Indigineous origins of Colonial Institutions

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Abstract

Differences in colonial institutions appear to explain divergent patterns of political and economic development across former colonies. The origins of colonial institutions, however, are not well understood. This article proposes that hierarchy in pre-colonial indigenous governance can explain variation in colonial labor institutions. We obtain predictions using a game-theoretic framework that emphasizes a mechanism through which indigenous leaders served the colonists in exploiting existing labor. The contribution to output from the indigenous leaders' mediation between colonists and workers explains the persistence of indigenous institutions. Institutions persist unless highly profitable resources compensated for the cost of creating new high-hierarchy institutions. We test the hypotheses using an original dataset of labor and tribute institutions from the pre-colonial and colonial periods for 444 sub-national territories in the Americas. The findings suggest that differences in political and economic development today may predate European colonialism.[1]

Keywords: Institutional Persistence, Colonialism, Indigenous Institutions, Natural Resources, Economic Development.

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INTRODUCTION

Colonial institutions appear to explain contemporary development.[2] Traditional explanations of different types of colonial institutions focus on Europeans: European culture, European religion, and European legal and economic institutions (Weber 1958, La Porta et al. 1997, 1998; Lange et al. 2006; Mahoney 2010). Recent research emphasizes indigenous prosperity (i.e. population density, urbanization), and natural endowments (Acemoglu et al. 2001, 2002b, Engerman and Sokoloff 1997, 2000, 2006). The mechanisms behind institutional persistence, however, remain poorly specified. Also, it is possible that colonial institutions were influenced by existing indigenous institutions. The role of indigenous institutions and peoples remains largely unaddressed.[3] Were colonial institutions new or did they represent the persistence of indigenous governance practices?

Europeans found elaborate systems of indigenous hierarchical governance in some of their colonial expeditions. Upon reaching the valley of Mexico, for example, Cortés found the Aztecs living in large and intricate polities (Macleod 2000, p. 5) with a political elite and an administrative hierarchy able to mobilize labor for public works and other activities (Cline 2000, p. 194). Cortés wrote: "There are many chiefs, all of whom reside in this city, and the country towns contain peasants who are vassals of these lords and each of whom holds his land independently... And there are many poor people who beg from the rich in the streets as the poor do in Spain and in other civilized places," (Cortés 1986). Cortés replaced the top of the Aztec empire with Spanish rule and otherwise maintained the Aztec hierarchical and extractive institutional structure. The Spanish called Aztec institutions they ruled by new names—such as *encomiendas* or *repartimientos*—but much of the institutional structure and its laborers remained the same (Macleod 2000, p. 13-14). Indigenous peoples rarely escaped because in regions with high degrees of hierarchy (according to the historical account), the decision to "flee the good lands of sedentary life and take refuge in mountain or forest fastness [...] was not open to the bulk of the population and was not generally adopted for more than fleeting periods" (Lockhart 1992, p. 82).

Elsewhere, in regions such as the subnational Mexican states of Sonora, Sinaloa, Durango, Chihuahua and Baja California, Europeans encountered dispersed settlements with hunters and gatherers. These societies lacked hierarchy. Headmen or elders provided guidance with charisma or persuasive skills (Deeds 2000, p. 51). Leadership was not easily identifiable and workers could escape and fight. According to a historical account, "While the complex societies of central Mexico had been rapidly subdued in 1519-21, the nomads of the north presented a greater military challenge... The Chichimecs [for example] were formidable warriors, highly mobile..." (Knight 2002, p. 69). Thus, the Spanish could not easily organize the existing population for labor in *encomiendas* or *repartimientos*. In fact, many of these societies posed a constant threat to the Spanish for more than a generation. In some of these territories, the Spanish managed to settle and pacify the regions only after negotiating with the principal Chichimec leaders "with promises of food, clothing, lands, [...] and agricultural implements to attract them" (Powell 1952, p. 188). The degree of hierarchy of colonial labor institutions in these territories was similar to the indigenous peoples' degree of hierarchy before colonists arrived.

Not all of the low hierarchy territories in northern Mexico had a degree of colonial hierarchy similar to that in the pre-colonial

[2] See for instance Nunn and Wantchekon 2008, Bardhan 2005, Rodrik, Subramanian and Trebbi 2004, Easterly and Levine 2003, Glaeser et al. 2004, Acemoglu et al. 2001, 2002b, Hall and Jones 1999.

[3] Africa scholars acknowledge the impact of pre-colonial institutions on economic development. See Gennaioli and Rainer 2007, Boone 2003, Englebert 2000, and see also Acemoglu et al. 2002a. Ertan and Putterman (2007) consider all world countries. None focus on mechanisms of institutional persistence. Dell 2010 proposes channels to explain persistence from colonial to contemporary institutions, but ignores indigenous institutions.

period, however. Colonists also brought slaves to some of them. This seems to have occurred where colonists found minerals. In mineral-rich territories with low hierarchy, settlers brought labor from the outside (e.g. Africa) and therefore created a new labor hierarchy (Frye 2000, p. 92). This hierarchy depended on workers who could not easily escape. As outsiders, African slaves lacked knowledge about the area (Service 1955).

Thus, we see both institutional persistence and change in Mexico from the pre-colonial to the post-colonial periods. Did institutional persistence and change occur similarly in the rest of the American continent? How did pre-colonial institutions influence colonial institution building? Did the available resources, colonist nation of origin, or the timing of the expedition affect institutional persistence? And if so, how?

We offer a formal model that reveals a mechanism to explain institutional persistence from indigenous governance hierarchies to colonial labor institutions. The purpose of the model is to analyze the mechanism through which indigenous leaders served profit-maximizing colonists who sought to exploit existing labor. Using the indigenous leaders as mediators contributed to total output. The contribution to total output depended on the degree of hierarchy in indigenous governance. Replacing a leader was more costly, in terms of the loss in output, the lower the initial degree of hierarchy. The loss in output was smaller when indigenous hierarchy was high because the existing institutional infrastructure facilitated obtaining compliance from the workers in those regions.

The model predicts institutional persistence in equilibrium at any initial level of hierarchy. At high levels of hierarchy, colonists kept the labor hierarchy because the lower cost of replacing the indigenous leader allowed colonists to obtain a higher share of the surplus. Colonists in these regions were thus more likely to establish colonial labor institutions relying on hierarchies, such as *repartimiento*. In regions with low hierarchy, colonists also gain by keeping the low degree of hierarchy. The colonists needed to transfer a higher share of the surplus to the leader, but replacing the leader led to a larger loss in output. Colonial institutions in regions with low hierarchy were thus more likely to have mobile workers who received payment for their work. Finally, the analysis predicts that colonists kept the existing level of indigenous hierarchy unless two conditions were both present: (1) the absence of high indigenous governance hierarchy and (2) the presence of highly profitable resources. Colonists established new hierarchical labor institutions, like African slavery, in these territories because resource wealth could offset the cost of creating the new institution.

We test the predictions of the theory in the Americas, where we identified a natural experiment to study institutional persistence. Because Europeans had no contact with the region prior to their first expeditions in 1492, the expeditions serve as an exogenous shock that allows us to disentangle indigenous and European influences on colonial institutions. It is much more difficult to disentangle indigenous from European influences on colonial institutions in Africa, the Middle East, and Asia because Europeans traded with indigenous peoples in those regions for centuries prior to colonial rule.[4]

We collected original data across 444 subnational territories in the Americas. These data improve on existing quantitative research by disaggregating present-day national boundaries. Present-day national boundaries, like those of Mexico, can include a broad range of indigenous and colonial institutions.[5]

[4] There had been a few short-term expeditions to Newfoundland. These expeditions were unlikely to influence indigenous institutions present as of 1492 because the early European expeditions were short-term, and occurred five centuries before 1492. Also, in contrast to Africa and Asia, the Americas and Europe lacked trade relationships prior to colonization.

[5] Dell 2010 studies subnational variation within Peru but does not incorporate the influence of indigenous institutions. Bruhn and Gallego 2009 have a subnational analysis closer to ours, for Spanish America, that emphasizes types of colonial economic activities and not indigenous organization. Banerjee and Iyer 2005 do emphasize pre-colonial institutions, and have a subnational level analysis for India. Their fo-

We find that increasing indigenous governance hierarchy from low to high reduced the likelihood of free labor by 40% and increased the likelihood of assigned labor (such as *encomiendas* or *repartimientos*) by 37%. Indigenous governance hierarchy only increases the probability of slavery, however, when colonists found a combination of relatively low indigenous governance hierarchy and profitable natural resources. These results hold after including potentially confounding geographical factors such as altitude, precipitation, latitude and distance to the nearest port, and fixed effects for colonist nation of origin and expedition arrival date. The results also remain consistent when altering modeling choices and when using alternative measures of indigenous institutions.

Our analysis has implications for several literatures. Domar (1970) first developed the argument that economic forces (i.e. the land to labor ratio) alone are not sufficient to explain labor institutions. Domar focuses instead, for example, on the influence of political infrastructure on restricting the movement of peasants and limiting land ownership. We build on Domar's analysis of political institutions by analyzing the mechanisms through which external actors imitate or change different types of political infrastructures.[6]

Our analysis is also related to the literature on the transfer of institutions. Berkowitz et al. (2003) study the determinants of legal institutions by analyzing the process through which legal institutions were transplanted in the colonies. They find that transfers were successful in colonies where the transplant adapted to local conditions or where the population was familiar with the law. Their findings are in line with our argument that the institutions colonists "built" share common elements with the indigenous institutions already in place.

Our approach also contributes to the literature incorporating history to the game-theoretic study of institutions (e.g. Greif and Laitin 2004, 2004, Greif et al. 1994). By studying institutions as an endogenous process, under specific historical conditions, we are able to provide an explanation for the endogenous persistence and change of indigenous institutions in the colonization of the Americas.

Finally, historical institutionalism holds that institutions persist until challenged by a critical juncture.[7] New institutions that emerge after a critical juncture depend on a constellation of interests, ideas and pre-existing institutions. Consistent with theories of historical institutionalism, we find that the critical juncture of colonial expansion had widely different effects on colonial labor institutions throughout the Americas.

In what follows, we begin with a description of indigenous governance institutions when colonists arrived to the Americas. Second, we offer a formal model to explain variation in colonial labor institutions. Third, we test observable implications of the theory with original data on indigenous and colonial institutions, and natural resources across the Americas. The final section concludes with a discussion of the implications of our study.

INDIGENOUS GOVERNANCE HIERARCHY

We identify systematic similarities in how indigenous leaders organized labor and collected tribute across the Americas. These similarities allow us to categorize indigenous societies into three different levels of governance hierarchy. *Indigenous governance hierarchy* refers to the degree to which indigenous leaders relied on a political infrastructure to enforce the mobilization of labor and goods.[8]

High-level hierarchy societies were 'complex', with sedentary peoples, and multi-

cus, however, is on explaining the variation in economic performance while ours is on the mechanisms behind institutional development.

[6] See also Acemoglu and Wolitzky 2009, for an economic theory of coercion in labor arrangements.

[7] See Thelen 2004 and Thelen 1999 for a review. Also Pierson and Skocpol 2002.

[8] Our characterization of indigenous governance draws from Lockhart and Schwartz (1983), Villamarín and Villamarín (1975), Sanders and Marino (1970), and Greif (2006).

level political organization. Indigenous leaders in these societies used an extensive political infrastructure to organize labor and tribute. They institutionalized labor drafts and rotary labor for public works, cultivation of fields, and tribute collection. Economic specialization fostered overall productivity and food surpluses. Using the multi-level political administration, the elite could extract part of the surplus.[9] Leaders of high-hierarchy societies used their government administration to inform the society of rules and to punish noncompliance. Crucially, workers in high-hierarchy settings were accustomed to hierarchy and generally not mobile. They found it difficult to migrate because they possessed a specialized set of skills (intensive agriculture, trade, or ritual-making, for example).[10]

In present-day Mexico, for example, there were "countless quite autonomous states with their own tlatoque, together with others ruled by military governors and tribute collectors imposed by a tlatoani of a dominant state"(Gerhard 1993, p. 5). The Spanish referred to this Mesoamerican *altepetl*, or city-state, as *señorío*. The *altepetl* consisted of a head, the *tlatoani*, surrounded by counselors, the *pipitlin*. The *pipitlin* also served as high-level functionaries (Cline 2000, p. 193) and sometimes governed subunits of the *altepetl* (*calpulli*). Each *calpulli* had its own god and its own hierarchy (Lockhart 1992, p. 16). Elites in the *calpulli* mobilized labor for public works, agriculture, and religious activities (Cline 2000, p. 194). Some of these elites needed to transfer goods to an externally based government since some states wielded military, economic, and political hegemony over others. For example, the Triple Alliance of the Mexica, Tepanec, and Acolhuaque—known as the Aztec Empire— controlled much of central Mexico. All other states were subordinate to the Triple Alliance, and paid tribute and joined the Alliance military (Gibson 1964, p. 34). This hierarchical administrative structure facilitated the transfer of goods and labor from states in the periphery of the empire to the capital in the valley of Mexico.[11]

Colonists could plainly see the institutions of political authority and class differentiation in these high-hierarchy societies. The clothing of the ruling class, for example, was very different from that of commoners. Also, "lavish residences, stone-lined tombs, and sumptuary privileges" indicated the presence of an elite (Zeitlin 1989, p. 32). From a colonist perspective, these societies and their distinguishable institutions and personnel could offer a surplus based on a workforce that could not easily escape.

Other territories contained low levels of hierarchy where labor and tribute organization did not depend on formal multi-level institutions. Instead, labor and tribute collection depended on peer-pressure, kinship and community consent. If there was a leader at all, this chief or headman was concerned mostly with ceremony and war, and (typically) his authority depended on merit (e.g. success in war, healing powers), or age.[12] An example of this type of indigenous governance are the Guaraní in Paraguay where kinship played an important role.[13] Also, the Chichimecs, occupying the north of present-day Mexico had low degree of governance hierarchy. According to a historical account, "Even at the village level, tribute paying and community rotary labor were not known, nor was there a strong chief empowered to demand levies" (Lockhart and Schwartz 1983, p. 52). The Chontal and the Huave in the present-day state of Oaxaca in Mexico and

[9] Draft labor in the Andes, for example, was called *mita*, and the same system in Mesoamerica was called *coatequitl*. See Macleod 2000, p. 5-6, and Lockhart 1992, p. 16. Also Villamarín and Villamarín 1999 and Newson 1985.

[10] For more on social factors relating to escape see Service 1955. See Lockhart 1992, p. 52-56, for mobility of warfare.

[11] Furthermore, the peoples of central Mexico had pre-hispanic experiences of conquest (Cline 2000, p. 198). *Altepetl* were in constant competition with each other, which resulted in their frequent restructuration and in the formation of expansive units as a consequence of alliances (Bartolomé 1992, p. 255), like in the case of the Aztec Empire.

[12] See Greif 1994 for a description of community-based enforcement.

[13] See for instance Lockhart and Schwartz 1983, p. 260.

other tribes in present-day Guerrero offer other examples of low governance hierarchy. Colonists viewed them as "people on a relatively primitive cultural level with simpler social and political institutions" (Gerhard 1993, p. 5). These societies often consisted of hunters and gatherers, had small food surpluses, and were "considered barbarians by the Mexica [Aztecs]" and other peoples living in the more complex societies. These low-hierarchy societies "had literally...no permanent settlements" (Lockhart 1992, p. 56). Workers in these societies were organized based on age and sex, if at all. They could escape more easily than those in societies with higher degrees of hierarchy. Indigenous peoples accustomed to low-level hierarchy were more self-sufficient.

