Explaining Informality: Extractive States and the Persistent Incentives for Being Lawless

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Abstract

This paper explains informality not as a recent feature of developing countries, but as an underlying historical cause of underdevelopment today. I argue that colonial extractive states not only caused underdevelopment through persistent bad institutions for property rights protection, but also through persistent incentives to enforce property rights out of the law; i.e., through a persistent gap between de jure and de facto institutions. I present historical accounts of the emergence of an informal sector in the colonial period considering Antioquia, a large gold producer region under Spanish rule. I provide empirical evidence of a significant persistent link between this colonial informal sector and current informality outcomes within Antioquia; for this purpose, I use the fact that colonial informal miners only extracted gold from rivers and not from mountains. This paper further shows that this persistence is not explained by constant geographical conditions, availability of resources, nor by differences in other development outcomes. I propose social capital as a channel to understand long-term path dependence and provide a theoretical model.

Keywords: Informal Sector, Shadow Economy, Institutions and Growth, Social Capital, Latin America.

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1 Introduction

Informality is one of the most salient features of developing countries. The size of the informal economy in these countries is huge, on average 40 percent of GDP, ranging from 14 percent to 70 percent of these countries' economies.[1] This has been an issue of concern, given the wide negative effects that informality imposes on economic growth. It leads to insecure property rights, uncertainty in markets, fiscal losses and low public goods provision; it also undermines governance and may be related with criminal activities.[2] Informality is often understood as a by-product of other current underdevelopment features, and its long run implications have not been extensively studied.

This paper argues that informality is not a recent feature, but an underlying historical cause of underdevelopment today, and that for many countries its roots go back to the colonization era. The literature indicates that colonial extractive states established institutions that deny property rights to the majority of the population, thereby hampering economic growth and perpetuating the institutional status quo.[3] Resorting to historical evidence and data for Colombia, I argue that extractive colonial states not only left detrimental institutions for property rights, but also created long-lasting incentives to secure property rights out of the law. This study argues, in other words, that extractive colonial states have not only caused underdevelopment through persistent bad institutions, but through a persistent gap between de jure and de facto institutions as well.

The idea that formal institutions today account for the majority of development differences leaves several observed outcomes unexplained: Formal institutions have changed in former colonies, or have replicated those in western industrialized countries, but most former colonies with extractive activities in the past still seem trapped in underdevelopment equilibria. Development differences can be also found within developing countries, where high levels of informality are often observed regardless of relative prosperity. Finally, as a large related literature observes, same formal institutions can perform differently in different cultural environments (Tabellini, 2010).[4] A persistent gap between de jure and de facto institutions, once created by the experience of an extractive state, can help understand the above mentioned observations.

This paper starts by presenting historical evidence of the emergence of an informal

[1] See Buehn et al. (2010).

[2] For an analysis of the informal economy problem and its size see La Porta and Shleifer (2014) and Buehn et al. (2010).

[3] As in the seminal works by Engerman and Sokoloff (1997) and Acemoglu, Johnson and Robinson (2001, 2002).

[4] See also Putnam et al. (1993), Fukuyama (1996), Knack (2002), among others.

sector as a consequence of an extractive state domination, that is, the rule of a colonial state that did not grant equal rights to the population; instead, it favored the extraction of rents by local elites as opposed to investments in the colony.

Records on tax evasion or other types of informality can be found in several former colonies in Spanish America.[5] I present here the case of Antioquia, a current Colombian department, where the presence of an extractive state and a resulting informal sector during the colonial period can be well established. The region of Antioquia, in the Viceroyalty of Nueva Granada, was one of the main gold producers among Spanish colonies.[6] Registered gold production in Antioquia was not always consistent with the abundance of gold observed. The literature suggests that this was not a sign of an actual decrease in production, but the consequence of a "legality crisis in the tax base" (Alvarez and Uribe, 1985, p. 92). An extractive state was clearly in place in Antioquia with near absence of public goods investment and the imposition of high taxes. As a consequence, a decline in formal colonial enterprises occurred, and a growing number of informal miners extracting gold from rivers and evading colonial taxes replaced them (Alvarez and Uribe, 1985; Poveda, 1981; Restrepo, 1888).

