itself, the Castilian Crown resorted to capitulaciones – contracts with individuals and corporations for the exploration of roughly demarcated regions – to take possession of its new lands. Under this device, holders of capitulaciones organized and financed journeys of conquest, and were promised in return governorship of the territories they conquered, plus a fixed proportion of treasure. The Crown retained ultimate political

authority, and a fifth of all treasure gained (Villamarín 1972).

The men who joined these expeditions were likewise promised precious metals, land, Indians, honorific titles, offices and pensions. Their financial investments, and the risks they bore, were considerable, and so once in the Americas they quickly turned to pillage and looting to extract treasure quickly. The plunder began early in the 16th century, and was formalized as the rescate, the repartimiento, and the encomienda. Under the rescate (“rescue”, 1500-1540), Spaniards exchanged mirrors, axes, knives, and other objects of modest value for gold (Tovar 2013). When indios refused to trade, the Spanish used violence to force them. Cities such as Panamá (1519), Santa Marta (1526) and Cartagena (1533) were initially founded as points of exchange in support of the rescate in colonial New Granada.

As new generations of conquistadores arrived, earlier settlers petitioned the Crown for monopoly rights of exchange with indios that excluded new arrivals. This became the repartimiento (“distribution”), which conceded to the residents of certain towns exclusive rights to trade with surrounding indigenous settlements “things of little value” in exchange for gold (Villamarín 1972: 101). Colonists claimed property rights over these communities and their resident indios. As a result, a number of indigenous communities fled their territories and became nomads. Both rescate and repartimiento began to disappear as gold became scarce, the Spanish population increased, and the native population collapsed on account of the Great Death and nomadism. This intensified the need to conquer new territories. But a new generation of conquistadores eschewed the rescate and repartimiento, which had led to the annihilation of the native population, and turned instead to a new extractive form: the encomienda (Colmenares 1999).

3.2 Encomienda

Encomiendas were assigned at the end of an expedition of conquest, after the division of the booty. Once the local population was subdued, the leader distributed captured treasure (typically gold and gems) and indios amongst his men and their financiers, according to

military rank and/or contribution (Groot 2008). Smaller chiefdoms were assigned whole to senior officers – convenient because indios readily obeyed only their chief. But the demand for indios was high, and so larger and more complex chiefdoms, like Bogotá, were split into several encomiendas, and their existing organization destroyed (Colmenares 2015, Gamboa n.d.). Distribution marked the dissolution of an expedition and the initiation of settlement (Villamarín 1972).

Assigning indios to conquistadores initially violated colonial law. Indios were regarded as free vassals by the Crown, and very few capitulación holders held the right to appropriate their labor. And yet the practice flourished throughout the region. Informal titles were formalized when encomenderos petitioned the Crown to confirm their property rights during “two lives” – their own and that of an heir – and the Crown agreed (Villamarín 1972). Royal vacillation between active protection of indios and passive non-application of its own laws was symptomatic of the weakness of Spanish rule in the Americas. The Crown did not possess the men or resources to administer its vast territories, and did not want to discourage conquistadores’ private efforts on their behalf. Plus it relied on a ready supply of indigenous labor for the royal mines. So a compromise was reached in which indios were obliged to work on settlers’ farms, in their mines, and as their servants in exchange for being protected and taught Catholicism by encomenderos. The abuses of the indigenous population that ensued were terrible, and loudly denounced by the Church. In 1555, the newly-established Real Audiencia de Santafé (Bogotá) sought to regulate encomiendas, stipulating that:

1. Taxes on natives would be communal, not individual, based on tributes paid to chiefs prior to the conquest;
2. Indios would pay tributes to encomenderos in cash or in kind twice a year;
3. Indios were obliged to plant, harvest and deliver wheat, maize, barley and potatoes to their encomenderos;
4. Native communities must provide labor for encomenderos’ farms, for transporting pro-

duce to market, must supply their haciendas with wood and fodder, and must provide them with cooks, maids and errand boys.

The tribute that resulted is illustrated in table 1 for three selected communities. This reform was one of several attempts to limit the abuse of indios and rein in the growing power of encomenderos; another was the New Laws of 1542. But a weak colonial government failed to enforce such rules, and indios remained heavily exploited (Villamarín 1972).

Table 1: Yearly Tribute According to Levy of 1555

Community	Tribute ^a		Indians for personal service ^b	Cultivation of Crops ^c		
	Money	Mantas		Maize	Wheat	Potatoes
Guatavita	2400	240	32	35	8	4
Suesca	682	150	20	8	26	2
Cota	None	400	10	8	8	3

Community	Wood for building			Others		
	Large Beams	Small Beams	Rods	Wood for cooking ^d	Fodder ^d	Deer
Guatavita	15	150	300	4380	3650	24
Suesca	8	80	120	2190	1460	36
Cota	4	40	80	1095	1095	24

^a The money was in pesos of 7 1/2 carats. Mantas were square cotton cloth measuring approximately 35" x 35"

^b There were three main classes of work for the Indians in encomienda: i) Communal labor for planting, harvesting and delivery of crops or other goods. ii) Work to which a certain number were assigned to the encomendero's hacienda, for livestock and agricultural work. In the encomienda of Guatavita 12 could be allotted yearly for such work. iii) Work to which a certain number, in the case of Guatavita 20, could be allotted, for any job, anywhere (town, hacienda, and even errands outside the Sabana) encomendero desired.

^c Crops were reckoned in fanegas = about 150 pounds.

^d Cooking wood and fodder were reckoned in cargas -bundles measuring 69" in diameter. In addition to what appears in the table, Guatavita had to plant an area of 150 square feet, in the valley of Guachetá, with sugar cane.

Source: Villamarin (1972, p.57)

Encomiendas dominated colonial society during the 1500s, but declined from the 1600s onwards asymmetrically. In many rural, distant areas they survived right up to the end of

empire in the late 18th century. Closer to cities and major economic centers, by contrast, they died out more quickly. The single largest cause was the demographic catastrophe of the Great Death, which devastated the indigenous population throughout Spanish America, killing 90 percent or more of many groups, and completely exterminating others (Landes 1999, McFarlane 1993). Conflict amongst encomenderos, and between them and non-encomenderos, as well as indios fleeing to escape exploitation, also contributed. The decline of their labor force weakened encomenderos until they could no longer challenge the Crown. It also transformed the encomienda in fundamental ways. Deprived of labor, encomenderos began to live near, and then seize, native lands, and take direct control of the indigenous workforce, all of which was forbidden. From these beginnings grew the colonial hacienda, Spanish rural estates based not on collective tribute but rather formal landownership and individual labor agreements (Lockhart and Schwartz 1983).