Finally, some territories contained a middle level governance hierarchy. These territories fall into a middle category because they lacked the multi-level political administration of high-hierarchy regions and the fully nomadic nature of low-hierarchy regions. Indigenous leaders either organized communal labor on a regular basis for religious or military needs, or collected tribute locally. Examples include the Arawaks in the Caribbean islands and the Chibcha of present-day Colombia. There was some asymmetry in political power in these cases, but it was nominal and on the basis of personality.

In summary, we categorize indigenous governance into three levels of hierarchy based on labor mobilization and tribute collection. Regions with high-level hierarchy offered a surplus to the leader and contained a stationary labor force that could not easily escape. As hierarchy declined, surplus also declined and the workers' ability to escape increased. The next section analyzes how these differences in indigenous governance hierarchy influenced colonist labor institution building.

FORMAL MODEL

Colonists found diverse institutional and natural endowments across the Americas. To profit from the regions and their resource wealth, colonists required indigenous, or other, labor to exploit those endowments. We propose a mechanism to explain institutional persistence in light of differences in colonists' abilities to exploit existing labor. The modeling is kept simple and is directed at analyzing the mechanism through which indigenous leaders can serve the colonist in exploiting existing labor.

Players, Strategies, and Payoffs

We model the encounter between a colonist and an indigenous leader. The colonist wants to exploit resource wealth, r. A region has a fixed number of workers and high or low resource wealth, $r \in \{r_L, r_H\}$. The indigenous leader has labor organization technology t.[14] The colonist can exert effort ($e = 1$) or not ($e = 0$) to change the labor organization technology to t_c at cost c. Total output Y depends on whether the indigenous leader mediates (denoted by $I = 1$) or not ($I = 0$) between the workers and the colonist, on the labor organization technology, and on resource wealth: $Y = f_I(t, r)$. We assume that f_I is increasing in t and r, nonnegative, and $f(0, r) = 0$ for all r. Workers are paid a reservation wage. We assume that Y and f_I are net of labor input costs.

The colonist chooses whether to exert effort to change the labor organization technology before output is realized. If the colonist does not exert effort ($e = 0$), the colonist and the indigenous leader bargain for a division of the total output. We adopt the Nash bargaining solution.[15] The in-

[14] There is evidence that upon arrival colonists inquired about the types of resources and the forms of labor governance. See, for instance, Villamarín and Villamarín 1999, p 579. Furthermore, colonists obtained early on an idea of the functioning of each society. They could not understand the detail of all the norms, beliefs and organization. However, indigenous leaders and differentiation were often visible. See also Lockhart and Schwartz 1983, p. 79.

[15] Even though cooperative Nash bargaining does not explicitly specify the bargaining procedure, Binmore et al. (1986) show that for an appropriate choice of the disagreement point, the Nash solution approximates the perfect equilibrium outcome of the alternating offers model in Rubinstein (1982) when the length of a single bargaining period is sufficiently small.

digenous leader transfers b to the colonist upon agreement. If an agreement is reached, the indigenous leader mediates between the colonist and the workers, and the total output is: $f_1(t,r)$. If agreement breaks down total output falls to $f_0(t,r)$, and the fall in output is larger the lower the labor organization technology: $f_1(t,r) - f_0(t,r) > f_1(t',r) - f_0(t',r) > 0$ for all $t' > t$. The indigenous leader obtains outside option $\bar{u}$. If the colonist exerts effort ($e = 1$), the indigenous leader is replaced by the colonist and total output—now appropriated in its entirety by the colonist—becomes: $f_0(t_c,r)$.

The model identifies indigenous governance hierarchy with the labor organization technology, t. We interpret higher t as higher degrees of hierarchy. The labor organization technology affects (1) the total productivity, and (2) the contribution of the indigenous leader's mediation to the total output. The fall in total output once a leader is replaced is decreasing in t. This 'cost' from replacing the leader is higher as indigenous hierarchy decreases because it is easier to obtain compliance from workers, once colonists have replaced their leader, the higher the initial hierarchy of the society.[16] Our historical description of indigenous governance hierarchy in section provides justification for this. First, labor and tribute arrangements in hierarchic societies rely on institutionalized channels of authority, by means of a political administration and legitimate coercion. In contrast, in less hierarchic societies authority depends more on the charisma or skills of a specific person. The existing institutional infrastructure when indigenous hierarchy is high facilitates obtaining compliance from the workers in those regions. Second, the mobility of workers is higher in regions with low hierarchy. Thus it is less costly for workers to migrate rather than comply with the colonist in regions with low hierarchy.

In the model, effort increases the degree of hierarchy of the labor organization technology. We rarely observe institutional change going in the opposite direction (see the Data section). The colonist's effort leading to a more hierarchical organization, has a dual effect. It affects the total output, and it gives all the bargaining power to the colonist by dispensing with the indigenous leader's mediation. Effort increases the total output a colonist can obtain without the indigenous leader's mediation ($f_0(t_c,r) > f_0(t,r)$), but effort's effect on output relative to that obtained with the indigenous leader's mediation is ambiguous. The latter effect depends on the indigenous labor technology and on resources. The lower the level of hierarchy in indigenous institutions, the higher is $f_0(t_c,r)$. The higher the resources, and the higher the complementarity between resources and the new labor technology, the higher is $f_0(t_c,r)$.[17]

We proceed to analyze the game using backward induction to find the subgame perfect equilibrium.

Bargaining with the Indigenous Leaders

If agreement breaks down, the colonist pays the workers directly and obtains outside option $f_0(t,r)$. The agreement specified by the Nash solution to the problem described above is the solution to:[18]

$$\max_b [b - f_0(t,r)][f_1(t,r) - b - \bar{u}].$$

There are mutually beneficial agreements between colonist and indigenous leader as long as the surplus is positive. We assume $f_1(t_0,r) - f_0(t_0,r) \geq \bar{u}$. The following result provides the equilibrium division of the total output.

[16] Mahoney 2010 makes a similar argument about resistance of societies with low hierarchy. See pp. 26-27. Gerring et al. 2011 make a parallel argument to explain indirect rule.

[17] Complementarity here means, assuming differentiability, the change in f with respect to t as resource wealth changes; that is, $\partial f_0(t,r_H)/\partial t - \partial f_0(t,r_L)/\partial t > 0$. If the change is positive when resources are present, the labor organization technology and resources are complements; the higher the change, the higher the complementarity.

[18] The solution satisfies the four axioms formulated by Nash: scale invariance, efficiency, symmetry, and independence of irrelevant alternatives.

Result 1. *When there are mutually beneficial agreements for the colonist and the indigenous leader, in equilibrium the colonist obtains payoff:*

$$b = \frac{1}{2}\Big(f_1(t_0, r) + f_0(t_0, r) - \bar{u}\Big). \quad (1)$$

By negotiating with the leader and keeping the existing labor organization technology the colonist obtains a fraction of the output. Furthermore, the amount the colonist obtains is higher, the higher the degree of hierarchy of the labor organization technology. This is because the fall in output to $f_0(t, r)$ is lower the higher the initial level of hierarchy of the labor organization technology t. The colonist is able to extract more of the value from societies with hierarchies because replacing the leader is less costly. The cost of replacing the leader is in terms of the loss of compliance from the workers, as discussed above.

Effort to Change Institutions

Exerting effort to change the labor organization technology increases the output that the colonist can obtain lacking the indigenous leader's mediation. The result below follows from backward induction. To decide whether to put effort in new hierarchic labor institutions, the colonist compares his payoff from Result 1 above to the payoff he would obtain if exerting effort $e = 1$. The latter payoff is $f_0(t_c, r) - c$.

Result 2. *If the following inequality holds, in equilibrium the colonist does not exert effort ($e = 0$) and indigenous institutions, t, persist:*

$$f_1(t, r) + f_0(t, r) \geq 2[f_0(t_c, r) - c] + \bar{u}. \quad (2)$$

Otherwise, the colonist exerts effort $e = 1$ and new hierarchic institutions, t_c, prevail.

The inequality above shows that, given some cost c, whether institutions persist depends on two effects: (1) the sum of total output with and without the leader as a mediator, when the colonist exerts no effort: $f_1(t, r) + f_0(t, r)$, and (2) total output relative to cost as a result of the new organization technology when the leader is replaced: $f_0(t_c, r) - c$. The sum (1) is higher the higher the degree of indigenous hierarchy. Recall that the fall in output if agreement breaks down is smaller, the higher the degree of indigenous hierarchy. Therefore, the higher the initial degree of hierarchy, the higher is the left hand side of the inequality above. Total output $f_0(t_c, r)$ is increasing in r, and higher the higher the complementarity between the new hierarchic labor institutions and the resource wealth. Therefore, when resource wealth is high it is more likely that the increase in output offsets the cost of creating new hierarchic institutions. Combining the two effects, the inequality above is less likely to hold when resource wealth is high, and high indigenous hierarchy is lacking.

The analysis shows that colonists were more likely to change institutions when resources were present at lower initial degrees of hierarchy as long as the increase in output offset the cost of creating new hierarchic institutions. Otherwise, institutions persisted for any initial level of hierarchy in indigenous labor organization. Colonists kept the labor hierarchy in regions with higher hierarchy because the lower cost of replacing the indigenous leader allowed them to obtain a higher share of the output. Colonists also gained by keeping the degree of labor hierarchy in regions with low hierarchy when there were no highly profitable resources present. In this case, the colonists needed to transfer a higher share of total output to the indigenous leader, but replacing the leader led to a larger loss in output.

The analysis implies the following testable predictions. (1) **Institutional Persistence Prediction**: as indigenous governance hierarchy increases, colonists were less likely to implement hierarchical labor institutions and more likely to use the existing labor hierarchy. (2) **Institutional Change Prediction**: colonists were more likely to create new labor hierarchies in territories with high resource wealth that lacked high levels of indigenous governance hierarchy.

DATA

To test the predictions regarding persistence and change from indigenous institutions to early colonial institutions, we create an original dataset including 444 subnational territories in the Americas drawing from ethnographic and secondary sources in the historical literature (see Appendices B through D). By studying the Americas, we avoid the potential endogeneity problem we would face if studying non-American colonies. Europeans traded with Asia, Africa and the Middle East for centuries preceding colonialism. Through these trade relationships, Europeans might have influenced the indigenous institutions that were in place as the colonial project formally began. But in the Americas, Europeans lacked trade relationships or any other form of contact prior to the colonial expeditions. Because Europeans could not have influenced the indigenous institutions they encountered in the Americas, the Americas offer a relatively clean test of our hypotheses.

The unit of analysis is the "territory", the largest political demarcation within present-day countries (i.e. 33 states in Mexico, 10 provinces and 3 territories in Canada, 9 departments in Bolivia, and so on). This disaggregation of present-day countries improves on existing quantitative studies, which use present-day national boundaries to analyze indigenous (Gennaioli and Rainer 2007, Englebert 2000 and Ertan and Putterman 2007) and colonial institutions (La Porta et al. 1997, 1998; Lange et al. 2006; Mahoney 2010). Mexico, for example, contained high, medium and low indigenous hierarchies during the pre-colonial period, and different types of early colonial institutions, ranging from free labor to slavery. By aggregating many different types of indigenous and colonial institutions during either the pre-colonial or early colonial periods, cross-national data analysis are very far removed from local choices about labor institutions. Our data improve on existing cross-national quantitative work, therefore, by reducing the number of institutions contained in each unit.[19]

Expeditions across these territories in the Americas occurred over 333 years, and settlement took over four centuries, 429 years. We code the expedition arrival as the first expedition on record marking the arrival of colonists to the territory in question. During the first European expedition, Spain reached the Dominican Republic, Haiti, Cuba and the Bahamas in 1492. The United Kingdom launched the last expedition in 1825 into the Yukon province of Canada. The median expedition year was 1530. On average, colonists settled 83 years following an expedition. The settlement year refers to the first year in which a governor or mayor (whoever arrived first) governs the territory in question.[20] The first settlement was in 1500 in the Dominican Republic, and the last was in 1929 in Aisen, Chile. The shortest amount of time between expedition and settlement was one year (in Cusco, Peru, for example), and the longest was 409 years (in Aisen, Chile). By 1550, one-third of the territories were settled. Fifty-eight percent of the territories were settled by 1600, 77% by 1700, and 92% by 1800. All territories were settled by 1929. Figure 1 demonstrates the distribution of settlement over time.

Dependent Variable: Colonial Labor Institutions

We investigate the influence of indigenous governance on the development of colonial labor institutions involving *free labor*, *assigned labor*, and *African slavery* fifty years after colonists settled. The three types institutions were coded as present, "1", or absent, "0".

Free Labor

We code free labor as present in a territory when we found evidence of direct agreements between laborer and employer where

[19] Below, we discuss steps we took to address the presence of more than one indigenous or colonial institution in each territory.

[20] This approach follows Lange et al. 2006 who relate the onset of colonialism with the foundation of major settlements that established control over the indigenous population.

a laborer received payment for his or her work, and the laborer was free to move. The agreements were sometimes contractual and did not involve coercion, quotas or intervention by crown officials. While free labor was most prevalent in urban areas, we found it throughout Canada, and the present-day United States (Figure 2). It was also scattered in parts of Mexico, Central America the Caribbean, and South America.

Assigned Labor

We code assigned labor as present in a territory when labor arrangements involved quotas or intervention by royal officials that constrained the mobility of the existing indigenous labor force. In contrast to free labor, laborers under assigned labor received little or no payment for their work. One example is the *repartimiento* institution implemented by the Spanish. This was a system of quotas where colonists had to petition crown officials in the colonies for workers. Laborers tended colonist property on a rotational basis for a fixed, low wage. The legal work period was one or two weeks and wages were lower than those paid for free labor.[21] Another example is the Spanish *encomienda*, a legal institution that assigned a number of indigenous people to a colonist. Colonists seized tribute and labor from indigenous peoples, supposedly in exchange for protection and instruction in the Catholic faith. Workers in encomiendas were nonsalaried, but owned the lands where they worked. In addition to the Spanish, the Dutch, English, French, and Portuguese implemented assigned labor. Assigned labor was present in Mexico and parts of the United States (Figure 3). It was also present throughout Central America, South America, and the Caribbean.

African Slavery

African slavery was a third type of labor institution common across the Americas during early colonialism. We code African slavery as present in a territory when colonists used slave labor from Africa. African slavery is similar to assigned labor in that both labor institutions involved hierarchical relationships. Crucially, assigned labor and slavery differ in that slavery required new workers and assigned labor involved using existing indigenous laborers. Slavery was widespread throughout the Americas. It was present throughout northeast Canada, southeast United States, much of the Caribbean, parts of Central America, and territories in the north and east of South America (Figure 9).

African slavery was present in 29% of territories (128 out of 444), free labor was present in 43% of the territories (192 out of 444), and assigned labor was present in 60% of territories (265 out of 444). It is possible that the same region contained more than one labor institution since we code whether any territory includes free labor, assigned labor or slavery. None of the territories, however, contained all three institutions. Only 7% (32 out of 444) contained both free and assigned labor, 16% contained both assigned labor and slavery, and 9% included both free labor and slavery. Table 1 provides descriptive statistics.

Independent Variables

Our prediction on institutional persistence is that higher levels of indigenous governance hierarchy reduce the likelihood that colonists worked alongside indigenous peoples, and increase the likelihood that colonists took over indigenous leaders and their labor hierarchies. That is, as indigenous governance hierarchy increases, free labor should be less likely and assigned labor should be more likely. Regarding institutional change, the formal model predicts that colonists were more likely to create new hierarchy, measured by African slavery, when they encountered profitable natural resources in a territory with low or medium indigenous governance hierarchy. Thus, we code two main independent variables of interest: indigenous governance hierarchy and natural resources.