I proceed in three steps in order to test and elaborate my hypothesis: I analyze qualitative historical evidence on informality among miners in Antioquia. I provide empirical evidence for a persistent link between colonial informal mining and current informality levels within this region. Finally, I propose a channel of persistence by understanding its working mechanisms with a theoretical model, which also provides foundations for the economic incentives behind the outcomes observed by the historical literature.

The Antioquia region provides the following scenario: A same colonizer and economic activity, with variation in the potential size of the informal sector across areas. Historical records indicate that informal miners in the colonial period worked in placer mines (gold found in rivers or that has been transported by water), rather than vein mines (gold found in mountains). This is explained by differences between these types of mines in the ease of extracting gold and concealing factors of production. Thus, following historical accounts, the availability of placer mines in an area can be considered a necessary condition for

[5]Some examples are reported by Castro Aranda (1977) and Diaz-Cayeros and Jha (2014): As documented by the former, the permanent hiding of natives in order to avoid the payment of tribute was a main problem for the calculation of population in New Spain (currently Mexico); in fact, the first census in 1790 reveals a large number of natives missing from the list of individuals with tributary status. Also for New Spain, Diaz-Cayeros and Jha (2014) report evidence of indigenous individuals reneging on unfavorable trade contracts with local colonial authorities.

[6]The territory of Colombia as a whole had the largest cumulative gold production until 1875 among Spanish colonies (Alvarez, 1900).

the emergence of informality in the past.

I collect the number and type of colonial mines from a unique catalogue of historic mines records from 1739 until 1900 for Antioquia. I take the number of placer mines during 1739-1810 (72 years before independence) as intention-to-treat, and use variation in this number across municipalities to test the persistence of informality in a within-department setting.

After controlling for the overall number of colonial gold mines in the same period (which should capture, among others, the effect of the number of slaves, the amount of gold and the size of colonial settlements in a given municipality) and under different specifications, I find that a larger number of colonial placer mines is significantly associated with a higher share of individuals not affiliated to the health or pension system (as formally required), with a lower probability of employed individuals having a formal contract and with a higher probability that a child is working or looking for a job. I further control for placer and total mines during 90 years after independence. Current informality outcomes are not driven by the presence of placer mines in general; they are only significantly related to placer mines in the colonial period. Therefore, results in this paper are not telling a story of geography alone explaining informality (of persistent geography effects), but geography as a means to escape an extractive state. Finally, I test my hypothesis using two different smaller and more homogeneous samples: One sample considers only municipalities with presence of colonial gold mining; the second sample only includes municipalities with no gold today. Results lead to the same conclusions: a larger prevalence of placer mines in the colonial period is related to greater informality today. Interestingly, a higher overall number of colonial gold mines is associated with less informality in terms of the different measures.

Given significant transformations and the advancement of modernization processes in independent nations, among them Colombia, it is not straightforward to observe the persistence of informality found in this paper, considering that it is unrelated to resources' availability and type of economic activity. I propose social capital as a channel through which persistence in informality can be explained. This channel is presented by a theoretical model, where individuals are allowed to inherit and invest in sector-specific social capital, that is, cultural values and social skills that are relevant to be productive, either in the formal or informal sector of the economy. Inherited social capital is a function of parental initial cultural values and social skills, as well as of parental investments on social capital, which depend on their choice of being in the formal or informal sector. The choice of the first individuals in each dynasty depends on: (i) the type of colonizer (the extent of extraction vs. public goods investment), which

determines the profitability of the formal sector; and (ii) on the amount of resources that can be exploited out of the reach of the colonial state - or the profitability of being informal. This yields an equilibrium size of the informal sector in the colonial period, i.e. the initial condition from which each place starts off.

In the light of this model, places in the Antioquia region, being under equal colonial extraction, should have different informality levels in equilibrium depending solely on their resources' characteristics. Generations of individuals develop their sector-specific social capital, which affects their sector productivity. This implies, in particular, that generations with rooted cultural values towards informality which have learned how to be 'successful' out of the control of the state, may still have incentives to stay in the informal economy, even if resources change or profitability of the formal sector increases.