But even where encomienda disappeared its effects were enduring, because it played a central role in the beginnings of the local state in Colombia. When founding a city, Spaniards quickly established a town hall (*cabildo*), plaza, church, a jail, and sometimes a notary. *Cabildos* administered justice for minor crimes, controlled access to land, and – crucially – served as the union of encomenderos against the Crown. This last was key because encomenderos sought to rule the land and indios with minimal interference. The uses and abuses of indigenous labor were a major source of friction, and the object of continual power struggles between settlers and Crown. Encomenderos bolstered their privileges by building local political power. Town hall became their principal instrument (Colmenares 2015, Groot 2008).

The *cabildos* they established outlived them. As *encomiendas* declined in the 17th century, an ascendant Crown took advantage of divisions between settlers to institute a fiscal state. Taxes on sales, trade, food, gold, silver and precious gems, road and port tolls, and special religious tithes, amongst others, were established or increased. Many of these taxes were paid to, and administered through, town halls. Proof of encomenderos' success in gener-

ating state capacity is how the cabildos they established were used against their descendants during the centuries that followed.

4 Data

We build our database from primary and secondary sources. Number of tributary Indians comes from Tovar (1988). Our index of colonial state presence is from García-Jimeno (2005). Precipitation and temperature (monthly average, 1980-2010) are from IDEAM (Instituto de Hidrología, Meteorología y Estudios Ambientales). Remaining variables – long-run development outcomes, plus geographic and other controls – are from our own panel data. Unless otherwise specified, variables values are for 2005.

Our main outcome variables measure different aspects of development: Unsatisfied Basic Needs (UBN), which varies between 0, when all basic needs are satisfied, and 100, when they are unsatisfied; a multidimensional poverty index, which captures a similar concept; human development via the infant mortality and enrollment rates; municipal GDP; measures of fiscal performance; and various measures of economic inequality. Our main independent variable measures encomienda via the number of tributary Indians. This data was collected by colonial officers on periodic visits to New Granada from 1550 onwards. Their aim was to record the number of indios under encomienda in order to regularize tributes to encomenderos, as well as the 20 percent share (quinto real) due the Crown (Colmenares 2015). These registries are published by Tovar (1988), georeferenced by us, and include only tributary indios: males 17-55 years old. Table 2 provides descriptive statistics for all our variables, as well as for subsamples of municipalities with and without encomienda, and non-encomienda municipalities adjacent to encomienda municipalities (neighbors).

The table shows clear differences between encomienda and non-encomienda municipalities. Encomienda municipalities show better long-run development outcomes, such as UBN, poverty, and infant mortality. But they are also more unequal. The presence of the state

in 1794 is higher in encomienda municipalities, but so is the Gini in 1878 and 1890 (in the department of Cundinamarca). The 1959 road network is more extensive in municipalities without encomienda, implying greater central government provision of public goods. Other municipal characteristics also show systematic differences, with the exception of terrain aptitude and some river densities. This highlights the necessity of employing neighbor-pair fixed effects. We can control for observable differences between encomienda and neighbor municipalities; any remaining unobservable differences need to be controlled via pair fixed effects.

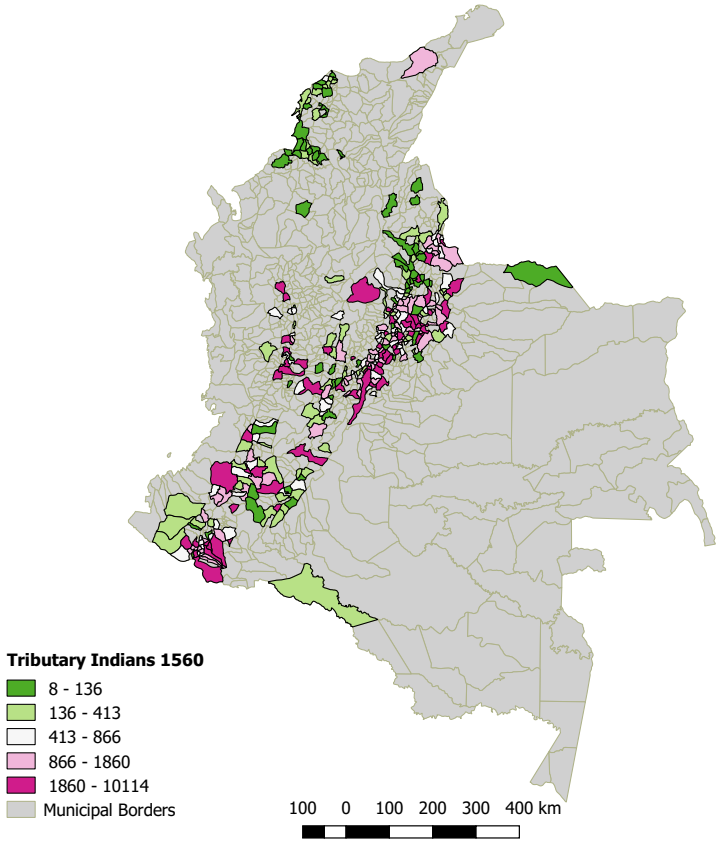
Figure 2 shows the distribution and intensity of tributary indios throughout Colombia in 1560, and also where encomienda and neighboring (non-encomienda) municipalities are located – principally in Colombia’s eastern mountains. Our estimations will concentrate here (panel b), but omitting encomienda municipalities completely surrounded by other encomienda municipalities, i.e. that lack a non-encomienda neighbor.