[21] For example, according to Haring, "by the mining ordinances of the viceroy Toledo, *mitayos* assigned to the mines in Peru were to be paid two and a half reals a day, free laborers three and a half reals."

Indigenous Governance Hierarchy

Indigenous governance hierarchy refers to the type of labor governance and tribute collection indigenous people organized in each territory before colonists arrived. We code labor governance and tribute collection fifty years before the colonial expedition reached the territory in question. The fifty-year lag allows us to code indigenous institutions close enough to the colonial expedition so that we observe institutions colonists likely observed, but far enough before colonists arrived so that colonists could not influence the indigenous institutions we code.

We code indigenous labor on an ordered three-point scale. Territories with no specialized political or religious institutions that could mobilize labor are coded as "0". When indigenous leaders could mobilize communal labor, the territory was coded as "1". Territories with a system of draft rotary labor were coded as "2".

As with indigenous labor organization, indigenous tribute collection is coded on an ordered three-point scale. Territories with no systematic collection are coded as "0".[22] Territories with systematic local collection were coded as "1", and territories with systematic collection and transferring tribute to an authority external to the indigenous society are coded as "2". Indigenous labor and tribute are positively correlated at 0.65.

Using the data on indigenous labor and tribute, the degree of indigenous governance hierarchy can be separated into three levels: low, medium, and high. Territories where labor and tribute both equal "0" are coded as having *low indigenous governance*. These territories contained societies with no specialization of labor, where some individuals functioned as leaders but only for specific roles and under specific circumstances, such as war. Kinship was stressed in economic and political exchange. When labor and tribute were not both "0" or "2", we coded *medium indigenous governance*. These territories had some political leadership with the ability to obtain labor and resources from the local community on a regular basis, but lacked routinized labor drafts. Territories where both labor and tribute were coded as "2" were coded as having *high indigenous governance*. In these territories, a central authority and intermediary authorities administered the relationship between communities and the elite.[23]

Figure 6 demonstrates the distribution of indigenous labor organization, tribute collection, and governance hierarchy.[24] While 13% of territories contained the lowest-level labor organization, 50% contained the lowest-level tribute collection. The two categories overlap in 12% of territories, and the territories in the overlap are coded as containing low-levels of indigenous governance hierarchy. This type of indigenous institution was present in throughout Canada (Figure 5). It was also present in the north-central United States, West Virginia, California, northern Mexico, Belize, Costa Rica, and Guatemala. In South America, it was present in central parts of the continent, as well as in Argentina, French Guiana and Guyana.

On the other extreme, 31% of territories had labor drafts and 33% had external tribute collection. The 28% percent of territories that contained both are coded as having high-level hierarchy. High-level hierarchies were present mainly in the Aztec regions of central Mexico, El Salvador, Guatemala, and Honduras, and in the Inca areas of South America, including northern Argentina, Bolivia, Chile, Colombia, Peru, and Venezuela.

The vast majority of territories, the remaining 60%, had medium-level hierarchy.

[22] There could be some tribute collection for war or other purposes, but the tribute had to be requested each time.

[23] Only 2% of territories were coded as containing more than one type of indigenous tribute organization, and 10% of territories were coded as containing more than one type of indigenous labor organization. In these cases, we chose the lower estimate because a scan of the data revealed that the lower estimate is more likely to cover a wider percentage of the actual terrain of the territory in question. Nevertheless, using the high estimate does not change results (Table A.1).

[24] The main results hold whether we use the indigenous governance hierarchy measure or the measures of indigenous labor (Table A.2) or indigenous tribute (Table A.3).

Most of the territories in this category (77%) contained communal labor and no systematic tribute collection (labor = 1 and tribute = 0) or communal labor and local tribute collection (labor =1 and tribute = 1). Medium-level hierarchies were present throughout most of the United States and Canada, a few areas in mainly Western Mexico, and Central America, much of Brazil, along with parts of every other country in South America, except French Guiana.

Natural Resources

The second independent variable of interest is natural resources. We identify three resources that colonists sought to exploit in the Americas throughout the colonial period: minerals, sugar, and tobacco. Colonists sought minerals, and especially silver, because minerals were the main means of exchange in Europe at the time.[25] Europeans also sought to cultivate sugar, which became popular in the European diet during the 1500s. Large scale production became possible in the 1400s with the technological innovation of the two-roller mill (Schwartz 1985, p. 183). Tobacco was crucial to two markets: Europe (for the better grade) and the African coast (for the lesser grade) (Lockhart and Schwartz 1983, p. 213). We code each territory as "1" for minerals, "1" for sugar, or "1" for tobacco if historical sources indicate that colonists were aware of, or already exploiting, the respective resource fifty years after the expedition year, and "0" otherwise.

Forty-six percent of the territories (205 out of 444) had minerals, 19% (86 out of 444) had sugar, and 21% (91 out of 444) had tobacco. Resources and indigenous governance hierarchy were not strongly correlated, however, with none of the pairs exceeding 0.3 (Figure 8). Some tropical areas in the Caribbean, Brazil and southeast Mexico were optimal for growing sugar and tobacco, for example, but lacked pre-existing societies with high levels of indigenous hierarchy. While colonists found silver and gold mines in high-indigenous hierarchy territories of Central Mexico and the highlands of Peru, colonists also found mines in territories with low or medium hierarchy, such as present-day Zacatecas in the northeast of Mexico and in Potosí in the highlands of Peru. Unlike Europeans, indigenous peoples did not commercialize minerals, nor did they have technology for the extraction of minerals from ore. At most, the highest indigenous authorities used gold and silver as part of their attire.

Sugar and tobacco are correlated with slavery (0.46 and 0.40, respectively), but not with free or assigned labor. Minerals, however, are not correlated with slavery, but are positively correlated with assigned labor (0.4), and negatively correlated with free labor (0.4).

The institutional change hypothesis predicts that profitable natural resources required new forms of organized hierarchy, such as African slavery, when indigenous governance hierarchy was low or medium. We therefore create a binary variable coded as "1" if the territory contained either minerals, sugar, or tobacco, and coded as "0" otherwise. We also create a binary variable coded as "1" if the territory contained either low or medium indigenous hierarchy and "0" otherwise. The raw data indicate that African slavery was more common in territories with the combination of resources and either low or medium indigenous hierarchies (see Figure 9).

The raw data also appear to support the institutional persistence prediction. There appears to be little change between precolonial institutions and early colonial institutions using existing labor. High indigenous governance in Figure 5 appears to overlap with assigned labor in Figure 3, and low and medium governance hierarchy appears to overlap with free labor 2. The same pattern is visible in Figure 7. When indigenous hierarchy increases from Low to Medium to High, the percent of regions with free labor declines from 70% to 45% to 12% (Figure7 A) respectively, and the

[25] Resource wealth is contingent on the technological and cultural context of a society. For a thorough discussion of resources as a dynamic concept functionally related to a complex of variables see Glade 1969, p. 14-21.

precent of regions with assigned labor increases from 33% to 59% to 88%, respectively (Figure7 B). Ninety-five percent (182 out of 192) of territories with free labor contained low or medium indigenous governance hierarchy before colonists arrived. Similarly, 90% (239 out of 265) of territories with assigned labor contained high or medium indigenous hierarchy. In contrast, only 8% of territories with African slavery, a high-hierarchy colonial institution using outside labor, contained high indigenous hierarchy before colonists arrived.

Controls

While the raw data appear to support our persistence and change hypotheses, several factors could confound the relationships. We control for two types of potentially confounding factors: geographic conditions and distance to commercial ports.

First, to account for the possibility that colonists were more likely to settle in regions that had lower rates of malaria and other disease (Acemoglu et al. 2001), we control for the elevation of each territory (above sea level in meters). Territories with higher altitude should be less likely to have disease.[26]

We also control for geographic latitude and precipitation in each territory. These two variables account for any natural resources, particularly related to agriculture, that we may not have coded. Also, it is important to control for altitude, latitude and precipitation because these variables may have contributed to the development of certain types of indigenous organization (Diamond 1997, Sachs 2000). The correlation between these factors and indigenous hierarchy, however, does not exceed 0.21, except for altitude and high indigenous hierarchy at 0.4 (Figure 10).

Finally, we control for the distance from each colony to the nearest port to account for the possibility that colonists may be more likely to settle in areas closer to export ports. The major ports included: Buenos Aires, Cuba, Panama, Maryland, Massachusetts, New York, Pennsylvania, South Carolina, and Veracruz. The data for altitude, precipitation and latitude come from the Shuttle Radar Topography Mission and are available from "Global Climate Data". We calculated the data for distance using spatial data from "Global Administrative Areas".

[26] We control for settler mortality using the cross-national measures offered by 2001 and 2006 (Table A.5 and Table A.6). Results support the hypotheses when including these controls.

EMPIRICAL ANALYSIS

Because any territory can contain more than one labor institution, we analyze colonists' choice to adapt or build new hierarchy by modeling the probability of each colonial institution separately in each territory i using a probit regression:

$$\begin{aligned} Pr(Y=1) = \Phi[\beta_0 + \beta_1 \text{M indig. hier}_{\,i} + \\ \beta_2 \text{H indig. hier.}_i + \beta_3 \text{minerals}_i \\ + \beta_4 \text{sugar}_i + \beta_5 \text{tobacco}_i \\ + \gamma \times \text{controls}_i + \epsilon_i] \end{aligned}$$

The function Φ refers to the standard normal distribution function. According to the model, the probability of free labor, assigned labor, or slavery depends on indigenous governance hierarchy, resources—minerals, sugar, and tobacco—a vector of controls and an error term (ϵ). Each territory has either low, medium, or high indigenous governance. As a result, the model drops one of the three binary variables representing the level of hierarchy, treating it as the baseline against which the other two levels of indigenous hierarchy can be compared. In the main analysis, the low category is the baseline category against which the coefficients on medium and high indigenous governance are compared. (Table A.9 presents the results for both low and high as baseline categories.) A positive and statistically significant coefficient on medium indigenous governance represents the likelihood of the dependent variable as indigenous governance hierarchy increases from low to medium. Similarly, a positive coefficient on high indigenous governance represents the likelihood of the dependent variable as indigenous governance hierarchy in-

creases from low to high. We focus our analysis on the increase from low indigenous governance to high indigenous governance (and, therefore, the coefficient on high). Because we use the same regression model across the three dependent variables, we ensure that the results are not an artifact of a correlated error structure by also running seemingly unrelated regressions (Tables A.11 and A.12).

Results

Table 2 presents the marginal effects of each predictor variable on each dependent variable. Probit coefficients are available in Table A.9, and the linear predictions are available in Table A.10. The marginal effects represent the change in probability given all covariates are set at their mean. Consistent with the institutional persistence prediction, higher levels of indigenous governance hierarchy reduces the probability of free labor (model 1 in Table 2). As indigenous hierarchy increases from low to high, the probability of free labor declines by 40% holding the other variables at their means. The result is statistically significant at the 99% level. Furthermore, increasing indigenous governance hierarchy increases the probability of assigned labor (model 2) by 37%. The result is statistically significant at the 99% level. Thus, multivariate-regression results are consistent with the patterns suggested by the raw data indicating that indigenous governance hierarchies persisted as either assigned or free labor.

Indigenous governance hierarchy has no effect on the likelihood of slavery, however. Important determinants of slavery include minerals, sugar and tobacco, which increase the likelihood of slavery by 13% and 33%, and 24%, respectively (model 3). We assess whether colonists were even more likely to introduce slavery in territories with resources that had either low or medium indigenous governance (institutional change prediction). To do so, we interact the presence of any of the three natural resources with the presence of low or medium indigenous governance:

$$Pr(Y = 1) = \Phi[\beta_0 + \beta_1(\text{L or M indig hier})_i + \beta_2\text{resources}_i + \beta_3(\text{L or M indig hier*resources})_i + \gamma \times \text{controls}_i + \epsilon_i]$$

As predicted by our formal model, the interaction of resources and low or medium indigenous governance hierarchy is positive and statistically significant at the 99% level (Table 3). If resources are not present at low levels of hierarchy, however, the likelihood of slavery declines by 35%.[27] We also find that at high levels of indigenous hierarchy (low or medium hierarchy is zero), resources do not change the likelihood of slavery. Thus, resources do not incentivize colonists to undertake the cost of bringing in outside labor when there is high hierarchy, and therefore, an existing labor force that cannot easily escape.

Three important threats to the validity of the findings need to be considered. The first is the origin of colonists. Some colonists may have been inclined to build institutions based on their cultures or crown policies. For example, Spanish settlers may have seized opportunities for *repartimiento* because the Spanish crown outlawed slavery. We therefore include colonist-nation fixed effects (Table A.7). The inclusion of these fixed effects does not change the results, but they do indicate that colonist nation of interest makes a difference to colonial institution building. There were eight nations involved in settlement across the Americas, including Spain, the United Kingdom, Portugal, France, the Netherlands, the United States, Argentina, and Chile. The United States settled some of its west and Argentina and Chile expanded south. In Table A.7, the results for each binary variable representing the colonist nation of interest

[27] When including the interaction term individual independent variable predictions are indexed at zero for each of the remaining interaction variables. Thus, the coefficient on resources represents the influence of resources on the probability of slavery when low or medium hierarchy is set at zero, and the coefficient on low or medium indigenous hierarchy represents the influence of such hierarchies on the probability of slavery when resources are set at zero.

needs to be interpreted relative to Spain, the missing baseline category. Thus, the British and French were more likely to implement free labor than the Spanish, but less likely to implement assigned labor than the Spanish. The Portuguese were less likely to implement assigned labor than the Spanish, but more likely to implement slavery. The Netherlands were also more likely to implement slavery than the Spanish. And the three late-colonizers were more likely to implement free labor in their territories and less likely to implement assigned labor. Only the United States was less likely to implement slavery than the Spanish in its new territories.

Another threat to validity is expedition arrival time period. Colonists might have been more likely to choose a certain type of labor arrangement at certain moments in time because of the successes of a specific model. For example, when the Virginia Company first arrived to Jamestown, the British settlers attempted to replicate the manorial system and build a labor system similar to an *encomienda* (which failed in a few years).[28] Another reason time may systematically influence results it that many indigenous peoples died as a result of disease from settlers. Over time, the demographic collapse would have limited possibilities for exploiting indigenous labor. Also, over time, our natural experiment becomes less clean, as colonial labor institutions in one territory might have influenced indigenous governance hierarchy in a nearby, but not-yet-settled territory. Despite these concerns for how time may confound our findings, the results are consistent after including fixed effects for the decade in which colonists arrived to the new territory (Table A.8).

A final important threat to validity is population density. Population density may influence colonial institution building if colonists chose to extract from more populous territories (Acemoglu et al. 2002b). Population density is not a control in our baseline model because subnational data on population are not reliable. Instead, we obtained national-level population density data from Acemoglu et al. (2002b). We find, consistent with Acemoglu et al. (2002b), that population density in 1500 positively affects the likelihood of assigned labor and negatively affects the likelihood of free labor (Table A.4). Controlling for population, however, does not affect the influence of indigenous governance hierarchy on these colonial institutions.[29]

Acemoglu et al. (2001) also argue that colonists were more likely to build hierarchical institutions in territories where fewer colonists could settle. They predict that settler mortality is correlated with hierarchical colonial institutions. Of our geography controls, altitude is intuitively related to settler mortality rates.[30] While our data on slavery support their argument, our data on assigned labor do not. As altitude declines (and settler mortality therefore increases), the hierarchical institution of slavery was more likely. As altitude increases, however, the hierarchical institution of assigned labor was more likely.