The colonization experience has served as an 'experiment' in history for identifying institutions as a main cause of economic growth. The seminal works by Acemoglu et al. (2001, 2002) argue that extractive colonial activities have imposed a major obstacle to long run development by setting persistent institutions that deny property rights to the majority of the population, which can then explain very low investment rates, and thus backwardness after the Industrial Revolution. Several other studies, also based on the Engerman-Sokoloff Hypothesis[7], have found evidence for long lasting effects of specific colonial institutions, such as slavery (Nunn (2008), Acemoglu et al. (2012)) and the mita forced labor system (Dell (2010)), as well as of colonial activities resulting from different factor endowments (Naritomi et al. (2012), Bruhn and Gallego (2012)). This paper contributes to that literature by showing an additional possible channel through which these effects on current development could be also explained, namely, through a persistent condition of anarchy created by the rational will to escape an oppressive rule in the past.

There is also significant literature that draws attention to the paradox that countries with more abundant natural endowments display worse economic outcomes or weaker democracies.[8] This paradox, known as the resource curse, has been consistently related to "dysfunctional state behavior" (Robinson et al, 2006, p. 448). In a long run perspective, my study helps to understand this paradox among places that were once subject to an extractive state: The possibility of operating out of the reach of such a state, provided by the abundance of resources, can explain a persistent gap between formal and informal institutions that leads to poor development outcomes.

[7] Engerman and Sokoloff (1997).

[8] See Robinson et al. (2006), Ross (1999), Sachs and Warner (1995) and Gelb (1986), among others, for studies and evidence of this paradox.

Finaly, this research complements the literature that examines causes and consequences of current informal economies. Many studies examine the effects of taxes and state regulations on the size of the informal sector,[9] where several of them find that changes in these policy instruments are not always associated with a reduction of the existing informal economy (Bruhn (2008)), and that well-functioning legal systems seem to play a central role (Dabla-Norris et al. (2008)). Other literature sees formal and informal economies as largely disconnected, where informality is foremost a by-product of poverty conditions such as low human capital and productivity (La Porta and Shleifer (2014)).[10] My paper is different to the literature mentioned above in that it looks at more structural features of informality and mechanisms of persistence. I conceive informality studied in these papers also as a sign of a deeper deviation from formal rules.

The paper proceeds as follows: Section 2 analyzes historical accounts for the Antioquia region. Section 3 reports empirical evidence for the persistence of informality in Antioquia, where I also describe the empirical strategy and data. In section 4, I present a theoretical model to elaborate on the logic of the proposed channel of persistence. Finally, section 5 concludes.

2 The case of colonial gold mining in Antioquia-Colombia

Whereas social mobility through the possession of gold was not present in the precolonial period, the new colonial context in Spanish America rewarded gold accumulation, and so mining and commerce became the main vehicles for upward mobility in colonial times (Brading, 1973). Under this scenario, the rule of a state that did not grant equal rights to the population and favored the extraction of rents by local elites as opposed to the investment in the colonies, put great pressure for the emergence of illegality, as it will be portrayed next by the historical qualitative literature.[11]

This section presents evidence on how an informal sector emerged in Antioquia[12] during the Spanish colonial period, and it describes characteristics of both the informal sector and the formal economy. This informs the source of exogenous variation in my empirical strategy and how I set up the baseline theoretical model for proposing a chan-

[9] See, among others, de Paula and Scheinkman (2009), Dabla-Norris et al.(2008), Bruhn (2008), Monteiro and Assunção (2006).

[10] See also Rauch (1991) and Harris and Todaro (1970).

[11] Considering that in the *pre*colonial period mining was performed within a self-developed indigenous society, that precious metals were demanded for artistic and religious purposes, and social status could not be gained through the possession of gold, there is no hint that mining could have possibly been used to escape the formal structure of the precolonial society, or that there were such incentives at all.

[12] Antioquia is a current Colombian department and was part of the Viceroyalty of Nueva Granada.

nel in section 4.

Records on historical informality

The existence of informal miners, namely, miners that escaped the colonial control and evaded gold taxes, is well reported in Antioquia. They were increasing in number during the colonial period and replaced formal mining to a large extent: Formal mining, mainly based on slave work, was producing in the second half of the 18th century about only one third of all gold (Poveda, 1981), and towards 1851, around 80% of all workers in the mining industry were free informal miners.[13]

In the presence of informality, gold could not be completely located in its production phase, but it was more likely found in its circulation, that is, in trade. Traders received gold dust from transactions with informal miners (who did not melt gold as legally required) and they converted a considerable amount of this gold into currency to further engage in trade (Poveda, 1981). However, merchants saved a share of gold dust unmelted in order to smuggle unregistered foreign goods.[14] In general, as shown in Table 1, there was a decline over time -between 1670 and 1800- in the share of molten gold by miners relative to that share for merchants. This behavior indicates a decline in the contributions of miners, as taxes were paid at the time of melting, thereby suggesting the existence of illegal mining in the early colonial period.