Table 2: Descriptive statistics

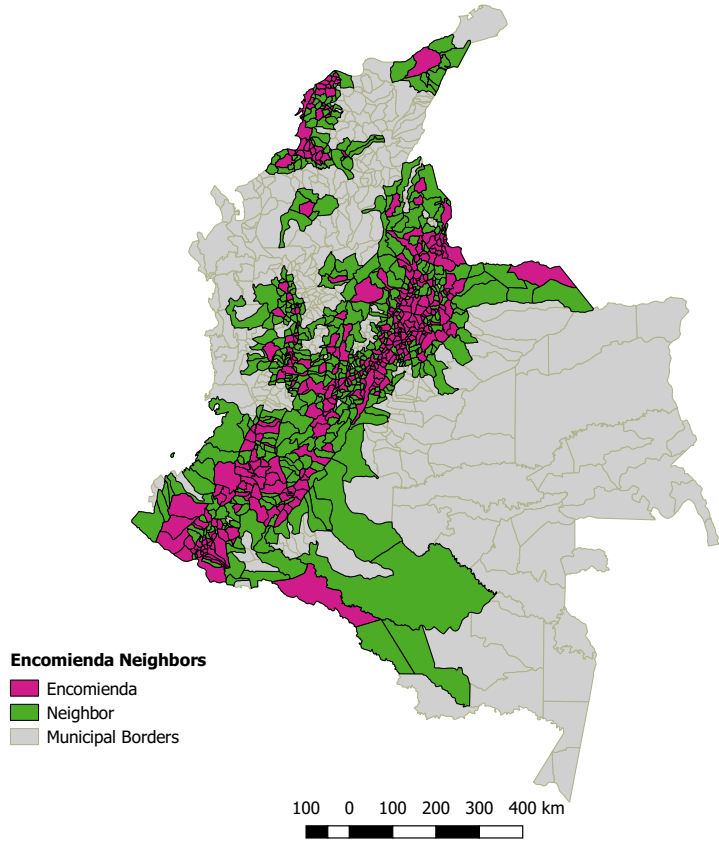
Variable	All Municipalities (1)			No Encomienda (2)			Encomienda (3)			Ttest $\mu_2 = \mu_3$	Encomienda Neighbors (4)			Ttest $\mu_3 = \mu_4$
	Obs	Mean	Std Dev	Obs	Mean	Std Dev	Obs	Mean	Std Dev	P value	Obs	Mean	Std Dev	P value
Encomienda Related														
Tributary Indians	1122	347.08	981.12	789	0.00	0.00	333	1169.44	1511.84	0.00	448	0.00	0.00	0.00
Log. Distance to Sogamoso	1118	12.49	0.87	785	12.62	0.67	333	12.19	1.18	0.00	448	12.49	0.74	0.00
Long-run Development Outcomes														
NBI Unsatisfied Basic Needs 2005	1114	44.94	20.95	781	47.17	21.76	333	39.72	17.87	0.00	447	43.23	19.10	0.01
Multidimensional Poverty Index 2005	1113	69.46	16.38	780	71.49	15.83	333	64.70	16.70	0.00	448	69.03	15.14	0.00
Infant Mortality Rate 2005	1122	24.40	9.98	789	25.73	10.95	333	21.27	6.17	0.00	448	23.29	8.19	0.00
Log. Municipal GDP 2005	1097	11.26	1.28	764	11.23	1.22	333	11.33	1.41	0.23	446	11.18	1.19	0.11
Log. Municipal GDP per capita 2005	1097	15.52	0.74	764	15.52	0.77	333	15.52	0.67	0.87	446	15.54	0.73	0.78
Fiscal performance Indicator 2000-2014	1101	60.96	5.71	768	60.33	5.53	333	62.42	5.86	0.00	446	60.81	5.28	0.00
Log. Tax Collection 2005	1100	6.42	1.59	767	6.31	1.47	333	6.65	1.81	0.00	446	6.26	1.49	0.00
Secondary Enrollment Rate 2005	1112	53.04	70.12	779	50.98	39.59	333	57.87	112.91	0.28	447	50.65	16.10	0.25
Municipal GINI Index 2005	1122	0.42	0.12	789	0.41	0.14	333	0.44	0.05	0.00	448	0.43	0.11	0.01
Land Informality 2005	942	0.20	0.23	623	0.23	0.25	319	0.15	0.18	0.00	401	0.20	0.23	0.00
Property Gini 2005	953	0.71	0.10	632	0.70	0.11	321	0.73	0.08	0.00	404	0.71	0.11	0.00
Terrain Gini Index 2005	953	0.69	0.11	631	0.67	0.12	321	0.72	0.09	0.00	404	0.68	0.11	0.00
Terrain Valuation Gini Index 2005	953	0.66	0.10	631	0.66	0.10	321	0.68	0.08	0.00	404	0.66	0.10	0.00
Top 50% land ownership 2005	871	0.93	0.04	565	0.93	0.04	306	0.94	0.03	0.00	369	0.93	0.03	0.00
Top 10% land ownership 2005	870	0.59	0.11	564	0.58	0.11	306	0.62	0.10	0.00	369	0.59	0.10	0.00
Top 1% land ownership 2005	856	0.21	0.09	555	0.20	0.08	301	0.23	0.09	0.00	362	0.20	0.08	0.00
% Land greater than 500ha	792	0.14	0.18	484	0.15	0.19	308	0.13	0.17	0.06	337	0.13	0.17	0.95
Middle term Outcomes														
State Presence Index 1794	1025	0.57	0.87	696	0.50	0.78	329	0.72	1.01	0.00	422	0.54	0.81	0.01
State Presence Index 1794 (greater than 0)	1099	0.43	0.50	765	0.41	0.49	333	0.46	0.50	0.13	446	0.42	0.49	0.23
Gini 1878	95	0.63	0.11	48	0.60	0.11	47	0.67	0.10	0.00	42	0.62	0.10	0.03
Gini 1890	101	0.66	0.10	52	0.63	0.12	49	0.69	0.08	0.00	44	0.65	0.11	0.05
Road Network 1949 (km)	1049	42.99	54.89	722	45.53	58.85	327	37.37	44.48	0.01	425	45.52	53.87	0.02
Literacy Rate 1918	764	0.25	0.12	464	0.25	0.12	300	0.25	0.11	1.00	305	0.25	0.11	0.49
Municipal Characteristics														
Year of foundation	1122	1870.35	110.35	789	1895.59	95.92	333	1810.53	119.08	0.00	448	1878.37	99.50	0.00
Official area - km2	1122	1017.60	3201.21	789	1280.08	3755.49	333	395.68	758.21	0.00	448	704.54	2352.64	0.01
Distance to Department Capital - km	1118	81.31	60.32	785	88.91	64.82	333	63.41	43.17	0.00	448	74.47	53.07	0.00
Distance to Bogotá - km	1118	321.07	194.81	785	335.84	199.11	333	286.26	179.83	0.00	448	293.82	184.64	0.57
Public employees 2005	1038	103.84	1195.93	714	56.62	153.25	324	207.89	2127.03	0.20	420	58.30	192.83	0.21
Altitude (meters above sea level)	1058	1183.33	1162.54	732	972.69	820.54	326	1656.31	1599.01	0.00	428	1140.18	803.99	0.00
Avg. Monthly Rainfall(mms) 1980-2010	1078	177.35	101.55	752	195.95	109.45	326	134.47	61.98	0.00	431	171.08	97.27	0.00
Avg. Monthly Temperature(C) 1980-2010	1066	21.58	4.86	741	22.59	4.50	325	19.26	4.86	0.00	422	21.31	4.54	0.00
Terrain Aptitude Index	1058	2.67	1.23	732	2.70	1.24	326	2.59	1.18	0.14	428	2.73	1.21	0.10
Principal river density	1049	0.03	0.23	722	0.02	0.10	327	0.05	0.39	0.18	425	0.03	0.12	0.28
Secondary river density	1049	0.03	0.12	722	0.03	0.14	327	0.02	0.06	0.13	425	0.04	0.18	0.09
Tertiary river density	1049	0.02	0.05	722	0.02	0.06	327	0.02	0.04	0.27	425	0.02	0.07	0.11