Combined, these findings support the institutional persistence and institutional change predictions. The degree of hierarchy of indigenous governance institutions persisted in colonial labor institutions. But colonists also introduced new forms of hierarchy. The combination of resources and low or medium indigenous governance hierarchies appears to have prompted colonists to organize new hierarchical labor organization where they brought African slaves to the colonies. The hypotheses are supported in the raw data, and after accounting for potentially confounding variables. We also find that indigenous governance hierarchy and resources influence the type of colonial

[28] See Galeson 1996, p. 136-138.

[29] While regions with high hierarchic governance invariably had higher populations densities, the converse is not necessarily true. Not all social groups with high population densities have a high degree of hierarchy. See Carneiro 1967 for a treatment of the relationship between population density and social complexity.

[30] The correlation between average national-level altitude and settler mortality is not as high as we expect: 0.03 using Acemoglu et al. 2002b measure and 0.17 using Albouy 2006 measure. There is, however, much debate on the accuracy of settler mortality data (see Albouy 2006 for example).

labor institution after including fixed effects for the national origin of the settlers, and including fixed effects for the time period in which the expedition occurred.

CONCLUSION

What explains persistence in colonial labor arrangements? We find that colonists often implemented labor institutions that reflected indigenous governance hierarchies. This helps account for why some colonies had free labor and others had assigned labor. However, we also find that when colonists discovered highly profitable resources that required novel hierarchical institutions, they built new hierarchical institutions, namely African slavery.

Because our analysis suggests that the contemporary study of institutions must incorporate the role of prior institutional elements as well as resources, it is important to consider how our results agree with Engerman and Sokoloff (1997, 2000, 2006) and Acemoglu et al. (2001, 2002b). Both seek to explain differences in today's economic development by reference to history. Engerman and Sokoloff emphasize natural resource endowments while Acemoglu et al. emphasize settler mortality and prosperity. We demonstrate when and how resource endowments and the indigenous institutions that likely supported prosperity before colonists arrived, matter for future institutional development. Moreover, we suggest that the history of institutions that is relevant for understanding differences in today's economic development predates European colonialism.

The results here are also consistent with existing studies of institutional transfer and of endogenous institutions. In the endogenous institutions literature, certain institutions are more or less sensitive to exogenous shocks. In our analysis, the degree of hierarchy influenced the constraints facing colonists and indigenous peoples, and led to institutional change in some cases and persistence in others. In the language of Greif and Laitin (2004), institutions with hierarchies are self-enforcing for a larger set of 'quasi-parameters' than are institutions with low degree of hierarchy.

An open question that is beyond the scope of this paper is what are the conditions and processes occurring since early history that led to indigenous governance hierarchies in some regions of the Americas but not in others. Physical geography and the relative abundance of resources valued by specific societies at specific periods in history may be key factors leading to institutional divergence.

TABLE 1: **Descriptive Statistics**

Variable	**Mean**	**SD**	**Min**	**Max**
Free Labor	0.43	0.50	0	1
Assigned Labor	0.60	0.49	0	1
AfrSlavery	0.29	0.45	0	1
L Indig. Hier.	0.19	0.40	0	1
M Indig. Hier.	0.62	0.49	0	1
H Indig. Hier	0.20	0.40	0	1
Minerals	0.46	0.50	0	1
Sugar	0.19	0.40	0	1
Tobacco	0.21	0.40	0	1
log(Altitude)	5.91	1.33	1.13	8.29
Precipitation	1.46	0.77	0.02	5.18
Latitude	5.40	23.32	-54.33	71.02
log(Distance)	14.09	3.01	2.30	16.12

TABLE 2: **Colonial Labor in the Americas**

	(1) Free	(2) Assigned	(3) Slavery
M Indig. Hier.	-0.138*	0.196***	0.094
	(0.072)	(0.070)	(0.061)
H Indig. Hier.	-0.399***	0.370***	0.072
	(0.056)	(0.055)	(0.091)
Minerals	-0.370***	0.267***	0.133***
	(0.049)	(0.051)	(0.051)
Sugar	-0.254***	0.111	0.328***
	(0.077)	(0.091)	(0.087)
Tobacco	0.062	-0.205**	0.241***
	(0.094)	(0.097)	(0.089)
log(Altitude)	-0.045*	0.050**	-0.064***
	(0.024)	(0.023)	(0.022)
Precip.	-0.085**	0.154***	-0.030
	(0.036)	(0.037)	(0.032)
Latitude	0.002	-0.002**	0.005***
	(0.001)	(0.001)	(0.001)
log(Distance)	-0.024**	0.035***	-0.007
	(0.010)	(0.011)	(0.007)
Observations	444	444	444

Probit analysis. The table presents marginal effects of each predictor given all covariates are at their mean. Low indigenous hierarchy is the baseline. Standard errors in parentheses* sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE 3: **Interaction of Resources and Indigenous Governance Hierarchy**

	(1) Slavery
L or M Indig. Hier.	-0.348***
	(0.121)
Resources (Min, Sug, or Tob)	-0.185
	(0.123)
L or M Indig. Hier.XResources	0.516***
	(0.101)
log(Altitude)	-0.112***
	(0.020)
Precip.	-0.057*
	(0.031)
Latitude	0.004***
	(0.001)
log(Distance)	-0.001
	(0.007)
Observations	444

Probit analysis. The table presents marginal effects of each predictor variable given all covariates are at their mean. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