[Table 1 here]

Registered concerns on the prevalence of illegality can in fact date back to 1678. An official communication signed in Madrid in that year established the reduction in colonial gold taxes in the whole territory of Nueva Granada. This was done provided the need to effectively set back the "deeply rooted crime of not taxing gold "(cited by Restrepo (1888), p.220).

The Spanish colonial state in Antioquia and the origin of informality.

It is argued that no other industry, except for gold mining, was developed in Colombia during three centuries of Spanish colonization (Alvarez, 1900). Despite this, there is debate whether the shipment of precious metals from the colonies to the metropolis was the ultimate goal of the Spanish Crown. As in the approach of Grafe and Irigoin

[13]The literature notes that for this reason, the abolition of slavery in Nueva Granada in 1851 - or the earlier abolition in Antioquia in 1813- did not have a big impact in gold production (Restrepo, 1888).

[14]Merchants were required to pay a gold tax since 1695. See Alvarez and Uribe (1985) for further evidence on illegality in trade and mining in Antioquia.

(2008, 2012), the Crown left most colonial revenues in the hands of local elites in Spanish America to buy them off and so guarantee the defense of its strategic interests and its final aim: expand and maintain the empire at very low cost, or a colonial empire 'run on the cheap'. Regional histories for Antioquia are consistent with this view, in that mineral resources were obtained at minimum investment levels while taxes enabled the extraction of rents by local elites.

Following these histories, informal mining in Antioquia emerged in order to avoid the high fiscal burden and lack of subsistence means that characterized districts with big-mining enterprises, as those districts did not properly develop other economic sectors. The colonial fiscal burden was shouldered by enterprises that were identified by colonial offices who looked after tax collection - *Cajas Reales*. These enterprises had to pay 20% of their total output as a tax, which was accordingly called *quinto real*, and they were singled out due to their visible geographical presence as well as factors of production; thereby, formal miners worked either in placer or vein mines with a fixed geographical location.

Given the mines' big size, a large labor force was required, as well as technologies. The latter were especially needed for gold extraction from mountains (Poveda, 1981; Restrepo, 1888). However, the conditions to sustain these factors of production were not fulfilled. Agriculture and trade were not properly developed during most of the colonial period, and hence, there was lack of subsistence means relative to the size of the labor force (Alvarez and Uribe, 1985; Colmenares, 1989; Poveda, 1981; Restrepo, 1888). A general rationale for this is that there was no incentive to attract workers with better welfare conditions if individuals were mainly forced to work. Yet, given insufficient living conditions, part of the labor force died or escaped mines (Colmenares, 1989).

Similarly, investments needed for production, such as technology investments, were low or inexistent. Well into the colonial period, mines were still exploited with techniques learned from the indigenous people and with the most rudimentary instruments. The colonial state neglected for long time the construction of roads and the establishment of river transportation means, which also prevented the entry of machines necessary for the exploitation of mines. As a result, the lack of appropriate technologies caused the desertion of many mines, foremost, vein mines (Alvarez, 1900; Colmenares, 1989; Poveda, 2002; Restrepo, 1888).

Big-mining enterprises then fell into a crisis as a result of: a) low returns explained by a high fiscal burden and low productivity in the absence of technologies and public goods; and b) the difficulties to sustain miners' crews (Alvarez, 1900; Alvarez and Uribe, 1985; Poveda, 1981; Restrepo, 1888). As Alvarez and Uribe (1985) indicate, this crisis

may have not only increased relative returns of other activities, but it released labor force suitable for mining.

Informal miners' characteristics: Why could they not be taxed.

Informal miners were not hired by anyone and were not tied to any specific place. They were nomads and moved to places with an easy access to gold, namely, they extracted gold from rivers (placer mines) and particularly used to look for dry rivers, which were easier to exploit (Poveda, 1981; Restrepo, 1888). Informal miners were able to move because they mostly worked on their own and just needed a simple tray to wash sand; alternatively, they could work with a small group of slaves taken away from legal mines.