Figure 1: Distribution of Encomienda in Colombia

18



(a) Tributary Indians by the encomienda



(b) Encomienda and neighbor municipalities

5 Methodology

To evaluate if the institution of Encomienda has a long term impact on the Colombian economy we use an econometric approach proposed by Acemoglu, García-Jimeno & Robinson (2012); we retain their notation for simplicity. Let M denote the municipalities with encomienda and N be the non-encomienda municipality adjacent to the former. Note that we restrict our sample of Colombia’s municipalities to these two subgroups. Municipalities with encomienda are indexed by g ($g \in M$) and municipalities without encomienda are indexed by i ($i \in N$). Additionally, let $N(g) \subseteq N$ be the subset of non-encomienda municipalities adjacent to encomienda municipality g ($g \in M$). Furthermore, denote $M(i) \subseteq M$ as the subset of encomienda municipalities that have non-encomienda municipality i ($i \in N$) as a neighbor. Lastly, y_τ denotes long-term outcomes of economic, human and institutional development, S_τ our measure of encomienda (number of Tributary *Indios*), G_τ is our instrument and \mathbf{x}_τ a vector of geographic, departmental and other controls.

5.1 Neighbor-pair fixed effects

The neighbor-pair fixed effects strategy compares pairs of adjacent municipalities where one had encomienda and the other did not. It controls for confounding factors that might make “treatment” (*encomienda* assignment) non-random. This supports treating the presence of encomienda as exogenous, especially when adjacent municipalities are small in area. Our database is composed of every possible combination of pairs (g, i) where $g \in M, i \in N(g)$:

$$\begin{aligned} y_g &= \beta S_g + \gamma \mathbf{x}'_g + \zeta_{gi} + v_g & g \in M \\ y_i &= \beta S_i + \gamma \mathbf{x}'_i + \zeta_{gi} + v_i & i \in N(g) \end{aligned} \tag{1}$$

In this framework, ζ_{gi} are the neighbor-pair fixed effects –unobservables common for the neighbor pair (i,g)– and v_τ are the specific unobservables –the error term. This model assumes that $cov(S, \zeta) \neq 0$ (hence the inclusion of fixed effects) but it assumes $cov(S, v) = 0$

implying that any remaining unobservables are uncorrelated with our measure of encomienda. We estimate using OLS.

We find this strategy convincing. But nevertheless, it might still be argued that even after neighbor-pair fixed effects, $cov(S, v) \neq 0$. To account for this possibility, we further estimate using instrumental variables (IV). Our first stage regression is:

$$\begin{aligned} S_g &= bG_g + c\mathbf{x}'_g + \zeta_{gi} + \epsilon_g & g \in M \\ S_i &= bG_i + c\mathbf{x}'_i + \zeta_{gi} + \epsilon_i & i \in N(g) \end{aligned} \tag{2}$$

Where G_τ is our instrument and ϵ_τ are the error term. The second stage β_{IV} .

$$\begin{aligned} y_g &= \beta_{IV}\widehat{S}_g + \gamma\mathbf{x}'_g + \zeta_{gi} + v_g & g \in M \\ y_i &= \beta_{IV}\widehat{S}_i + \gamma\mathbf{x}'_i + \zeta_{gi} + v_i & i \in N(g) \end{aligned} \tag{3}$$

5.2 The instrument

Endogeneity may arise if encomienda is not assigned exogenously across municipalities. Historians argue that encomiendas were established where indigenous people were settled, implying the presence of unobservables that might persist in the long run, and which might affect current development levels. Recent studies have addressed this problem by instrumenting for indigenous settlements with temperature, rainfall, altitude, and indicators of river density and terrain aptitude. But these variables are themselves correlated with the long-term development outcomes, and so unsuitable for our purposes.

We propose using distance to the religious center Sogamoso as an instrument. Before the arrival of the Spanish, Sogamoso was the most important city of the Muisca, one of the four comparatively advanced civilizations, alongside the Aztec, Inca, and Maya, encountered by the Spanish in the Americas (Ocampo 2007). The Muisca Confederation was the polity that dominated the Chibcha-speaking peoples of Colombia's densely-populated Eastern highlands. As conquistador and founder of Bogotá Jiménez de Quesada observed, "The

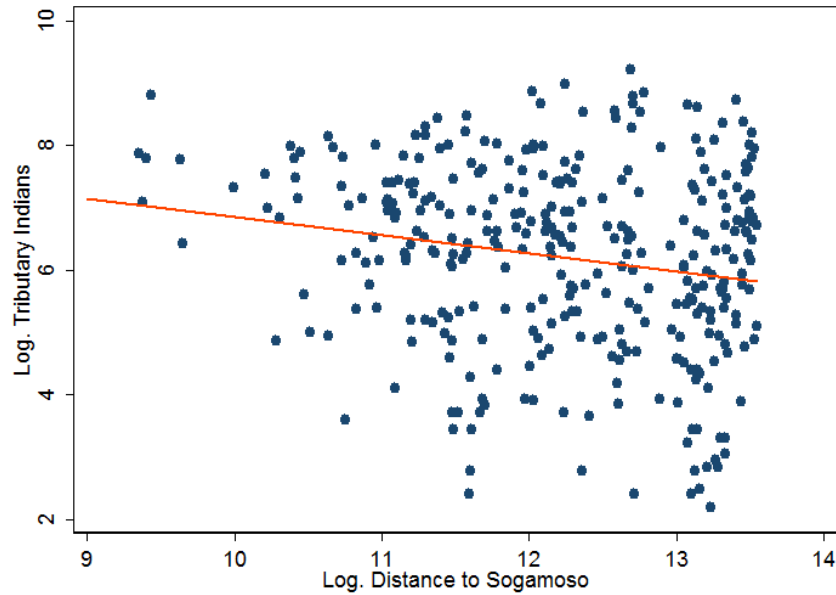
Town of Sogamoso is the center of their Religion. It is like Rome to them, and its Chief is their maximum Pontiff” (Hernández 1978: 154, our translation). Other sources concur, citing the important religious festivals celebrated in Sogamoso, and the fact that the Temple of the Sun, the largest and most important in Muisca culture, which was full of gold, was located there (Gómez-Montañez 2011, Safford and Palacios 2002).