FIGURE 1: **Settlement in the Americas, 1500-1929**

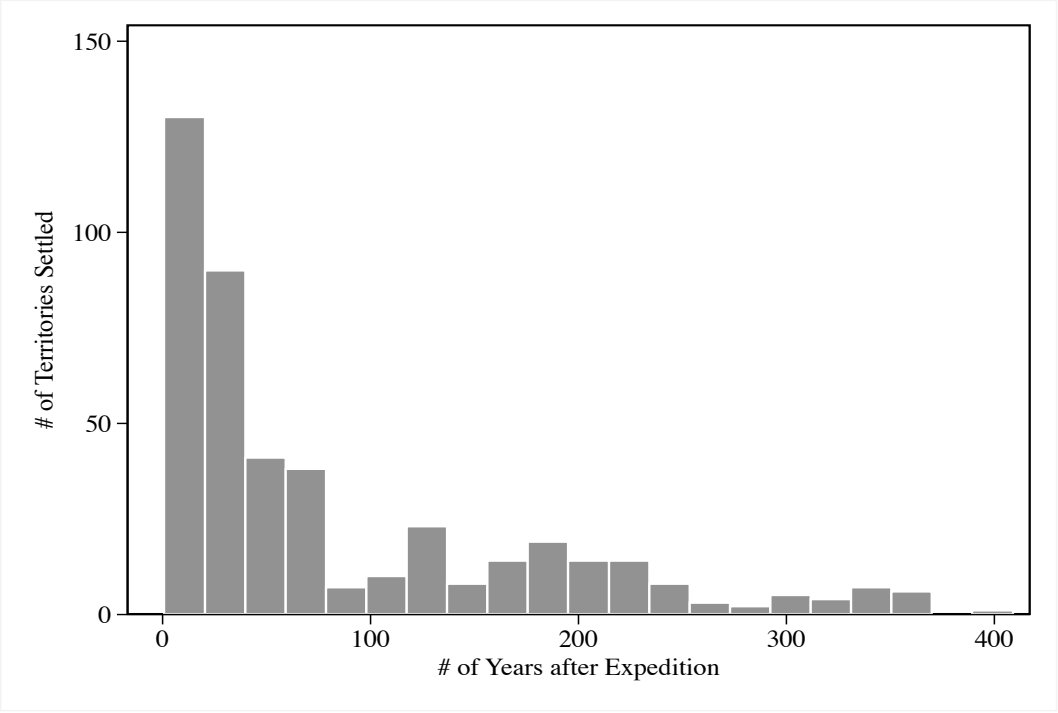


FIGURE 2: **Map of Free Labor**

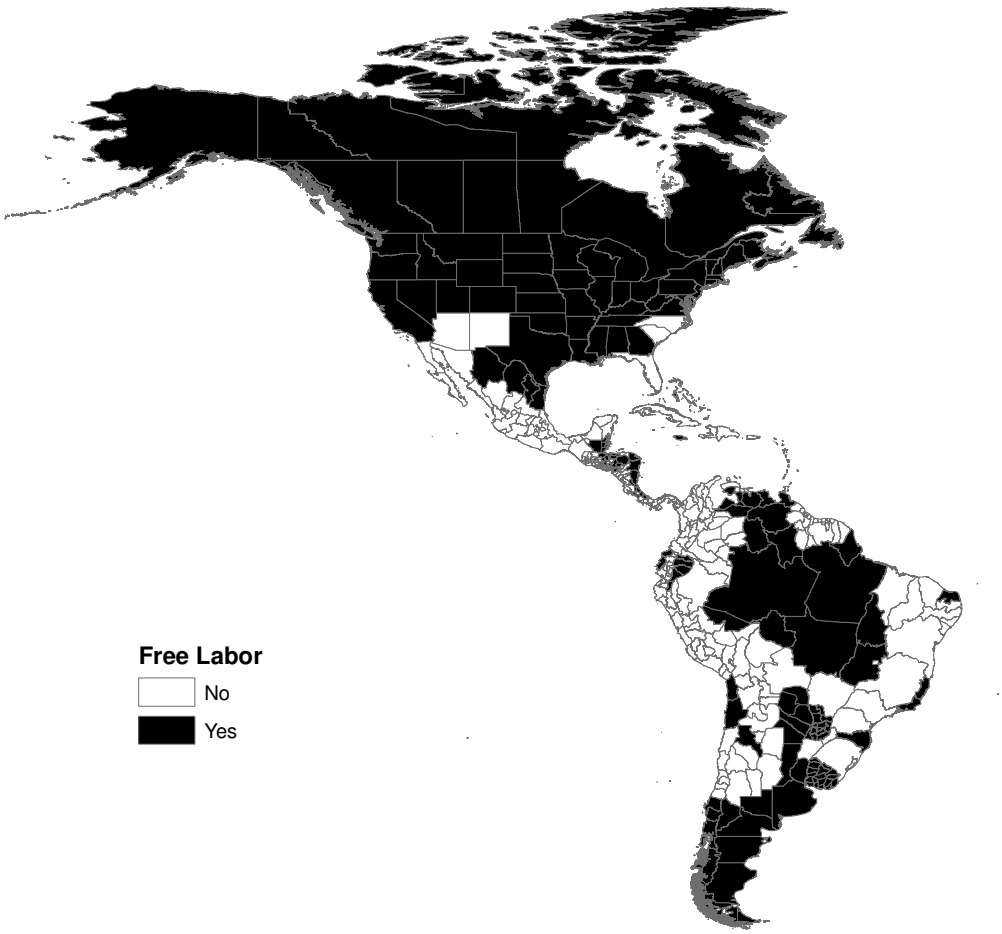


FIGURE 3: **Map of Assigned Labor**

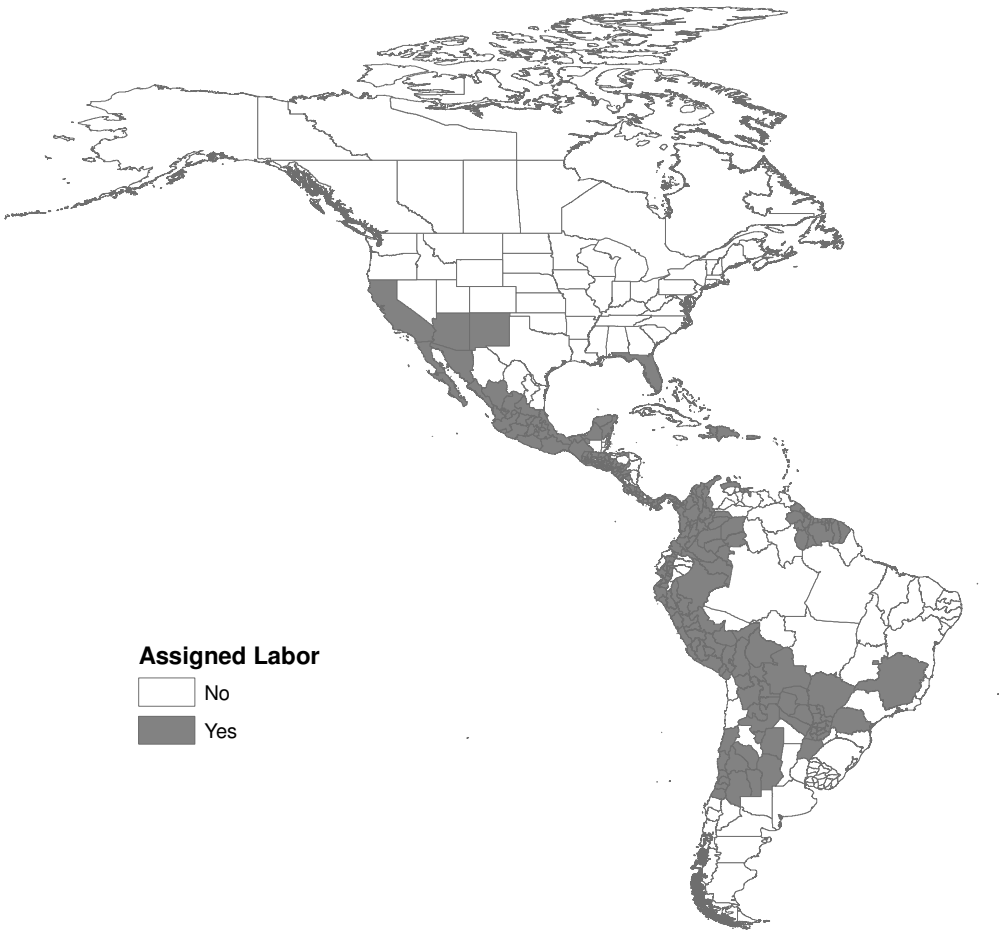


FIGURE 4: **Map of African Slavery**

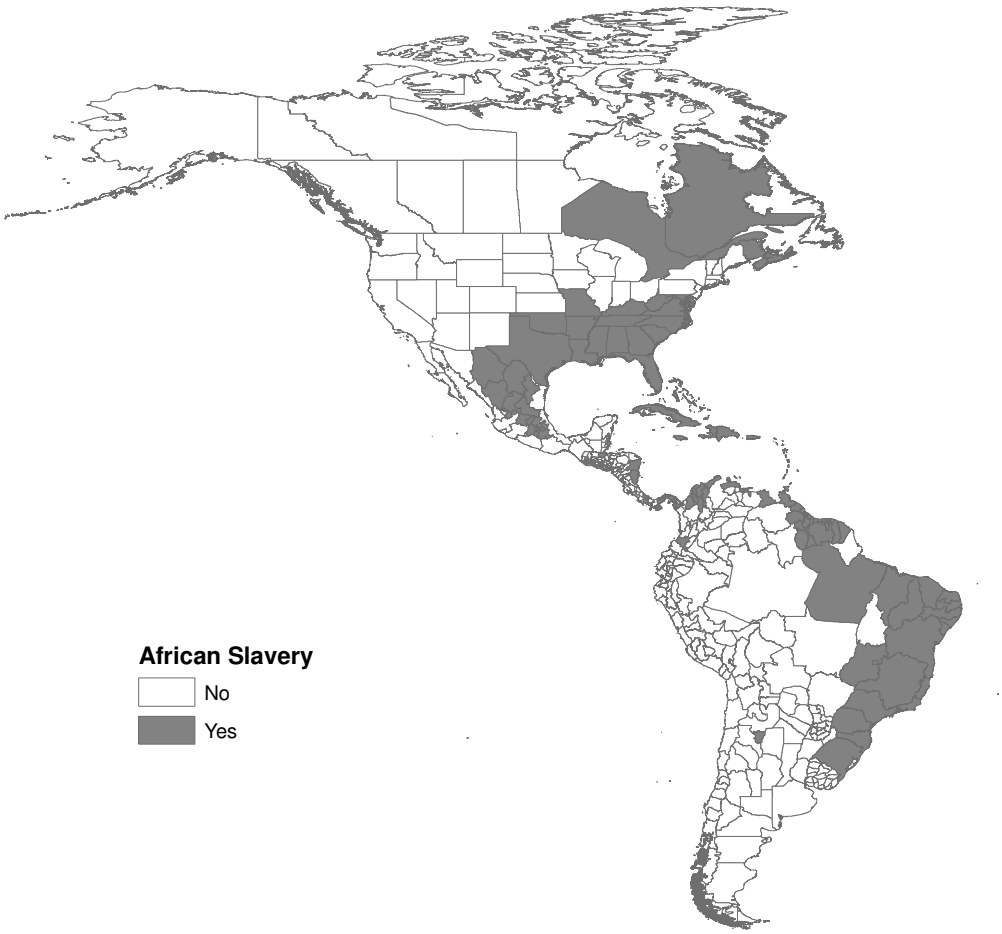


FIGURE 5: **Map of Indigenous Governance Hierarchy**

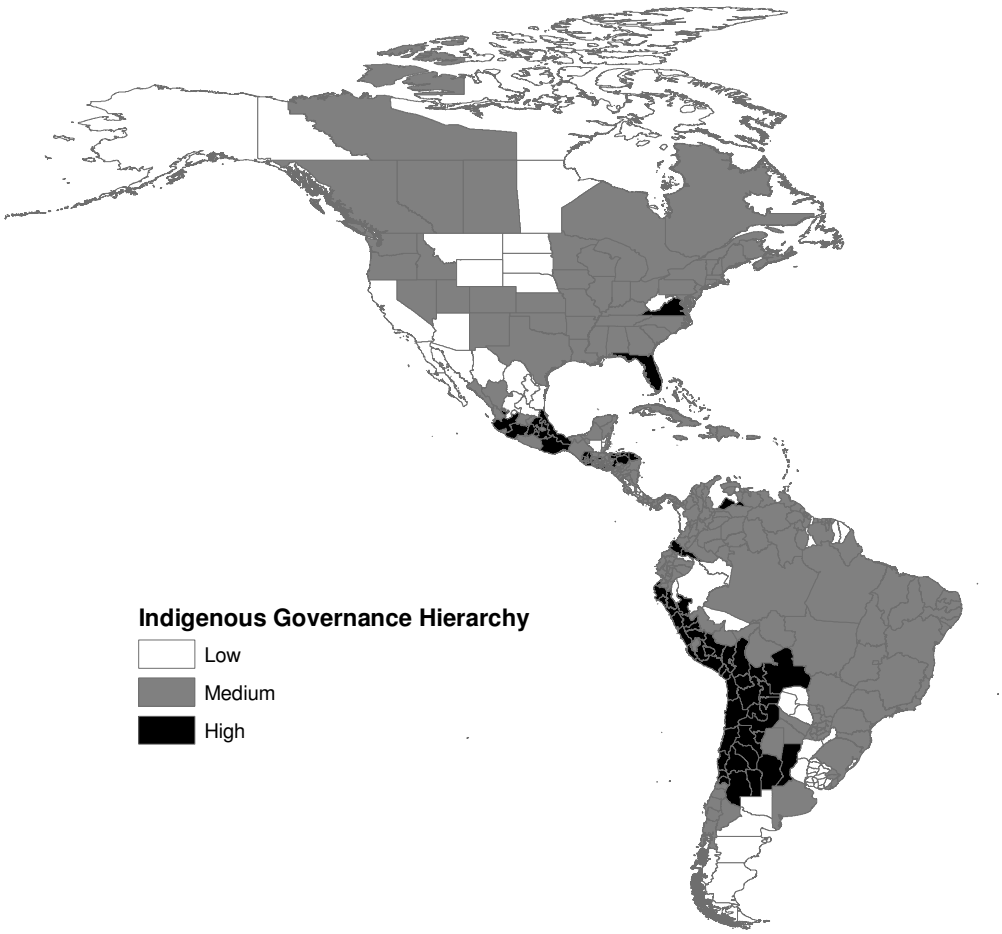


FIGURE 6: **Distribution of Indigenous Institutions**

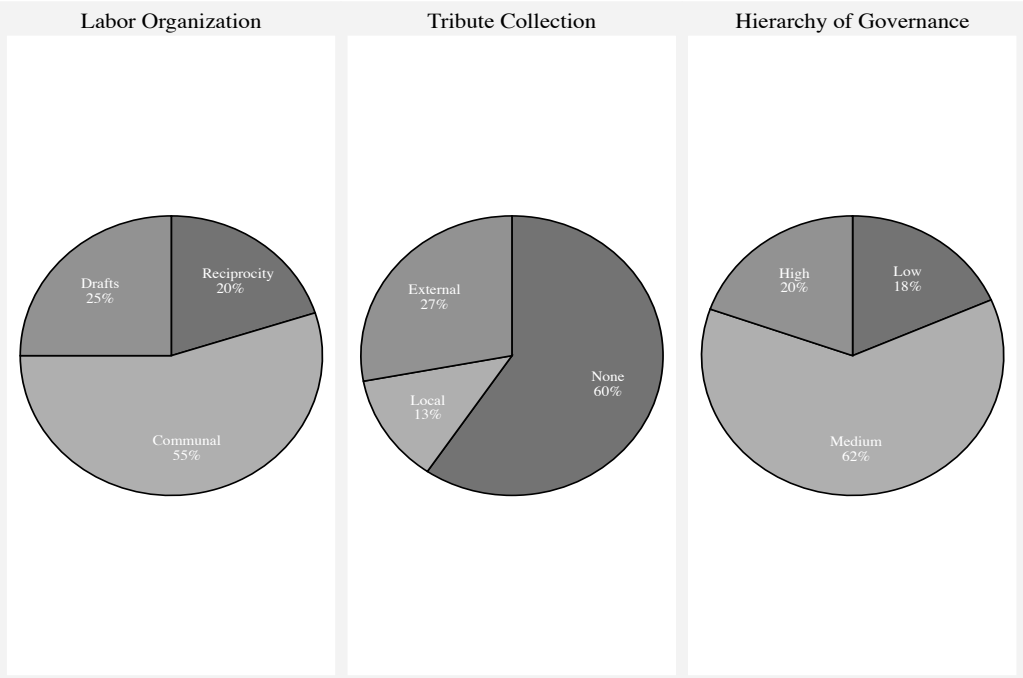


FIGURE 7: **Colonial Labor and Indigenous Hierarchy**

FIGURE 8: **Natural Resources and Indigenous Hierarchy**

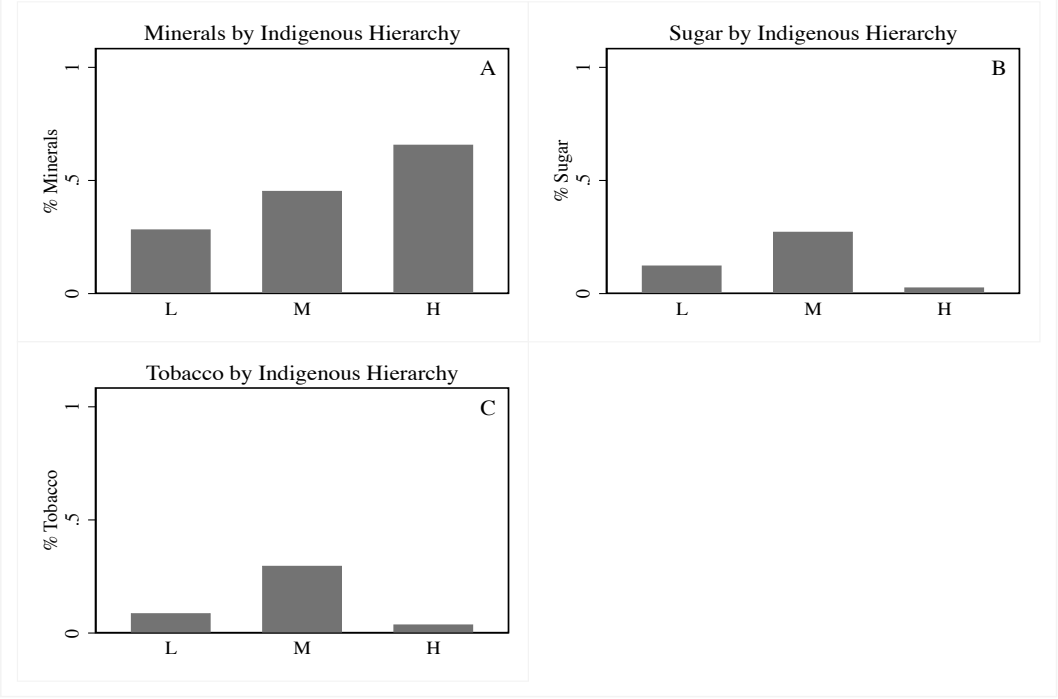


FIGURE 9: **Slavery, Resources and Indigenous Hierarchy**

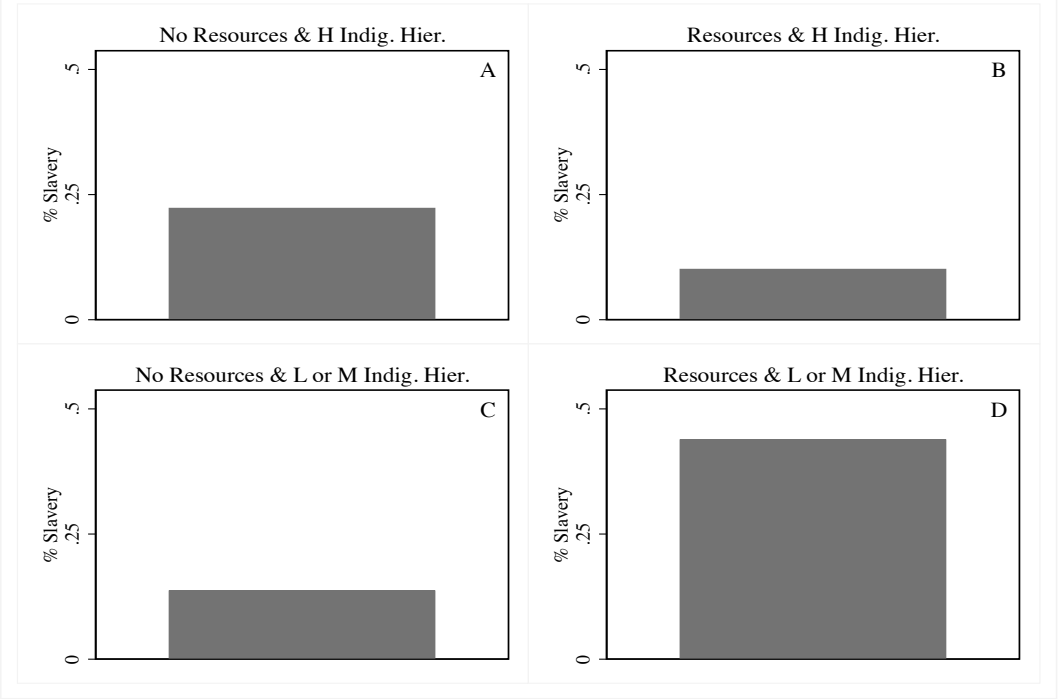
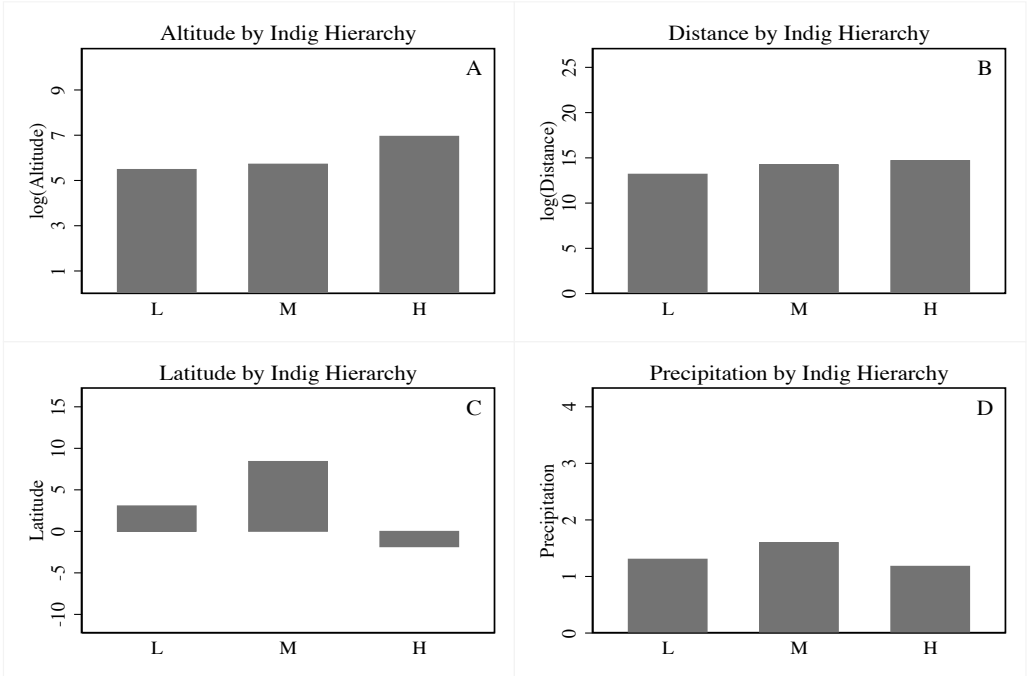


FIGURE 10: **Geographic Conditions and Indigenous Hierarchy**



APPENDIX A. Robustness Checks

TABLE A.1: **High Estimate of Indigenous Governance Hierachies**

	(1) Free	(2) Assigned	(3) Slavery	(4) Slavery
M Indig. Hier.	-0.136*	0.186**	0.121*	
	(0.079)	(0.077)	(0.070)	
H Indig. Hier.	-0.377***	0.347***	0.069	
	(0.065)	(0.064)	(0.092)	
L or M Indig. Hier.				-0.352***
				(0.114)
L or M Indig. Hier.XResources				0.535***
				(0.100)
Resources (Min, Sug, or Tob)				-0.159
				(0.109)
Minerals	-0.363***	0.267***	0.142***	
	(0.049)	(0.050)	(0.051)	
Sugar	-0.227***	0.081	0.305***	
	(0.081)	(0.094)	(0.089)	
Tobacco	0.044	-0.182*	0.255***	
	(0.093)	(0.097)	(0.087)	
log(Altitude)	-0.040*	0.048**	-0.063***	-0.110***
	(0.024)	(0.023)	(0.022)	(0.021)
Precip.	-0.071**	0.141***	-0.035	-0.052*
	(0.036)	(0.036)	(0.033)	(0.031)
Latitude	0.002	-0.003**	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
log(Distance)	-0.027***	0.038***	-0.005	-0.002
	(0.010)	(0.011)	(0.007)	(0.007)
Observations	444	444	444	444

Probit analysis. The table presents marginal effects of each predictor variable given all covariates are set at their mean. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.2: **Indigenous Labor**