It must be noted that the relationship between slaves and free men in the informal sector was different. Free-men informal miners were often mulattoes, and their work, as well as their families', was as important as that of slaves. Moreover, slaves could participate from gold output (Poveda, 1981).

Producing out of the reach of colonial authorities implied that informal miners retracted to some extent from places where the main formal activity was established. This enabled them tax evasion, without implying losses in terms of potential access to public goods (as these were not present in the formal sector). On the other hand, this pro-evasion way of production involved lower costs and investments than those in the formal sector: Informal mining did not require the maintenance of a large labor force (e.g. big crew of slaves) or made possible significant investments in a given place. In fact, informal miners did not typically buy lands and were therefore also called invasive miners (Alvarez and Uribe, 1985). Since they did not have any lasting place of work and did not display identifiable factors of production, they could not be taxed, nor restrained by the colonial power (Alvarez and Uribe, 1985).

3 Empirical evidence for the persistence of informality

In the following, I present empirical evidence for a persistent link between colonial informal mining and current informality levels in Antioquia. As historical evidence points out, informal or illegal miners worked in placer mines, rather than vein mines, given their ease for exploitation and for hiding factors of production. Whereas individuals in placer mines could go alone and wash sand with a simple tray, vein mines implied factors of production and access into a mountain that were visible and permanent in a given place. So, the availability of placer mines in an area can be considered a necessary condition for

the emergence of informality in the past; moreover, the possibility to become informal should have been increasing in the amount of such mines.

I will use an intention-to-treat approach, taking variation in the number of colonial placer mines across municipalities as variation for intensity assignment in the colonial informality treatment. As outcome variables I will use three measures of current levels of informality across municipalities or individuals in Antioquia. Note that the Antioquia case allows variation in the possibility to become informal in the past, while keeping the nature of the colonizer constant across areas.

The number of placer mines before independence comes from historical mines records in the Antioquia region at the municipality level during 1739-1810 (72 years before independence). Although registered mines were not necessarily those exploited in an illegal way, they provide the only hint of an area's gold richness and the way this richness was available, if in rivers or mountains.

The treatment may proxy other features in the past that are important for later outcomes, such as the degree of economic activity, the size of colonial settlements and the number of slaves. One strategy would be to control for population and its composition during the colonial period, however, these data are not available at the municipality level. Alternatively, the *total* number of gold mines can serve as a good proxy for the above mentioned factors. Therefore, the baseline model below includes total number of mines at the municipality level in the same period (1739-1810). In this way, the number of placer mines is not capturing the overall effect of colonial mining on current informality, but the effect of the potential for being informal under this colonial activity.

As historical evidence suggests, the extensive margin should have been the one relevant for informality given the need of informal miners to be out of reach of the colonial state. That is, each additional placer mine should have increased the possibilities of escaping the state, not a higher share of gold resources present in rivers.[15] Therefore, the number of available placer mines, and not the share of placer mines, should have explained variation in the size of the informal sector during the colonial period.

The baseline model is given by:[16]

[15] For example, a place with two gold mines, one (50%) of them a placer mine, provided less possibilities for becoming informal than another place with 20 placer mines out of a total of 100.

[16] Note that whereas placer mines are included in the number of total mines, this exercise wants to consider the exogenous variation in the possibility to become informal in the past controlling for variation in the overall level of gold mining activity. Alternatively, one can have a model with vein mines instead of total mines and reach the same conclusions that will be presented here (results available upon request).

$$I_{ij} = \alpha + \beta\, placer\ mines_{1739-1810\, j} + \lambda\, total\ mines_{1739-1810\, j} + W'_{ij}\eta + X'_j\varphi + U_{ij} \quad (1)$$

where index i denotes individuals and index j refers to the corresponding municipality for individual i. I is a current informality outcome, *placer mines* is total number of placer mines during 1739-1810, *total mines* is total number of gold mines in the same period, W is a vector of individual controls and X is a vector of observables at the municipality level.

3.1 Data description

Data on the number of gold mines and their type were consulted in a unique catalogue of historic mines records from 1739 to 1900 for Antioquia. This catalogue was developed by Mesa (1906). Figure 4 shows a map of Antioquia, where total number of mines and the number of placer mines in 1739-1810 can be visualized across municipalities.