We argue that the Muisca chose to settle near Sogamoso for religious reasons, the location of Sogamoso was itself determined by astronomical factors, and hence distance to Sogamoso is plausibly independent of current development outcomes. Anthropologists have shown that Muisca were expected to participate periodically in religious rituals in Sogamoso, implying a preference for proximity. And being itself a prominent chiefdom, Sogamoso had several smaller chiefdoms under its control (Hernández 1978). But the stronger argument has to do with how the Muisca Confederation expanded, and how the Muisca related to other Chibcha and non-Chibcha speaking people.

The Muisca Confederation expanded through wars of integration, not conquest or obliteration. Defeated tribes were not subjugated. Rather, their internal governing structures were retained, and their chiefs invited to join the Council of the Confederacy. Defeat led to expansion through amalgamation, creating a solar system of distinct, confederated tribes surrounding the central, victorious one (Hernández 1978). At the center of this ‘solar system’ was Sogamoso, and hence distance to Sogamoso proxies for both population density, and for the degree of alliance and integration into the Muisca polity. At a larger scale, it also proxies for degree of contact between Muisca and non-Muisca peoples. According to Safford and Palacios (2002) and Hernández (1978), the Muisca Confederation was in a more or less constant state of war with its non-Muisca neighbors, and hence the location of Sogamoso would have affected where non-Muisca settlements occurred too. Figure 1 confirms this intuition, showing a negative relation between tributary Indians and distance to Sogamoso.

The reverse case, that the location of Sogamoso was determined by Indian settlements, is unlikely. Historical evidence implies that the Temple of the Sun was built at Sogamoso

Figure 2: Scatterplot log Tributary Indians and log distance to Sogamoso



Note: Only municipalities with Tributary Indians greater than zero shown; Sogamoso omitted.

because of astronomical and mythical factors. Sogamoso receives more sunlight than any other city in Colombia, and is consequently ideal for worshipping a sun god (Alcaldía de Sogamoso 2012). According to Muisca mythology, it is also the place where Bochica, one of the foremost Muisca gods and givers of knowledge, abandoned the Earth (Hernández 1978). Hence we regard its location as exogenous.

Lastly, it is important to note that the preponderance of Sogamoso as a religious center and a prominent chiefdom disappeared with the Muisca. Over centuries of Spanish rule, the combined effects of plague, interbreeding, and Catholic teaching exterminated Muisca culture. Today Sogamoso is a minor city, less important than the departmental capital Tunja. It is unlikely to determine current development outcomes except through its effect on precolonial indigenous settlements.

6 Results

6.1 Long-term development outcomes

Table 3 show the results. For every dependent variable there are two estimations: neighbor-pair fixed effects (N-P FE) and neighbor pair fixed effects with instrumental variables (N-P FE IV). For NP-FE the table shows the estimated coefficient associated with $\text{Log}(\text{Tributary Indians } 1560)$ (Coeff.); its corresponding standard error (S.E) and the number of observations (obs). NP-FE IV reports the same information but adds the coefficient of $\text{Log}(\text{Distance to Sogamoso})$ (1 St. Coeff.) and the F test of excluded instruments (1 St. F). For both NP-FE and NP-FE IV we present our benchmark results using geographic controls and department fixed effects. Besides, dependent variables are divided into four blocks: long term economic performance; long term inequality; long term state capacity; and middle term outcomes.

Block A in Table 3 shows the results for long-term economic performance. Results indicate that encomienda in 1560 is related to positive outcomes today. For instance, a higher number of tributary Indians in 1560 is related to: lower Unmet Basic Needs index, lower Multidimensional Poverty Index, lower infant mortality, higher secondary school enrollment, higher municipal GDP, higher municipal GDP per capita and higher population in 2005. In addition, results are significant in both NP-FE and NP-FE IV specifications. This results are surprising: encomienda –a coerced labor institution– generated positive results in the long run. This is contrary to the findings of authors like Sokoloff & Engerman (2000); Dell (2010); Nunn (2008); Acemoglu, García-Jimeno, & Robinson (2012) and Bruhn & Gallego (2012) who have shown the negative effects of coerced labor in long term performance.

In addition, Block B in Table 3 shows the results for long term measures of inequality. Results differ depending on the specification: in NP-FE results suggest that encomienda increased long term inequality but NP-FE IV shows no relationship. We attribute this inconsistency to endogeneity in NP-FE. Regarding NP-FE IV, it is interesting that the

impact of the encomienda cannot be considered different from zero for every measure of inequality analyzed. Neither property gini, terrain plot size gini, terrain plot valuation gini, percent of land held by the top 50%, 10% and 1% or percent of land greater than 500 hectares (in Table 4) were significant. This means that, in spite of the fact that encomienda was an institution of coerced labor it did not have an effect on long term inequality. This is also surprising because the theory of Sokoloff & Engerman¹ (2000) describes Colombian history accurately. Nonetheless, we hypothesize that through the town hall encomenderos seized land not only in encomienda municipalities but in their neighbors too, having as a result high inequality in both (like a spillover effect). However, when we take the full sample of municipalities (see Table 2) we see that inequality is usually higher in encomienda municipalities as expected. It is also worth mentioning that encomienda did not have a long term impact on land informality.

Furthermore, Block C in 3 shows the results for long term state capacity. Municipalities with higher number of tributary Indians in 1560 have higher fiscal performance, higher tax collection per capita and less permanent public employees per 1000 inhabitants. This provides evidence that encomienda municipalities have higher state capacity than its neighbors. Also, encomienda municipalities have fewer public employees per capita but they are more efficient.

Finally the results show a clear picture: the highest the number of tributary Indians in 1560, the better off the municipalities in 2005.

¹ Sokoloff & Engerman stated that depending on the available natural resources (including native population), colonies tended to be more or less unequal; this inequality allowed the elites to grab political power; and this power allowed them to make laws, rules or public policies to help them keep the political power and perpetuate the high degree of inequality .