	(1) Free	(2) Assigned	(3) Slavery	(4) Slavery
M Indig. Labor	-0.129*	0.161**	0.099	
	(0.069)	(0.067)	(0.061)	
H Indig. Labor	-0.404***	0.365***	0.120	
	(0.056)	(0.056)	(0.082)	
L or M Indig. Hier.				-0.298***
				(0.111)
L or M Indig. LaborXResources				0.434***
				(0.105)
Resources (Min, Sug, or Tob)				-0.058
				(0.102)
Minerals	-0.361***	0.260***	0.129**	
	(0.050)	(0.051)	(0.051)	
Sugar	-0.237***	0.101	0.335***	
	(0.078)	(0.091)	(0.087)	
Tobacco	0.018	-0.168*	0.250***	
	(0.094)	(0.098)	(0.090)	
log(Altitude)	-0.055**	0.057**	-0.067***	-0.113***
	(0.023)	(0.022)	(0.021)	(0.020)
Precip.	-0.084**	0.154***	-0.028	-0.055*
	(0.036)	(0.037)	(0.032)	(0.031)
Latitude	0.002*	-0.003**	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
log(Distance)	-0.024**	0.035***	-0.007	-0.002
	(0.010)	(0.011)	(0.007)	(0.007)
Observations	444	444	444	444

Probit analysis. The table presents marginal effects of each predictor variable given all covariates are set at their mean. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.3: **Indigenous Tribute**

	(1) Free	(2) Assigned	(3) Slavery	(4) Slavery
M Indig. Tribute	-0.032	0.099	-0.130**	
	(0.084)	(0.078)	(0.052)	
H Indig. Tribute	-0.284***	0.311***	-0.102*	
	(0.057)	(0.053)	(0.054)	
L or M Indig. Hier.				-0.323***
				(0.103)
L or M Indig. Trib.XResources				0.590***
				(0.090)
Resources (Min, Sug, or Tob)				-0.200*
				(0.104)
Minerals	-0.399***	0.300***	0.132***	
	(0.048)	(0.050)	(0.051)	
Sugar	-0.238***	0.079	0.372***	
	(0.081)	(0.096)	(0.089)	
Tobacco	0.023	-0.155	0.260***	
	(0.093)	(0.098)	(0.087)	
log(Altitude)	-0.036	0.033	-0.051**	-0.109***
	(0.024)	(0.024)	(0.022)	(0.021)
Precip.	-0.077**	0.155***	-0.028	-0.067**
	(0.035)	(0.036)	(0.032)	(0.032)
Latitude	0.002	-0.002**	0.005***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
log(Distance)	-0.023**	0.032***	-0.003	-0.001
	(0.010)	(0.010)	(0.007)	(0.007)
Observations	444	444	444	444

Probit analysis. The table presents marginal effects of each predictor variable given all covariates are set at their mean. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.4: **Population**

	(1) Free	(2) Assigned	(3) Slavery	(4) Slavery
M Indig. Hier.	-0.155**	0.240***	0.124**	
	(0.077)	(0.079)	(0.062)	
H Indig. Hier.	-0.369***	0.332***	0.095	
	(0.065)	(0.067)	(0.095)	
L or M Indig. Hier.				-0.345***
				(0.121)
L or M Indig. Hier.XResources				0.507***
				(0.102)
Resources (Min, Sug, or Tob)				-0.177
				(0.121)
Minerals	-0.367***	0.253***	0.133***	
	(0.052)	(0.056)	(0.050)	
Sugar	-0.083	-0.171	0.276***	
	(0.102)	(0.117)	(0.101)	
Tobacco	-0.177*	0.140	0.284***	
	(0.094)	(0.100)	(0.103)	
log(Altitude)	0.000	-0.018	-0.059***	-0.104***
	(0.025)	(0.025)	(0.022)	(0.021)
Precip.	0.057	-0.052	-0.043	-0.054
	(0.042)	(0.044)	(0.036)	(0.034)
Latitude	0.001	-0.002*	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
log(Distance)	-0.015	0.027**	-0.007	-0.001
	(0.011)	(0.013)	(0.008)	(0.008)
log(Population Density)	-0.163***	0.235***	0.008	-0.007
	(0.027)	(0.029)	(0.020)	(0.018)
Observations	435	435	435	435

Probit analysis. The table presents marginal effects of each predictor variable given all covariates are set at their mean. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.5: **Settler Mortality (AJR)**

	(1) Free	(2) Assigned	(3) Slavery	(4) Slavery
M Indig. Hier.	-0.132*	0.207***	0.142**	
	(0.077)	(0.074)	(0.062)	
H Indig. Hier.	-0.381***	0.350***	0.117	
	(0.061)	(0.057)	(0.097)	
L or M Indig. Hier.				-0.334***
				(0.121)
L or M Indig. Hier.XResources				0.504***
				(0.103)
Resources (Min, Sug, or Tob)				-0.180
				(0.119)
Minerals	-0.409***	0.309***	0.134***	
	(0.051)	(0.053)	(0.049)	
Sugar	-0.166*	-0.005	0.233**	
	(0.096)	(0.110)	(0.104)	
Tobacco	-0.060	-0.065	0.314***	
	(0.102)	(0.107)	(0.104)	
log(Altitude)	-0.028	0.022	-0.062***	-0.105***
	(0.024)	(0.023)	(0.022)	(0.020)
Precip.	0.012	0.040	-0.058	-0.060*
	(0.042)	(0.042)	(0.037)	(0.034)
Latitude	-0.002*	0.002	0.006***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
log(Distance)	-0.005	0.020	-0.006	-0.002
	(0.012)	(0.013)	(0.009)	(0.009)
log(SettlMort) (AJR)	-0.314***	0.324***	0.059	0.012
	(0.061)	(0.059)	(0.045)	(0.042)
Observations	429	429	429	429

Probit analysis. The table presents marginal effects of each predictor variable given all covariates are set at their mean. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.6: **Settler Mortality (Albouy)**

	(1) Free	(2) Assigned	(3) Slavery	(4) Slavery
M Indig. Hier.	-0.092	0.167**	0.126**	
	(0.078)	(0.074)	(0.061)	
H Indig. Hier.	-0.400***	0.347***	0.107	
	(0.058)	(0.057)	(0.095)	
L or M Indig. Hier.				-0.300**
				(0.120)
L or M Indig. Hier.XResources				0.474***
				(0.106)
Resources (Min, Sug, or Tob)				-0.173
				(0.116)
Minerals	-0.394***	0.237***	0.125**	
	(0.054)	(0.054)	(0.049)	
Sugar	-0.261***	0.086	0.210**	
	(0.081)	(0.103)	(0.102)	
Tobacco	0.099	-0.244**	0.298***	
	(0.108)	(0.109)	(0.102)	
log(Altitude)	-0.023	0.056**	-0.061***	-0.094***
	(0.027)	(0.026)	(0.022)	(0.022)
Precip.	-0.068*	0.152***	-0.046	-0.054*
	(0.039)	(0.039)	(0.033)	(0.031)
Latitude	-0.002*	-0.000	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
log(Distance)	-0.010	0.025*	-0.002	0.001
	(0.012)	(0.013)	(0.009)	(0.009)
log(SettlMort) (Albouy)	-0.212***	0.102***	0.047*	0.015
	(0.035)	(0.031)	(0.028)	(0.027)
Observations	412	412	412	412

Probit analysis. The table presents marginal effects of each predictor variable given all covariates are set at their mean. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.7: **Colonist Nation Fixed Effects**

	(1) Free	(2) Assigned	(3) Slavery	(4) Slavery
M Indig. Hier.	-0.064	0.174**	0.061	
	(0.081)	(0.082)	(0.068)	
H Indig. Hier.	-0.277***	0.255***	0.048	
	(0.076)	(0.078)	(0.096)	
L or M Indig. Hier.				-0.348***
				(0.128)
L or M Indig. Hier.XResources				0.489***
				(0.107)
Resources (Min, Sug, or Tob)				-0.218*
				(0.127)
Minerals	-0.354***	0.280***	0.123**	
	(0.055)	(0.060)	(0.056)	
Sugar	-0.184**	0.013	0.342***	
	(0.088)	(0.114)	(0.092)	
Tobacco	0.045	-0.115	0.111	
	(0.106)	(0.121)	(0.094)	
log(Altitude)	-0.055**	0.039	-0.048**	-0.075***
	(0.027)	(0.027)	(0.024)	(0.024)
Precip.	-0.028	0.080*	-0.032	-0.063*
	(0.039)	(0.041)	(0.035)	(0.034)
Latitude	-0.002	0.001	0.006***	0.005***
	(0.002)	(0.002)	(0.002)	(0.001)
log(Distance)	-0.006	0.012	-0.003	0.001
	(0.011)	(0.013)	(0.008)	(0.008)
UK	0.547***	-0.691***	0.035	0.060
	(0.080)	(0.040)	(0.108)	(0.108)
Portugal	0.180	-0.450***	0.385***	0.360***
	(0.145)	(0.120)	(0.139)	(0.124)
France	0.483***	-0.522***	0.061	0.092
	(0.104)	(0.094)	(0.124)	(0.125)
Netherlands	-0.160	-0.129	0.408***	0.557***
	(0.111)	(0.132)	(0.143)	(0.105)
USA			-0.243***	-0.248***
			(0.046)	(0.039)
Chile				
Argentina	0.253	-0.338*		
	(0.199)	(0.180)		
Observations	422	422	429	429

The table presents coefficients from a linear probability model. The baseline in these. models is Spain. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.8: **Expedition Arrival Fixed Effects**

	(1) Free	(2) Assigned	(3) Slavery	(4) Slavery
M Indig. Hier.	-0.094*	0.154***	0.053	
	(0.056)	(0.055)	(0.052)	
H Indig. Hier.	-0.296***	0.270***	-0.005	
	(0.071)	(0.070)	(0.066)	
L or M Indig. Hier.				-0.226**
				(0.088)
L or M Indig. Hier.XResources				0.481***
				(0.104)
Resources (Min, Sug, or Tob)				-0.119
				(0.093)
Minerals	-0.360***	0.270***	0.134***	
	(0.043)	(0.043)	(0.040)	
Sugar	-0.204***	0.045	0.293***	
	(0.072)	(0.071)	(0.068)	
Tobacco	0.018	-0.127*	0.234***	
	(0.071)	(0.071)	(0.067)	
log(Altitude)	-0.042**	0.047**	-0.059***	-0.102***
	(0.018)	(0.018)	(0.017)	(0.017)
Precip.	-0.038	0.092***	-0.065**	-0.089***
	(0.028)	(0.028)	(0.026)	(0.028)
Latitude	0.000	-0.001	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
log(Distance)	-0.024***	0.028***	-0.005	0.001
	(0.007)	(0.007)	(0.006)	(0.007)
Observations	444	444	444	444

The table presents coefficients from a linear probability model. Standard errors in parentheses.
* sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.9: **Probit Coefficients**

	(1) Free	(2) Free	(3) Assigned	(4) Assigned	(5) Slavery	(6) Slavery
L Indig. Hier.		1.254***		-1.199***		-0.217
		(0.245)		(0.247)		(0.266)
M Indig. Hier.	-0.355*	0.899***	0.511***	-0.689***	0.304	0.087
	(0.184)	(0.210)	(0.182)	(0.215)	(0.205)	(0.214)
H Indig. Hier.	-1.254***		1.199***		0.217	
	(0.245)		(0.247)		(0.266)	
Minerals	-0.998***	-0.998***	0.721***	0.721***	0.416***	0.416***
	(0.145)	(0.145)	(0.143)	(0.143)	(0.158)	(0.158)
Sugar	-0.716***	-0.716***	0.302	0.302	0.917***	0.917***
	(0.247)	(0.247)	(0.258)	(0.258)	(0.233)	(0.233)
Tobacco	0.157	0.157	-0.527**	-0.527**	0.687***	0.687***
	(0.239)	(0.239)	(0.249)	(0.249)	(0.238)	(0.238)
log(Altitude)	-0.115*	-0.115*	0.132**	0.132**	-0.203***	-0.203***
	(0.060)	(0.060)	(0.060)	(0.060)	(0.067)	(0.067)
Precip.	-0.220**	-0.220**	0.403***	0.403***	-0.094	-0.094
	(0.093)	(0.093)	(0.097)	(0.097)	(0.102)	(0.102)
Latitude	0.005	0.005	-0.006**	-0.006**	0.015***	0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
log(Distance)	-0.063**	-0.063**	0.091***	0.091***	-0.021	-0.021
	(0.025)	(0.025)	(0.028)	(0.028)	(0.023)	(0.023)
Constant	2.662***	1.408**	-3.142***	-1.943***	0.137	0.354
	(0.494)	(0.548)	(0.555)	(0.599)	(0.516)	(0.574)
Observations	444	444	444	444	444	444

The table presents coefficients from a probit model. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.10: **Linear Probability Model**

	(1) Free	(2) Free	(3) Assigned	(4) Assigned	(5) Slavery	(6) Slavery
L Indig. Hier.		0.383***		-0.368***		-0.050
		(0.070)		(0.070)		(0.065)
M Indig. Hier.	-0.122**	0.261***	0.184***	-0.184***	0.074	0.025
	(0.056)	(0.058)	(0.056)	(0.058)	(0.051)	(0.053)
H Indig. Hier.	-0.383***		0.368***		0.050	
	(0.070)		(0.070)		(0.065)	
Minerals	-0.329***	-0.329***	0.238***	0.238***	0.111***	0.111***
	(0.043)	(0.043)	(0.043)	(0.043)	(0.040)	(0.040)
Sugar	-0.238***	-0.238***	0.084	0.084	0.313***	0.313***
	(0.074)	(0.074)	(0.074)	(0.074)	(0.068)	(0.068)
Tobacco	0.056	0.056	-0.171**	-0.171**	0.207***	0.207***
	(0.073)	(0.073)	(0.072)	(0.072)	(0.067)	(0.067)
log(Altitude)	-0.039**	-0.039**	0.040**	0.040**	-0.058***	-0.058***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.016)	(0.016)
Precip.	-0.076***	-0.076***	0.130***	0.130***	-0.039	-0.039
	(0.028)	(0.028)	(0.028)	(0.028)	(0.026)	(0.026)
Latitude	0.001	0.001	-0.002**	-0.002**	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
log(Distance)	-0.020***	-0.020***	0.023***	0.023***	-0.007	-0.007
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)
Constant	1.379***	0.996***	-0.426***	-0.058	0.561***	0.611***
	(0.141)	(0.159)	(0.141)	(0.159)	(0.130)	(0.147)
Observations	444	444	444	444	444	444

The table presents coefficients from a linear probability model. Standard errors in parentheses.
* sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.11: **Seemingly Unrelated Regression**

	(1) Free	Assigned	Slavery
L Indig. Hier.			
M Indig. Hier.	-0.122**	0.184***	0.074
	(0.055)	(0.055)	(0.051)
H Indig. Hier.	-0.383***	0.368***	0.050
	(0.069)	(0.069)	(0.064)
Minerals	-0.329***	0.238***	0.111***
	(0.042)	(0.042)	(0.039)
Sugar	-0.238***	0.084	0.313***
	(0.073)	(0.073)	(0.067)
Tobacco	0.056	-0.171**	0.207***
	(0.072)	(0.072)	(0.066)
log(Altitude)	-0.039**	0.040**	-0.058***
	(0.018)	(0.018)	(0.016)
Precip.	-0.076***	0.130***	-0.039
	(0.027)	(0.027)	(0.025)
Latitude	0.001	-0.002**	0.003***
	(0.001)	(0.001)	(0.001)
log(Distance)	-0.020***	0.023***	-0.007
	(0.007)	(0.007)	(0.006)
Constant	1.379***	-0.426***	0.561***
	(0.139)	(0.139)	(0.128)
Observations	444		

The table presents coefficients from a linear probability model. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

TABLE A.12: **Seemingly Unrelated Regression (cont.)**

	(1) Free	Assigned	Slavery
L Indig. Hier.	0.383***	-0.368***	-0.050
	(0.069)	(0.069)	(0.064)
M Indig. Hier.	0.261***	-0.184***	0.025
	(0.057)	(0.057)	(0.053)
H Indig. Hier.			
Minerals	-0.329***	0.238***	0.111***
	(0.042)	(0.042)	(0.039)
Sugar	-0.238***	0.084	0.313***
	(0.073)	(0.073)	(0.067)
Tobacco	0.056	-0.171**	0.207***
	(0.072)	(0.072)	(0.066)
log(Altitude)	-0.039**	0.040**	-0.058***
	(0.018)	(0.018)	(0.016)
Precip.	-0.076***	0.130***	-0.039
	(0.027)	(0.027)	(0.025)
Latitude	0.001	-0.002**	0.003***
	(0.001)	(0.001)	(0.001)
log(Distance)	-0.020***	0.023***	-0.007
	(0.007)	(0.007)	(0.006)
Constant	0.996***	-0.058	0.611***
	(0.157)	(0.157)	(0.145)
Observations	444		

The table presents coefficients from a linear probability model. Standard errors in parentheses. * sig at 10 percent; ** sig at 5 percent; *** sig at 1 percent.