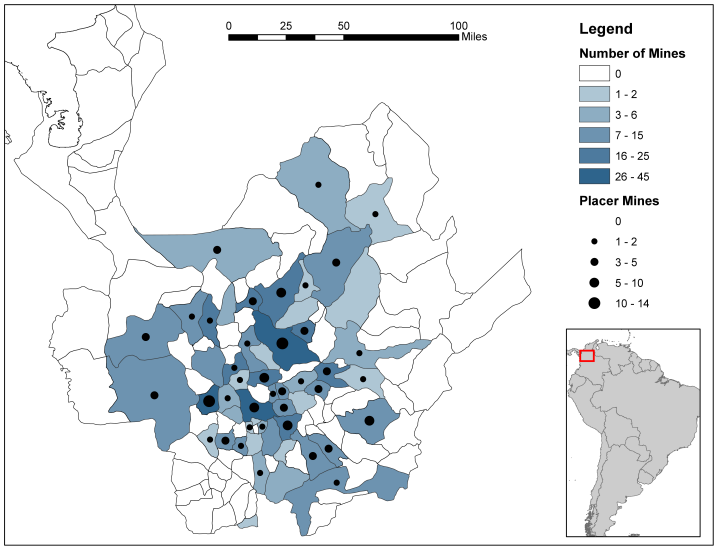

Figure 1: Map of Antioquia displaying colonial gold mines and the intensity of the treatment - number of colonial placer mines.

Places with colonial gold mining are close neighbors and clearly comprise the area of the Andes mountain chain along the Antioquia region. This can be seen in Figure 5, where a physical map is presented. Except for sharing these geographical conditions, no

other pattern can be observed among municipalities with colonial mining.

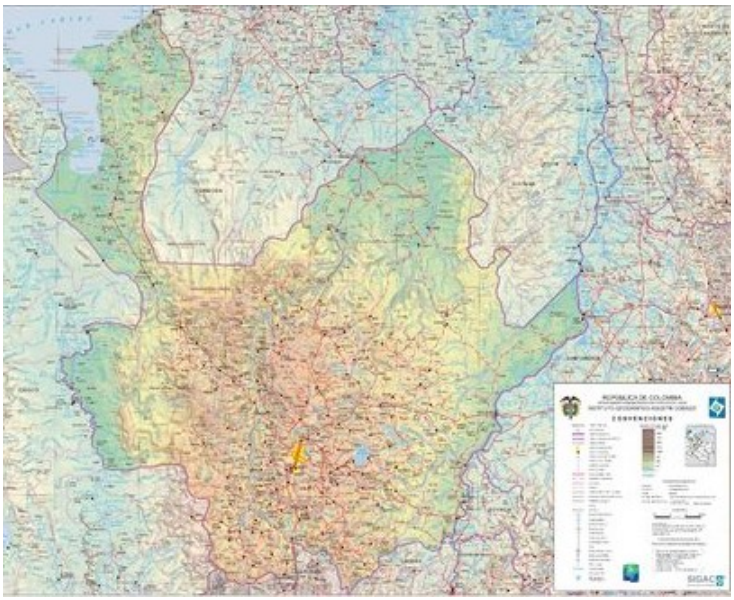

Figure 2: Physical map of Antioquia. Source: Instituto Geográfico Agustín Codazzi - IGAC.

I observe the following informality outcomes: Whether a child[17] is working or looking for a job (*child labor*), whether an employed individual has a formal contract (*formal employment contract*), and the share of employed individuals registered by the Colombian Ministry of Health and Social Protection that are not affiliated to the health or pensions system (*no health or pension system*). Note that affiliation to both pensions and health is a legal requirement in Colombia for formal employment. The first two variables come from the 2006 Colombian household survey -*Encuesta Continua de Hogares*- performed by the Colombian National Administrative Department of Statistics, DANE, which contains a representative sample of individuals in Antioquia. Urban residency and literacy of the individual are taken as control variables from this survey. The third outcome is available for all 125 municipalities in Antioquia in year 2008.