Table 3: Estimation Results

Dependent\Independent Variable	NP-FE			NP-FE IV			NP-FE IV	
	Log. Tributary Indians Coeff.	S. E.	Obs	Log. Tributary Indians Coeff.	S. E.	Obs	Log. Dist. Sogamoso 1 St. Coeff.	1 St. F
Block A. Long term economic performance								
NBI Unsatisfied Basic Needs 2005	-0.393***	(0.094)	1698	-2.458***	(0.657)	1698	-0.898***	59.47
Multidimensional Poverty Index 2005	-0.415***	(0.091)	1698	-2.740***	(0.663)	1698	-0.898***	59.47
Infant Mortality Rate 2005	-0.151***	(0.037)	1698	-0.594*	(0.320)	1698	-0.898***	59.47
Secondary Enrollment Rate 2005	0.301***	(0.103)	1698	1.169**	(0.543)	1698	-0.898***	59.47
Log. Municipal GDP 2005	0.071***	(0.008)	1696	0.390***	(0.062)	1696	-0.898***	59.54
Log. Municipal GDP per capita 2005	0.009**	(0.004)	1696	0.029*	(0.017)	1696	-0.898***	59.54
Log. Population 2005	0.063***	(0.007)	1698	0.361***	(0.053)	1698	-0.898***	59.47
Block B. Long term inequality								
Property Gini 2005	0.002***	(0.001)	1570	-0.006	(0.005)	1570	-0.889***	63.88
Terrain Plot Size Gini Index 2005	0.004***	(0.001)	1570	-0.000	(0.007)	1570	-0.889***	63.88
Terrain Plot Valuation Gini Index 2005	0.003***	(0.001)	1570	0.004	(0.006)	1570	-0.889***	63.88
Top 50% land ownership 2005	0.001***	(0.000)	1390	0.000	(0.002)	1390	-0.814***	59.42
Top 10% land ownership 2005	0.002***	(0.001)	1390	0.000	(0.005)	1390	-0.814***	59.42
Top 1% land ownership 2005	0.003***	(0.001)	1358	-0.001	(0.002)	1358	-0.819***	60.13
% Land greater than 500ha	0.004***	(0.001)	1362	-0.005	(0.005)	1362	-0.864***	61.31
Land Informality 2005	-0.001	(0.001)	1546	-0.002	(0.006)	1546	-0.866***	56.81
Block C. Long term state capacity								
Permanent public employees per 1000	-0.041***	(0.015)	1566	-0.255**	(0.105)	1566	-0.891***	59.64
Fiscal performance Indicator 2000-2014	0.209***	(0.036)	1696	1.520***	(0.217)	1696	-0.898***	59.54
Log. Tax Collection per capita 2005	0.001***	(0.000)	1696	0.015***	(0.002)	1696	-0.898***	59.54
Block D. Middle term outcomes								
State Presence Index 1794	0.058***	(0.008)	1678	0.345***	(0.042)	1678	-0.879***	54.62
State Presence Index 1794 (greater than 0)	0.015***	(0.004)	1696	0.112***	(0.014)	1696	-0.898***	59.54
Gini 1878 (Cundinamarca)	0.001	(0.002)	146	0.059	(0.491)	146	1.824	0.01
Gini 1890 (Cundinamarca)	0.000	(0.002)	164	0.038	(0.648)	164	-0.816	0.00
Literacy Rate 1912	-0.000	(0.001)	1178	-0.002	(0.002)	1178	-0.797***	69.09
Literacy Rate 1918	0.001*	(0.001)	1194	0.015***	(0.003)	1194	-0.791***	67.90
Road Network 1949 (km)	-0.182	(0.323)	1698	2.089	(1.388)	1698	-0.898***	59.47
Log. Population 1843	0.256***	(0.023)	1698	0.272***	(0.097)	1698	-0.898***	59.47
Log. Population 1851	0.250***	(0.025)	1698	0.218**	(0.087)	1698	-0.898***	59.47

*** p<0.01, ** p<0.05, * p<0.1. Neighbor-pair fixed effect models use robust standard errors. Constant and coefficients on controls not reported. Geographic controls include: Terrain aptitude index, distance to department capital, distance to Bogotá, official municipal area, elevation above sea level, latitude, longitude, average rainfall 1980-2010, average temperature 1980-2010, primary, secondary and tertiary river density. All models include geographic controls and department fixed effects

6.2 Middle-term development outcomes

In the last section we showed the positive impact *encomienda* had on several measures of long term economic performance, in this section we look at middle term outcomes that may shed light on the possible channel through which the institution of the *encomienda* persisted in time. We considered four main topics for the middle term outcomes: state presence; inequality (for the department of Cundinamarca); public good provision; and population (a measure of development in the Malthusian world).

There are four main results (see Table 3 Block D). First, municipalities with *encomienda* have higher state presence in 1794. Estimations using both measures of state presence index suggest that *encomienda* municipalities had higher state presence than its neighbors. Second, *encomienda* did not have an impact on inequality in the department of Cundinamarca –but it is important to remember the possible spillover effect of inequality discussed in the last section. Third, despite higher state presence it seems that *encomienda* did not have an impact on public good provision. In fact, there was no impact on road network density in 1949, and results for literacy rate are not conclusive. Fourth, *encomienda* municipalities have higher population in 1843 and 1851 than its neighbors, this suggest that by the XIX century *encomienda* municipalities were more developed than its neighbors. Hence there are two plausible hypothesis of for the persistence of *encomienda*: either persistence of state presence or persistence of population and agglomeration economies.

6.3 Are results driven by precolonial population or precolonial state persistence?

Before addressing the possible channel, some authors might argue that the results in Table 3 are not explained by *encomienda* but are driven by precolonial population –see for example Maloney & Valencia (2016)– or precolonial state capacity.

To tackle the hypothesis of precolonial population persistence –a measure of economic

performance in a Malthusian world– we replicate our results adding as control the population of the municipality in 1843. Although the idea would be to control for precolonial population, information is scarce. Perhaps the best proxy for precolonial population is the measure of tributary Indians we used to quantify the impact of the encomienda. Nonetheless, controlling for population in 1843 allow us to disentangle, to some extent, the effect from encomienda from precolonial population persistence. Results are shown in Table A1. The results show that almost all coefficients on tributary Indians are still significant and their magnitudes remain similar. Hence, our results are robust.

In addition, we have historical evidence that our results are not driven by persistence of precolonial state capacity². Like we mention previously, when the encomiendas were distributed, the big and complex chiefdoms –the ones with high state capacity– were dismembered while the small remain intact. Therefore, there was no persistence of precolonial state capacity.

6.4 The channel

Given the previous results, we test a final hypothesis. From Block D in Table 3 we saw that two possible channels through the Encomienda has a long term impact on the Colombian economy might be the persistence of the state or the persistence of population³ (which is also a proxy for the persistence of fortune). To test whether one of these could be a channel we use a 'horse race' approach and ran the long term outcomes as function of state presence and population using NP-FE. In this sense, we expect that the channel should be correlated to the long term outcomes and resemble encomienda's results. For the state variable we use

² Some proponents of the persistence of state capacity as determinant for long term economic performance are Bockstette, Chanda & Putterman (2002), Gennaioli & Rainer (2007) and Michalopoulos & Papaioannou (2013). These papers were summarized in the literature review.

³It is important to distinguish between precolonial population persistence and population persistence as a channel. The first one implies that results in Table 3 are not explained by encomienda; simply put, municipalities with encomienda have always been richer –even before the conquest– than its neighbors due to location fundamentals. Instead, population persistence as a channel implies that the institution of the encomienda generated economic prosperity since 1560, and this prosperity persisted in the long run which explains the results in Table 3.

the index between 1 and 4 of the presence of state agencies in 1794 and for population we use the log of municipal population in 1851. Concerning the long term outcomes we restrict our variables to those of Block A and C, since we concluded previously that encomienda did not have an impact in long term inequality and Block D are not long term outcomes.