APPENDIX B. Data Coding and Sources

COLONIAL LABOR

Instructions

We coded assigned labor, free labor, and slavery as follows.

Assigned Labor These are labor arrangements that involved quotas or intervention by royal officials that constrained the mobility of the labor force. Laborers received little or no payment for their work. Forced labor includes: *encomienda*, *repartimiento*, and similar arrangements in non-Spanish colonies. *Encomienda* was a form of labor organization in which a landowner assumed control over a group of natives that had been previously part of an indigenous town or community. *Repartimiento* was rotational labor assigned by royal officials on a temporal basis to landowners who petitioned for it. Laborers tended colonist property on a rotational basis for a fixed, low wage.

Free Labor We code free labor as "1" when we found direct contractual agreements between laborer and employer and the laborer received payment for his or her work. The agreements were sometimes contractual and did not involve coercion, quotas or intervention by crown officials.

In territories with extensive land ownership (instead of a handful of landed estates) and large, settler-founded towns free labor played an important role. It was also the major form of organization in territories that remained uninhabited until the late 1800s and were settled by "modern" states, such as parts of Argentina and Chile.

Slavery We code slavery as "1" when there was explicit evidence of Africans being held as slaves by colonists in the region at or around the date in question. Accounts of whether or not a region had slavery tended to be fairly straightforward.

Sources

We used several sources to code for colonial labor arrangements. Our main sources were handbooks, but we also relied on additional sources specific to each country. We include the main sources below, followed by the additional sources by region. Specific page numbers are available from the authors upon request.

- The Cambridge History of the Native Peoples of the Americas, volumes I, II and II (Trigger and Washburn, eds 1997, Adams and MacLeod, eds 2000 and Salomon and Schwartz, eds 2000).
- The Cambridge History of Latin America, volume 2 (Bethell, ed 1984).
- The Great Encounter: Native Peoples and European Settlers in the Americas, 1492-1800 (Sokolow 2003).
- Encyclopedia of Latin American History and Culture (Tenenbaum, ed 1996).
- Early Latin America: a History of Colonial Spanish America and Brazil (Lockhart and Schwartz 1983), Latin American Civilization: History and Society, 1492 to the Present (Keen 1995), and Colonial Latin America (Burkholder and Johnson 2007).

We also relied on the Country Studies published by the Federal Research Division of the Library of Congress, Washington, various years, also available online: http://lcweb2.loc.gov/frd/cs/cshome.html.

Caribbean Islands

Watts 1987, Hannau 1974, Stark 1891, Schomburgk 1840, Suckling 1780, Hirst 1891. Wright 1908, MacGaffey and Barnett 1962.

Central America

Sutherland 1998, Lovell 2005, Newson 1986, Newson 1987.

North America

Cadigan 2009, Hay and Craven 2004, Richmond 2001, Nugent 2008, Otto 1989, Rabushka 2008, Lightfoot 2006, Cavanaugh 2006, Harris 1997.

South America

Ferns 1971, Rock 1985, Cushner 2000, Kleinpenning 2003, Tandeter 1993, Bethell 1987, Sadlier 2008, Vidal-Luna 2003, Williams 2005, Rausch 1984, Querejazu and Ferrer 1997, Metcalf 1992.

INDIGENOUS GOVERNANCE

Instructions

We coded the degree of hierarchy in indigenous institutions according to two measures of indigenous organization: indigenous labor and indigenous tribute collection. For the coding of indigenous labor we focused on this three questions:

1. Is there any form of labor organization?

2. If there is organized labor, is it organized on the basis of kinship, reciprocity, or peer-pressure, and typically involves community consent?

3. Is there a political hierarchy with the infrastructure to mobilize labor for public works, cultivation of fields, or other activities? We looked specifically for institutionalized labor drafts (e.g. *mita* in the Andes, *coatequitl* in Mesoamerica).

If the answer to the first question is no, we coded a "0". In regions with no labor organization, gender roles play an important role in the division of labor. If the answer to the second question is yes and to the third question no, we coded a "1". Finally, if the answer to the third question is yes, we coded a "2". Typically, regions that had political leaders able to mobilize labor also had forms of kinship labor.

Regarding indigenous tribute collection, the relevant questions are:

1. Is there systematic collection of tribute? We do not consider the request of resources or labor only in extraordinary circumstances as systematic collection.

2. Is there systematic collection of goods organized at the local level, but not transferred to an larger level political leader or group?

3. Is there systematic collection of tribute that is transferred to a a larger level political leader or group?

If the answer to the first question is no, we coded a "0". If the answer to the second question is yes and to the third question no, we coded a "1". Finally, if the answer to the third question is yes, we coded a "2". Typically regions that transferred resources to an higher-level group had some administrative representative linked to the higher-level leader.

Coding inferences and difficulties

We found evidence of indigenous presence in all coded subnational territories. It was easier to find information for the territories where indigenous societies had some sort of written records, typically those with political hierarchies. Archeological and ethnographic evidence, however, also exists for the regions with nomadic and semi-sedentary societies. In a few of the latter regions if we found no information for the specific territory, we imputed data from nearby regions. This was the case for some of the territories in the Amazonia region: Orellana and Sucumbíos in Ecuador; Amazonas, Madre de Dios, and Loreto in Perú.

Sources

We used several sources to construct the indigenous institutions variable. To the extent possible, we relied on collections and handbooks. The main collections are included below, followed by the additional sources specific to each country. We also include a small description of indigenous organization by country. Specific page numbers are available from the authors upon request.

- Handbook of Middle American Indians (Wauchope, ed 1972), Handbook of South American Indians (Steward, ed 1946-1948), Handbook of North American Indians (Sturtevant, ed 1978-2004).

- The Cambridge History of the Native Peoples of the Americas, volumes I, II and II (Trigger and Washburn, eds 1997, Adams and MacLeod, eds 2000 and Salomon and Schwartz, eds 2000).

- Encyclopedia of Latin American History and Culture (Tenenbaum, ed 1996).

Caribbean Islands

According to archeological remains, the Europeans encountered the Caribbean a few centuries after its heyday, the time when it had been most populous and powerful. The islands had low or medium level of indigenous hierarchy. Circa 1492, most had low or medium levels of labor organization, but rarely was there a form of tribute collection. Puerto Rico is the only island where we found evidence of systematic tribute collection. The Bahamas and the Netherlands Antilles are the only ones with evidence for political leaders able to mobilize labor.

The islands included are: The Bahamas, Turks and Caicos Islands, Cayman Islands, the Greater Antilles: Cuba, Haiti, Dominican Republic, Puerto Rico, and Jamaica; the Leeward islands in the Lesser Antilles: Anguilla, Antigua and Barbuda, Guadeloupe, Montserrat, St. Kitts and Nevis, St. Martin, and U.S. and British Virgin Islands; the Windward islands in the Lesser Antilles: Dominica, Grenada, Martinique, St. Lucia, and Saint Vincent and the Grenadines; Netherlands Antilles, Barbados, and Trinidad and Tobago.

For the coding of the Caribbean islands we relied on the Handbook of South American Indians, Steward, ed 1946-1948, and the Handbook of Middle American Indians, Wauchope, ed 1972.

Central America

The pre-Colombian Mayan area extended over the contemporary territories of El Salvador, Guatemala, Honduras, and Mexico. By the time the Europeans arrived, the highly complex empire had been dissolved in smaller city-states. These states where highly organized and at contact no one state had a strong hold over the others, which led to them fighting amongst themselves often. In Central America, we found such states in the southern regions of Guatemala, the western and central regions of El Salvador, and western parts of Honduras. The rest of the region consisted mostly of nomadic or semi-sedentary groups that had likely migrated from South America. Most of the coding is based on the Handbook of Middle American Indians, Wauchope, ed 1972, and the Handbook of South American Indians, Steward, ed 1946-1948.

Belize

Belize is composed today of 6 districts: Belize, Cayo, Corozal, Orange Walk, Stann Creek and Toledo. All regions present low levels of both indigenous labor and tribute, except Stann Creek and Toledo where we observe some tribute collection at the local level.

Additional sources: Donohoe 1946, Bolland 1977 and Winzerling 1946.

Costa Rica

Costa Rica is divided in 7 provinces: Alajuela, Cartago, Guanacaste, Heredia, Limón, Puntarenas, and San José. Only in Guanacaste, Heredia and Puntarenas we found labor organized at the community level, otherwise tribes whose labor relations were based on reciprocity populated the region.

El Salvador

The 14 departments can be divided in three regions: the Western Region: Ahuachapán, Santa Ana, and Sonsonate; the Central Region: Cabañas, Chalatenango, Cuscatlán,

La Libertad, La Paz, San Salvador, San Vicente, La Unión; and the Eastern Region: Morazán, San Miguel, and Usulután. We found Mayan-origins city states with political leaders able to mobilize labor and collect tribute locally in most the western and central regions.

Additional sources: White 2008.

Guatemala

Guatemala is organized in 22 departments: Petén, El Progreso, Jutiapa, Izabal, Alta Verapaz, Baja Verapaz, Chiquimula, Jalapa, Santa Rosa, Chimaltenango, El Quiché, Escuintla, Guatemala, Huehuetenango, Quetzaltenango, Retalhuleu, Sacatepéquez, San Marcos, Sololá, Suchitepéquez, Totonicapán, Zacapa. The first 9, up to Santa Rosa, presented nomadic and semi-sedentary organization, with some tribute collection and labor organized at the community level, while the latter 13 departments had hierarchic labor organization and local tribute collection.

Additional sources: Lovell 2005, Nance et al. 2003, Rice and Rice 2009.

Honduras

Of the 18 departments in Honduras, 8 had had a strong Mayan presence, and thus had city-states with a highly organized political organization, but no external tribute collection: Comayagua, Copán, Intibucá, La Paz, Lempira, Ocotepeque, Santa Bárbara, Valle. The rest had semi-sedentary societies with some (Atlántida, Colón, Francisco Morazán, Gracias a Dios, Olancho, Yoro, Choluteca) or no (Cortés, El Paraíso, Islas de la Bahía) labor organization.

Additional sources: Winzerling 1946, Cuddy 2006, Rivas 1993.

Nicaragua

The 17 departments of Nicaragua had tribes with labor organized on the basis of reciprocity, but no tribute collection: Atlántico Norte, Atlántico Sur, Boaco, Carazo, Chinandega, Chontales, Estelí, Granada, Jinotega, León, Madriz, Managua, Masaya, Matagalpa, Nueva Segovia, Río San Juan, Rivas.

Additional sources: Noveck 1988.

Panama

Panamá is divided into 9 provinces and 3 indigenous *comarcas*. Provinces: Bocas Del Toro, Chiriquí, Coclé, Colón, Darién, Herrera, Los Santos, Panamá, Veraguas. *Comarcas*: Embera, Kuna Yala, Ngobe Bugle. Early European explorers describe the isthmian region as densely populated, yet with scattered and culturally diverse village groups. None of the regions presented high political hierarchies with control over labor, and there was no systematic tribute collection.

Additional sources: Helms 1985.

North America

The majority of pre-Colombian Native North Americans in the contemporary territories of the United States and Canada were nomadic or lived in semisedentary town and villages with extensive hunting and precise knowledge of their territories (Adams and MacLeod, eds 2000, p. 327).

By the 16th century, however, some regions were increasingly relying on more hierarchic labor and tribute arrangements, and expanding their populations: the Iroquoian around the Lower Great Lakes, the Coosas of Georgia, and the Powhatans of Virginia. Also, in the Southwest of the United States some groups were aggregating in larger communities: the Zuni Pueblo peoples in the Rio Grande Valley in contemporary Southern Texas and the Peco Pueblo peoples in eastern New Mexico, while those in the Western Anasazi area (northwest New Mexico) were abandoned. California had a relatively dense population but distributed more equally within the region, with numerous linguistic and cultural groups. This was because of the relatively equal distribution of resources along the coast and the abundant acorn and game in the interior (Adams and MacLeod, eds 2000, p. 329).

In Canada, nearly half of the indigenous peoples lived in the Pacific Northwest coast,

today British Columbia and parts of Alberta. Relative to other groups in Canada, they had more hierarchic labor arrangements, relying on reciprocity and kinship and not only gender roles, and also collected tribute locally. For this reason these two areas receive a coding of "1' for indigenous labor and "1" for tribute. All other regions have low labor hierarchy, "0". Some tribes also had basic forms of tribute collection, and therefore some of the other regions have a coding of "1" for tribute.

Mexico, in contrast, presented a large variation in terms of indigenous organization at contact within its contemporary territory. The Mesoamerican region was mostly dominated by the Aztec Empire, while the Northern region consisted mostly of nomadic tribes and semi-sedentary groups. The Mayan area in the Southeast consisted of many independent city-states, previously part of the large Maya empire, dissolved into autonomous states a couple centuries prior to the arrival of the Europeans.

Canada

Canada's 13 provinces: Alberta, British Columbia, Newfoundland and Labrador, Manitoba, New Brunswick, Northwest Territories, Nova Scotia, Nunavut, Ontario, Prince Edward Island, Quebec, Saskatchewan, Yukon. We separate Newfoundland and Labrador in two different observations because of their geographic separation and history.

Additional sources: Dickason 1992, Dahl et al. 2000, Bartlett 1987, Champagne 2001.

Mexico

Mexico's 32 states can be divided in roughly five regions according to their indigenous forms of labor and tribute organization. **Central Mexico**: Distrito Federal, México, Tlaxcala, Puebla, Morelos, Querétaro; **Center-West**: Aguascalientes, Nayarit, Jalisco, Colima, Michoacán, Guerrero, Guanajuato; **La Huasteca**: Veracruz, Hidalgo, San Luis Potosí, Tamaulipas; **Southeast**: Tabasco, Oaxaca, the Maya highlands: Chiapas, and the Maya Lowlands: Campeche, Quintana Roo, Yucatán; **Northeast**: Nuevo León, Coahuila, Zacatecas; and **Northwest**: Chihuahua, Durango, Sinaloa, Sonora, Baja California, Baja California Sur.