I divide observables in two sets of control variables. The first set includes relevant geographic characteristics of municipalities, namely, (log) altitude, presence of a river, as well as presence of gold, coal, and oil in 2002. The original source of these variables is the Geographic Institute Agustin Codazzi - IGAC. The aim of using this set of controls is to capture development differences related to the way that economic activity is organized,

[17]Child defined between 0 and 17 years old.

and to exclude the effect of currently available resources (including gold and rivers) on informality outcomes.

The second set of control variables comprises current socioeconomic characteristics at the municipality level. The Colombian National Administrative Department of Statistics (DANE) is the main source for these variables, and most of them are taken from the latest census in 2005. These are: population size, share of urban population, share of immigrants from other municipalities, share of forced migration, share of the population that belongs to an ethnic group, literacy rate, share of individuals with secondary/university education and employment rate. Unobserved features related to remoteness and historical development are captured by distance to the department capital city, and additional variables include mean unsatisfied basic needs index (1985-2002), population density and presence of indigenous population in the first half of the 16th century; these variables were provided by the Center of Economic Development Studies (CEDE) at Universidad de los Andes. Finally, I further add the presence of FARC and ELN guerrilla groups (1993-2010), the presence of AUC paramilitary group (1993-2010)[18] and mean coca-farmed area (2000-2008) in this set of controls, given the need to account for the effects of violence and delinquency activities related to illegal armed groups. Data on the presence of these groups is reported by the Colombian Presidency Observatory of Human Rights, and the original source for coca-farmed area is the Colombian National Department of Narcotics. These data were also provided by the CEDE.

It is worth noting that to the extent that these control variables are arguably endogenous to historical informality, including them in the estimation implies 'overcontrolling' and likely leads to underestimate the coefficient of interest.

Descriptive statistics of all variables are shown in Table 2. Additionally, Table 2 presents a comparison of the balancedness of these covariates across treatment status. Municipalities are defined as treated, for the purposes of this table, if they had a positive number of placer mines in the colonial period 1739-1810. It can be observed from a mean comparison test that municipalities in Antioquia are homogeneous between treatment and control group in terms of socioeconomic characteristics. The only significant difference in means is present in the distance to the department capital city, which is explained by the fact that places with colonial state presence -with colonial mining- have had a greater historical importance (and thus are closer to the capital city, or are the capital city itself). This difference in means thus disappears when only municipalities

[18]Presence of illegal armed groups are binary variables that inform if there is prevalence or not of these groups during the period 1993-2010.

with colonial gold mining are considered.[19] Finally, the mean comparison test indicates that treated municipalities have on average more mines before and after independence, are at a higher altitude, and a higher share of them has presence of gold today.

In sum, it is reasonable to conclude that municipalities with colonial placer mines compared with all other municipalities in Antioquia are quite homogeneous in terms of socioeconomic outcomes; they are, not surprisingly, different in geographical characteristics mostly related to gold richness, as well as historical variables. I control for these characteristics in my regressions.

[Table 2 here]

3.2 Results

Table 3 shows OLS estimates for the baseline model.[20] The first column under each dependent variable features no control variables; the second column includes only geographic characteristics mentioned above, while the set of socioeconomic control variables is added in the third column.

Conditional on the total number of colonial gold mines, a larger treatment is related to a higher share of individuals not affiliated to the health or pension system, to a lower probability of having a formal contract if employed and to a higher probability that a child is working or looking for a job. The treatment effect is significant under different specifications (with/without controls) and its sign remains stable in cases of no statistical significance.

Considering specifications that only control for geographical observables, one standard deviation increase in the number of colonial placer mines (equal to 2.2428 mines) is related to an increase equivalent to 25% of one standard deviation in the share of non-affiliated individuals, to a decrease equivalent to 20% of one standard deviation in the formal employment contract variable, as well as to an increase equivalent to 41% of one standard deviation in the child labor variable.

Interestingly, a larger total number of colonial mines is associated with lower levels of informality throughout the different measures.

[Table 3 here]

[19] See Table A1 in the Appendix for descriptive statistics and balancedness among control and treatment municipalities with colonial mining history.

[20] Logit regressions for the two binary dependent variables, *formal employment contract* and *child labor*, are shown in tables A2-A4 in the Appendix. These tables also include robustness checks described below.