The results are presented in Table 4. In this Table, each row represents the results of a single estimation using NP-FE in which both State Presence Index 1794 and Log. Population 1851 are used as explanatory variables simultaneously. We present the associated coefficient (Coeff.) and its standard error (S.E.). Results show that State Presence in 1794 is correlated with all long term outcomes except for one. In fact, results suggest that municipalities with higher state presence two hundred years ago today have less unsatisfied basic needs, less multidimensional poverty index, less infant mortality, higher GDP and population. Also, state presence in 1794 is correlated with all the variables in Bloc C which shows the persistence of the local State in Colombia. In other words, municipalities with higher state presence in 1794 have more efficient local governments today. This two facts provide evidence that the persistence of the State capacity might be a possible channel through which encomienda had a lasting impact on the Colombian economy.

On the other hand, Population in 1851 is correlated to some outcomes but not all. Population in 1851 is correlated to GDP and population today, and is also related to two current state capacity measures. Nonetheless, population in 1851 is not correlated with several of the measures of long term performance that encomienda was correlated to. For instance, in Table 3 shows that encomienda is related to NBI, Multidimensional Poverty Index, infant mortality, and secondary enrollment; but population 1851 is not related to this variables. This raises doubts whether the link between encomienda and long term outcomes is the persistence of population.

Furthermore, Table A2 shows additional estimations regarding the possible relationship between the two hypothesized channels and the long term outcomes. For every long term outcome there are three estimations: state presence 1794 as explanatory variable; log. popu-

lation 1851; and both⁴. It is very interesting that population 1851 alone results significant in several estimations but when we introduce the state presence index as explanatory variable, population loses its significance. This happens with NBI, Multidimensional Poverty Index, Infant Mortality and Secondary Enrollment. This results suggests that state presence has more explanatory power than population 1851.

To sum up, we tested two variables to see if they could be considered channels through which *encomienda* had a lasting impact in Colombian municipalities. Results show that: i) state presence is related to almost all long term development outcomes while population is related only to some outcomes; and ii) when state presence is used as explanatory variable, in several measures population in 1851 is not significant. This econometric evidence suggests that persistence of State capacity is the possible channel through which *encomienda* had a long term impact in Colombian municipalities.

Finally, the importance of state presence and state capacity for economic growth has been highlighted by several authors. For example, Acemoglu, García-Jimeno & Robinson (2015, p. 2405) shown that that “local state presence is indeed a first-order determinant of current prosperity, but much of this impact works through network effects.” Likewise, Acemoglu & Robinson (2012) acknowledged the need for political centralization for economic growth. They also show examples of countries with weak states that are in chaos because the state cannot enforce a minimum of law and order. Moreover, Acemoglu (2005, p. 1200) stated: “a large body of work in political science, especially in the context of African politics, views the main barrier to economic development not as the strength of the state, but as lack of state ‘capacity,’ state power or monopoly over violence”.

Hence, it is likely that the emergence of the local State (in the form of a town hall, a plaza, a church, a jail and sometimes a notary, and later as a purely fiscal state) might have been the start of diverging paths between Colombian municipalities. State presence, even when the Town Hall was captured by the *encomenderos* and served extractive purposes, might be

⁴The results of this final estimation are the same as those presented in Table 4

the legacy through which encomienda had a positive long term impact in Colombia.

Table 4: Estimation results for the possible channels

Dependent \ Independent Variable	State Presence		Log. Population		Obs
	Index 1794		1851		
	Coeff.	S.E.	Coeff.	S.E.	
Block A. Long term economic performance					
NBI Unsatisfied Basic Needs 2005	-3.661***	(0.465)	-0.045	(0.120)	1678
Multidimensional Poverty Index 2005	-3.348***	(0.524)	-0.124	(0.111)	1678
Infant Mortality Rate 2005	-1.465***	(0.179)	0.063	(0.054)	1678
Secondary Enrollment Rate 2005	2.752***	(0.529)	0.057	(0.142)	1678
Log. Municipal GDP 2005	0.357***	(0.043)	0.060***	(0.011)	1678
Log. Municipal GDP per capita 2005	0.010	(0.020)	0.010*	(0.005)	1678
Log. Population 2005	0.348***	(0.038)	0.050***	(0.009)	1678
Block C. Long term state capacity					
Permanent public employees per 1000	-0.186**	(0.072)	-0.078***	(0.022)	1554
Fiscal performance Indicator 2000-2014	1.579***	(0.184)	0.093**	(0.047)	1678
Log. Tax Collection per capita 2005	0.011***	(0.003)	-0.000	(0.001)	1678

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Neighbor-pair fixed effect models use robust standard errors. Constant and coefficients on controls not reported.

Geographic controls include: Terrain aptitude index, distance to department capital, distance to Bogotá, official municipal area, elevation above sea level, latitude, longitude, average rainfall 1980-2010, average temperature 1980-2010, primary, secondary and tertiary river density.

All models include geographic controls and department fixed effects

7 Conclusions

This paper has two major findings. The first is that there is a positive impact of the institution of the encomienda in a broad set of long term development outcomes. For instance, a higher number of tributary Indians in 1560 is associated with: greater municipal GDP and GDP per capita; lower measures of poverty like Unmet Basic Needs, Multidimensional Poverty Index and infant mortality rate; higher secondary school enrollment; it has no impact on neither of eight measures of inequality; and is associated with higher state presence today as measured by permanent public employees, fiscal performance indicator and higher

tax collection per capita. Given our econometric approach we take this to be evidence of causality instead of merely a correlation.

The second finding is that the possible channel through which Encomienda had a lasting impact on the Colombian economy is that it marked the beginning of the local State in Colombia. The *Conquistadores*, soon after distributing the encomiendas, establish a town hall (*Cabildo*), a plaza, a church, a jail and sometimes a notary; they built the basic infrastructure of the State which later would be used by the Crown to start a purely fiscal state. By the XVIII century, state capacity continued to be higher in encomienda municipalities; and, to this day, state capacity is greater in municipalities that had encomiendas 450 years ago. We claim that this is what made encomienda municipalities richer today than its neighbors.

It is important to mention that these results are driven neither by precolonial state presence nor by economies of agglomeration. With respect to precolonial state capacity encomenderos dismembered the big and complex (i.e. higher state capacity) chiefdoms into several encomiendas, while smaller chiefdoms did maintain some of its original structure. Hence, there was no persistence of precolonial state capacity. On the other hand, we provide econometric evidence that our results are robust after controlling for population in 1843.