The triple Alliance of the Mexica, Tepanec, and Acolhuaque—known as the Aztec Empire—controlled much of Central Mexico, except Tlaxcala. The territories in the region receive a coding of "2", for both labor and tribute organization. The Maya were in many of the territories in the Southeast, with a coding of "2" for the highly organized labor, but no external tribute, receiving thus a "1" for tribute organization (except Oaxaca which receives a coding of "2" since some city-states paid tribute to the Aztec Empire). Most regions in the Center-West also receive a coding of "2" for labor organization, except Jalisco where high indigenous hierarchy was found. La Huasteca, the Northeast and the Northwest are composed mostly of regions with nomadic or semi-sedentary groups, except Veracruz and Hidalgo where there was Aztec influence receiving thus a coding of "2" for their labor organization.

Additional sources: Lockhart 1992, Gerhard 1993.

United States

We include in the analysis 49 states: Alaska, Arizona, Montana, West Virginia, Wyoming, Alabama, Arkansas, Colorado, Delaware, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Nevada, New Jersey, New Mexico, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Washington, California, Nebraska, North Dakota, South Dakota, Maine, Connecticut, Maryland, Massachusetts, New Hampshire, New York, North Carolina, Ohio, Rhode Island, Vermont, Georgia, Florida, Virginia, Illinois, Michigan, Minnesota, Wisconsin. We do not include Hawaii.

Additional sources: Barnhart and Riker 1971, Baird and Goble 2008, Malinowski and Sheets, eds 1998, Federal Writers' Project 1941, Federal Writers' Project 1954.

South America

Argentina

Argentina is today composed of 23 provinces that can be divided roughly in two according to their pre-Colombian indigenous organization. The **Central and Southeast**: Buenos Aires, Corrientes, Entre Ríos, La Pampa, Misiones, Río Negro, Santa Cruz, Tierra del Fuego, Chaco, Neuquén, Santiago del Estero, Formosa; and the **Northwest**: Catamarca, Cordoba, Jujuy, La Rioja, Mendoza, Salta, San Juan, San Luis, Santa Fé, Tucumán, Chubut. Many of the groups occupying the Northwest had been conquered by the Incas by 1480. These consisted mostly of sedentary groups, who paid tribute to the Incas if they had been conquered. In contrast, the Southeast and Center were populated with nomadic tribes.

Additional sources: Rock 1985, Mandrini 2008, Télez-Lúgaro 2008, Levene 1963.

Bolivia

A large part of Bolivia was part of the Colla Kingdom, which was invaded and conquered by the Incas in 1438. The Incas obtained tribute and were able to mobilize labor from the region. Of Bolivia's 9 departments, 7 had Inca presence: Chuquisaca, Cochabamba, La Paz, Oruro, Pando, Potosí, and Tarija. The eastern part of Bolivia was populated by tribes subsisting on hunting and gathering, which the Inca had been unable to subdue: Santa Cruz and Beni.

Additional sources: Keen 1974, Nordenskiold and Lindberg, eds 1999.

Brazil

None of the 26 Brazilian states had indigenous societies with political hierarchies. Most were tribes surviving on hunting and gathering, while a few were semi-sedentary with labor organized on the basis of reciprocity or other characteristics. The states coded are: Acre, Alagoas, Amapá, Amazonas, Bahía, Ceará, Espirito Santo, Goiás, Maranhão, Mato Grosso, Mato Grosso Do Sul, Minas Gerais, Pará, Paraíba, Parana, Pernambuco, Piaui, Río Grande do Norte, Río Grande do Sul, Río de Janeiro, Rondonia, Roraima, Santa Catarina, São Paulo, Sergipe, Tocantins.

Additional sources: Hemming 1978.

Chile

Chile can be divided into a northern and a southern part along the Río Maule. The northern part of Chile was populated by sedentary indigenous groups over which the Inca dominated. The 7 regions in this northern part were assigned a coding of "2" for both tribute and labor organization: Antofagasta, Arica y Parinacota, Atacama, Coquimbo, Santiago, Tarapacá, Valparaíso. Of the remaining 8 regions in the contemporary territorial organization of Chile, 6 were populated by one of the largest semi-sedentary groups in South America: the Mapuche. These regions are: La Araucanía, Biobío, Los Lagos, Los Ríos, Maule, O'Higgins. The remaining 2, Aysén and Magallanes y Antártica Chilena, had nomads subsisting on hunting and gathering.

Additional sources: Elliott 1922, Edwards 1929.

Colombia

Colombia's 32 departments presented varied degrees of indigenous political organization. The departments around the Colombian Andean region were populated by a variety of autonomous, sedentary societies with political hierarchies, some of which (the southern-most ones) were under Inca control: Antioquia, Cesar, Caldas, Córdoba, Huila, La Guajira, Magdalena, Quindío, Risaralda, Sucre, Valle del Cauca, Narino, Putumayo. A next subgroup of departments had institutionalized forms of labor organization but no tribute collection: Arauca, Atlántico, Boyaca, Caqueta, Casanare, Cauca, Cundinamarca, Guainía, Guaviare, Meta, Norte de Santander, Santander, Tolima, Vaupes, Vichada, Bolívar. Finally, the 2 remaining departments had nomadic tribes: Amazonas in the Amazonia region and Choco in a region with difficult topography and coasts in both the Pacific and Atlantic oceans.

Additional sources: Rausch 1984, Bushnell 1993, Reichel-Dolmatoff 1965, Rodriguez 2005, Betancourt-Echeverry 1987, Calero 1997.

Ecuador

Ecuador is divided in 24 provinces, one of which is an island: Galápagos. Like Colombia, the provinces around the highlands (the Andes) portray sedentary societies. Unlike those in Colombia, however, most of the once autonomous groups in the central and southern Andean regions had been conquered by the Incas and were under their dominion at the time of European contact: Azuay, Bolívar, Canar, Chimborazo, Cotopaxi, El Oro, Guayas, Loja, Los Ríos, Santo Domingo de los Tsáchilas, Tungurahua, Zamora Chinchipe. In the northern Andean region most but not all had been able to maintain their autonomy: Carchi, Imbabura, Orellana, Pastaza, Pichincha, Sucumbíos. Santa Elena, also in the coast, because of its proximity to the Andean mountain range, had indigenous groups with more hierarchic labor organization, some of which under Inca control.

Additional sources: Newson 1995, Murra 1980, Keen 1974, Cobo 1983.

French Guiana

French Guiana is today an overseas region of France. It sends two deputies to the French national assembly, one representing the municipalities of Cayenne and Mancouria, Cayenne being the largest city, and the other representing the rest of the municipalities, the largest city of which is Saint-Laurent-du-Maroni. We divided this overseas region in two for coding: Cayenne and Saint-Laurent-du-Maroni. Both territories had a low hierarchy in their indigenous organization prior to contact, with no tribute but with some groups relying on reciprocity for labor organization.

Additional sources: Carlin and Arends, eds 2003, Nordenskiold and Lindberg, eds 1999.

Guyana

Guyana is divided in 10 administrative regions: Barima-Waini, Cuyuni-Mazaruni, Demerara-Mahaica, East Berbice-Corentyne Essequibo Islands-West Demerara, Mahaica-Berbice, Pomeroon-Supenaam, Potaro-Siparuni, Upper Demerara-Berbice, Upper Takutu-Upper Essequibo. These regions were settled by the Caribs and Arawaks prior to European arrival. Both ethnic groups composed various nomadic tribes, some of the Carib tribes with labor organization that was not solely based on gender.

Additional sources: Carlin and Arends, eds 2003.

Paraguay

The oriental part of Paraguay was relatively densely populated by many Guaraní tribes that although lacking a hierarchic political organization had developed a community-based labor organization for the practice of horticulture. This oriental part includes 14 of the 17 Paraguayan present-day departments: Alto Paraná, Amambay, Caaguazú, Caazapá, Canindeyú, Central, Concepción, Cordillera, Guairá, Itapúa, Misiones, Neembucú, Paraguarí, and San Pedro. The 3 remaining northwestern departments had less hierarchic societies surviving on hunting and gathering: Alto Paraguay, Boquerón, and Presidente Hayes.

Additional sources: Kleinpenning 2003.

Peru

The indigenous peoples in the highlands of Peru were on the most part under Inca control on the eve of the European encounter. Notwithstanding, 5 of the 24 departments in Peru are largely in the Amazonian jungle, and those had indigenous societies of hunters and gatherers prior to contact: Amazonas, San Martín, Ucayali, Madre de Dios, and Loreto. The remaining 19 are coded as having political hierarchies with the ability to mobilize both tribute and labor: Ancash, Apurímac, Arequipa, Ayacucho, Cajamarca, Cuzco, Huancavélica,

Huánuco, Ica, Junín, La Libertad, Lambayeque, Lima, Moquegua, Pasco, Piura, Puno, Tacna, and Tumbes.

Additional sources: Keen 1974, García-Hierro et al. 1998, Nordenskiold and Lindberg, eds 1999, Cobo 1983.

Suriname

Like Guyana, Suriname was also populated by Arawaks and Caribs at contact. The largest tribes were Arawak and survived on hunting and fishing. The country is divided into 10 districts: Brokopondo, Commewijne, Coronie, Marowijne, Nickerie, Para, Paramaribo, Saramacca, Sipaliwini, Wanica.

Additional sources: Carlin and Arends, eds 2003.

Uruguay

The 19 departments of Uruguay were populated by nomadic and semi-sedentary tribes. Most regions have no tribute collection and no labor organization apart from gender roles: Artigas, Canelones, Colonia, Durazno, Flores, Florida, Lavalleja, Montevideo, Paysandú, Río Negro, Rivera, Salto, San José, Soriano, Tacuarembó. Only in 4 regions we found labor organized on the basis of reciprocity and kinship: Cerro Largo, Maldonado, Rocha, Treinta y Tres.

Additional sources: Pacheco and Sanguinetti 1960.

Venezuela

Venezuela is divided in 23 states. For the coding we exclude Nueva Esparta, a relatively small island, and include the remaining 22 states: Amazonas, Apure, Zulia, Aragua, Bolívar, Carabobo Cojedes Delta Amacuro, Vargas, Falcón, Guárico, Lara, Mérida, Miranda, Monagas, Portuguesa, Sucre, Táchira, Trujillo, Yaracuy, Anzoátegui, Barinas. All regions had some form of tribute collection and labor organized at the local level. The regions with lower levels of hierarchy are Amazonas, Apure and Zulia.

Additional Notes

We exclude all capital and federal districts because of their very small size relative to the average subnational territory. The information for those districts is included in the larger political subdivision of which they are a part. We also do not include the Falkland Islands because of the controversy that exists over the original discovery and colonization of the islands by Europeans.

YEARS OF EXPLORATION AND SETTLEMENT

We code the year of **exploration** as the first expedition on record marking the arrival of Europeans to the territory in question. This is the earliest reported year that any European explorer entered the modern-day boundaries of a state/province/department. We include naval expeditions for coastal areas and land/river expeditions for inland regions. In some areas (such as the interior of Brazil) evangelizing missions were the first form of European contact. For some territories, the date is estimated based on approximations of the route of an expedition or based on the discovery dates of surrounding territories. For example, if we found evidence that territories A, B, and C in Brazil were first discovered by Europeans in 1550-1555, then we extrapolated that territory D, by virtue of neighboring all three others, was also first explored between these dates. Data was imputed or estimated in territories that did not exist as separate political entities at the time of exploration and in regions where there was no official government-sponsored expedition (i.e., the regions were explored either by unofficial settlers or missionaries). This was especially the case in the interior of Brazil (Amazon region) and Colombia, the Chilean/Argentine Patagonia region, and some territories in northern Canada.

Regarding year of **settlement**, we coded the first year in which a governor or mayor (whoever arrived first) officially governs the territory in question. We code only the territories where there is European settlement even if officially the governorship encom-

passes a larger area. If no official governor was in place, yet we found evidence of a permanent settlement, we coded for the year in which European (or *criollo*) settlers first formed a permanent colony in the given territory. "Settlement" included towns, permanent trading posts or military encampments, the construction of haciendas or estates, and religious missions. Settlements that were destroyed or uprooted were ignored.

Sources

To code year of exploration we relied on primary and secondary sources. Primary sources consisted mainly of accounts of voyages and expeditions written by members of exploring parties (i.e., explorers or soldiers themselves), including written narratives and journals. Secondary sources consisted of historians descriptions of these expeditions and historians maps of expeditions. For the coding of year of settlement we relied on secondary sources and the information at www.worldstatesmen.org. Our main sources are included below. We also relied on the Worldmark Encyclopedia of the Nations, the Encyclopedia Britannica, and the New World Encyclopedia.

- Encyclopedia of Latin American History and Culture (Tenenbaum, ed 1996).
- The Cambridge History of Latin America, Volume 1 (Bethell, ed 1984).
- Documents and Narratives concerning the Discovery and Conquest of Latin America (Cortes-Society 1907).
- Chronological History of the West Indies (Southey 1968).

NATURAL RESOURCES

We code for the presence of a resource in a territory only if we find explicit evidence of its cultivation or exploitation in that territory within the first 50 years after the expedition year. Thus, it is possible that a resource is documented as existing in a country, but we not code it as present in a territory within that country due to a lack of evidence of its presence in the specific territory.

Given the lack of records in come cases, evidence from roughly fifteen years before or after the 50 year guideline was considered, unless the evidence made specific reference to the start of cultivation after the 50-year mark or the end of cultivation before the 50-year mark. Evidence of cultivation or exploitation at a significantly later date was not considered.

Sugar and Tabacco

We code each territory as "1" for sugar or "1" for tobacco if historical sources indicate that colonists cultivated the crop roughly within the first fifty years after expedition, and "0" otherwise. Note that sugar or tobacco need not be the main economic activity of a territory for it to receive a coding of one.

Minerals

We code each territory as "1" for minerals if historical sources indicate that colonists were exploiting a mine within the first fifty years after the expedition year, and "0" otherwise. Minerals include silver, gold, coal, and mercury. If the region only had a short-lasting mine, we do not code minerals as present. For example, in Paraná, Brazil a gold mine was discovered and a village created around it by early settlers. However, the mine was fully explored in a few years time and the village was practically deserted.

Sources

The main sources detailed below, followed by the additional sources specific to each region. Specific page numbers are available from the authors upon request.

- The Cambridge History of Latin America, Volume 2 (Bethell, ed 1984).
- An Account of the Spanish Settlements in America (Campbell 1762).
- Colonial Travelers in Latin America (Hanke, ed 1972).

- Natural Resources in Latin American Development (Grunwald and Musgrove 1970).

- Spain and Portugal in the New World 1492-1700: Europe and the World in the Age of Expansion (McAlister 1984).

- The Cambridge Economic History of the United States (Engerman and Gallman, eds 1996).

- Historical Geography of the United States (Brown 1948).

- Historical Dictionary of Canada (Gough 2010).

We also relied on the Country Studies published by the Federal Research Division of the Library of Congress, Washington, various years, also available online: http://lcweb2.loc.gov/frd/cs/cshome.html; the Worldmark Encyclopedia of the Nations, the Encyclopedia Britannica, The Oxford Companion to Canadian History, and The Canadian Encyclopedia.

The additional sources we relied on for each country are detailed below.

Caribbean Islands

Keith and Parry 1984b, na para el Desarrollo Económico y Social, ed 1998, Watts 1987, Armitage and Braddick 2002, Wiley 2008, San-Miguel 2005.

Central America

Jones 1994, Bargalló 1955, Wells 1857, Dobson 1973.

North America

Mapp and Rushforth 2008, Prem 1992, Standish 2009, Adams and MacLeod, eds 2000, Bargalló 1955, Rothschild 2003, *The Mineral Resources of the United States* 1917, Chandler and Thames 1907, White 1991, Folely 1989, Warkentin 2010.

South America

Keith and Parry 1984a, Zulawski 1995, Cornblit 1995, Sokolow 2003, Raleigh 1886, Schomburgk 1840, Benzoni 1989, Bargalló 1955, Humbert 1985.

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