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Table A1: Estimation Results controlling for Log. population 1843

Dependent\Independent Variable	NP-FE			NP-FE IV			NP-FE IV	
	Log. Tributary Coeff.	Indians S. E.	Obs	Log. Tributary Coeff.	Indians S. E.	Obs	Log. Dist. 1 St. Coeff.	Sogamoso 1 St. F
Block A. Long term economic performance								
NBI Unsatisfied Basic Needs 2005	-0.296***	(0.102)	1698	-2.661***	(0.731)	1698	0.474***	74.68
Multidimensional Poverty Index 2005	-0.332***	(0.097)	1698	-2.997***	(0.747)	1698	0.474***	74.68
Infant Mortality Rate 2005	-0.154***	(0.040)	1698	-0.663*	(0.361)	1698	0.474***	74.68
Secondary Enrollment Rate 2005	0.211*	(0.108)	1698	1.202*	(0.623)	1698	0.474***	74.68
Log. Municipal GDP 2005	0.051***	(0.008)	1696	0.415***	(0.065)	1696	0.474***	74.77
Log. Municipal GDP per capita 2005	0.005	(0.004)	1696	0.028	(0.020)	1696	0.474***	74.77
Log. Population 2005	0.045***	(0.007)	1698	0.387***	(0.057)	1698	0.474***	74.68
Block B. Long term inequality								
Property Gini 2005	0.000	(0.001)	1570	-0.009	(0.005)	1570	0.513***	76.12
Terrain Plot Size Gini Index 2005	0.002***	(0.001)	1570	-0.002	(0.008)	1570	0.513***	76.12
Terrain Plot Valuation Gini Index 2005	0.002***	(0.001)	1570	0.004	(0.007)	1570	0.513***	76.12
Top 50% land ownership 2005	0.000**	(0.000)	1390	-0.000	(0.002)	1390	0.498***	65.54
Top 10% land ownership 2005	0.002**	(0.001)	1390	-0.001	(0.005)	1390	0.498***	65.54
Top 1% land ownership 2005	0.002***	(0.001)	1358	-0.002	(0.002)	1358	0.507***	65.08
% Land greater than 500ha	0.004***	(0.001)	1362	-0.007	(0.005)	1362	0.48***	72.93
Land Informality 2005	0.000	(0.001)	1546	-0.001	(0.006)	1546	0.501***	71.32
Block C. Long term state capacity								
Permanent public employees per 1000	-0.025*	(0.015)	1566	-0.269**	(0.118)	1566	0.462***	71.68
Fiscal performance Indicator 2000-2014	0.166***	(0.038)	1696	1.668***	(0.244)	1696	0.474***	74.77
Log. Tax Collection per capita 2005	0.001***	(0.000)	1696	0.017***	(0.002)	1696	0.474***	74.77
Block D. Middle term outcomes								
State Presence Index 1794	0.032***	(0.007)	1678	0.357***	(0.046)	1678	0.455***	70.07
State Presence Index 1794 (greater than 0)	0.001	(0.004)	1696	0.111***	(0.017)	1696	0.474***	74.77
Gini 1878 (Cundinamarca)	0.000	(0.002)	146	0.020	(0.038)	146	0.606	0.35
Gini 1890 (Cundinamarca)	0.000	(0.002)	164	-0.006	(0.029)	164	0.488	0.33
Literacy Rate 1912	0.000	(0.001)	1178	-0.002	(0.003)	1178	0.48***	61.58
Literacy Rate 1918	0.001	(0.001)	1194	0.017***	(0.004)	1194	0.489***	60.95
Log. Population 1851	0.014	(0.015)	1698	-0.039	(0.028)	1698	0.474***	74.68
Road Network 1949 (km)	-0.553	(0.353)	1698	2.029	(1.598)	1698	0.474***	74.68

*** p<0.01, ** p<0.05, * p<0.1

Neighbor-pair fixed effect models use robust standard errors. Constant and coefficients on controls not reported.

Geographic controls include: Terrain aptitude index, distance to department capital, distance to Bogotá,

official municipal area, elevation above sea level, latitude, longitude, average rainfall 1980-2010,

average temperature 1980-2010, primary, secondary and tertiary river density.

All models include geographic controls and department fixed effects

Table A2: Additional estimation results for the possible channels

	NBI Unsatisfied Basic Needs 2005		Multidimensional Poverty Index 2005		Infant Mortality Rate 2005		
State Presence Index 1794	-3.726*** (0.453)	-3.661*** (0.465)	-3.529*** (0.481)	-3.348*** (0.524)	-1.373*** (0.167)		-1.465*** (0.179)
Log. Population 1851		-0.429*** (0.123)	-0.045 (0.120)	-0.475*** (0.105)	-0.124 (0.111)	-0.090* (0.050)	0.063 (0.054)
Observations	1678	1678	1678	1678	1678	1678	1678
	Secondary Enrollment Rate 2005		Log. Municipal GDP 2005		Log. Municipal GDP per capita 2005		
State Presence Index 1794	2.835*** (0.480)	2.752*** (0.529)	0.445*** (0.039)	0.357*** (0.043)	0.025 (0.019)		0.010 (0.020)
Log. Population 1851		0.345*** (0.129)	0.057 (0.142)	0.098*** (0.010)	0.060*** (0.011)	0.011** (0.005)	0.010* (0.005)
Observations	1678	1678	1678	1678	1678	1678	1678
	Log. Population 2005		Permanent public employees per 1000		Fiscal performance Indicator 2000-2014		
State Presence Index 1794	0.420*** (0.034)	0.348*** (0.038)	-0.300*** (0.066)	-0.186** (0.072)	1.715*** (0.167)		1.579*** (0.184)
Log. Population 1851		0.086*** (0.009)	0.050*** (0.009)	-0.097*** (0.020)	-0.078*** (0.022)	0.259*** (0.044)	0.093** (0.047)
Observations	1678	1678	1678	1554	1554	1678	1678
	Log. Tax Collection per capita 2005						
State Presence Index 1794	0.010*** (0.002)	0.011*** (0.003)					
Log. Population 1851		0.001 (0.000)	-0.000 (0.001)				
Observations	1678	1678	1678				

*** p<0.01, ** p<0.05, * p<0.1

Neighbor-pair fixed effect models use robust standard errors. Constant and coefficients on controls not reported.

Geographic controls include: Terrain aptitude index, distance to department capital, distance to Bogotá,

official municipal area, elevation above sea level, latitude, longitude, average rainfall 1980-2010,

average temperature 1980-2010, primary, secondary and tertiary river density.

All models include geographic controls and department fixed effects