3.2.1 Robustness checks

Results above indicate there is a significant link between variation in colonial placer mines and current informality outcomes. This can be suggestive evidence for the widespread persistence of informality since colonial times; nevertheless, this evidence would be also consistent with the idea that placer mines provide favorable conditions for informality in any time period. In particular, in developing countries, current weak institutions and other underdevelopment features may allow the emergence of informality in places where placer mines are available. According to the literature, however, current gold production in Colombia from colonial gold deposits can be considered insignificant as these deposits are now empty (Acemoglu et al., 2012); thereby, current placer mines should not be related with the treatment.

On the other hand, there may be still the concern that the estimated effect captures something related to placer mines in a more recent past -which are more likely correlated with the treatment- but not necessarily the effect of placer mines during the colonial period. In order to rule this out, Table 4 includes number of placer mines and number of total mines during the next 90 years after independence (1811-1900)[21] in each municipality. Results show that it is not a general effect of placer mines the one driving current informality outcomes; variation in the number of colonial placer mines persistently explains variation in informality levels, while placer mines after independence are not significant to explain these outcomes. The treatment effect is now significant in all specifications with formal employment contract and child labor as dependent variables, and it has a larger magnitude.[22]

[Table 4 here]

An additional robustness check considers only municipalities with presence of colonial gold mining. This is meaningful as these municipalities may share unobserved characteristics that make them different from municipalities with no mining industry in the colonial period. They have a longer common history of state presence, early settlements and gold exploitation, but still differ in the amount of resources suitable for informal extraction. Results for this reduced sample are reported in the even columns of Table 5.

[21] Independence battles started around 1811 and Antioquia was self-declared independent in 1813, as many other Colombian regions, although definitive independence of Colombia was achieved in 1819. I take 1810 as the independence threshold in order to have a more conservative measure of colonial mines.

[22] Estimates from specifications only controlling for geographical features indicate a decrease equivalent to 47% of one standard deviation in the formal employment contract variable, and an increase equivalent to 52% of one standard deviation in the child labor variable, due to one standard deviation increase in the treatment.

The colonial placer mines treatment is still robust under specifications with no controls and all control variables, whereas it is not statistically significant to explain the share of individuals not affiliated to the health or pension system.

Finally, I perform regressions taking only municipalities with no gold today. This exercise seeks to clarify any concern that informality levels are driven by persistent geographical conditions favoring informality, and not by the fact that such conditions in the past gave the possibility to escape a colonial state. Estimates are shown under the odd columns of Table 5 and results lead to the same conclusions as before: Municipalities with no gold today that were however richer in placer gold mines in the colonial period display a larger informality.

[Table 5 here]

4 Proposing a channel of persistence

Independent nations have had important transformations over centuries, such as the abolition of slavery and other colonial institutions, the achievement of democracy and the advancement of modernization processes. It is therefore not straightforward to understand, regardless of resources' availability and economic activity, the persistence of informality. In this section I propose social capital accumulation as a channel of persistence by understanding its working mechanisms with a theoretical model.

Intuitively in this context, social capital accumulation refers to the development over generations of cultural values and social skills towards informality. Individuals develop a preference and learn how to succeed out of the control of the state. This 'knowledge' implies an advantage (capital) for them while staying under the shadow of informality.

In the following, a baseline model provides foundations for the economic incentives behind the emergence of informality. Thereafter, social capital formation is introduced.[23]

[23] One competing channel one can think of is state capacity. It may be reasonable to think that weak states should have emerged in places where individuals could not be easily taxed and kept under control (for studies investigating the process of state building, see, among others, Acemoglu (2005), Sánchez de la Sierra (2013), Besley and Persson (2009) and Acemoglu et al. (2014)). If weak states persisted over time, persistent informality can be explained. I can empirically rule out that there is a channel of state size/presence operating. Using the number of colonial officials and presence of local colonial offices as exogenous sources of variation in the current size of local states in an IV approach (conditional on the number and type of colonial mines), Tables A6-2 and A6-3 in the Appendix find no conclusive evidence of an effect of state presence on informality outcomes. This result does not necessarily imply that a broader meaning of state capacity that is endogenous to the evolution of social capital is not on scene. A persistent low legitimacy of local states, their dysfunction with respect to de jure institutional mandates, and thus their low possibility to make individuals comply with the law may also explain this paper's findings. This latter idea is also briefly discussed in Appendix 6 based on historical qualitative evidence.

A model of the emergence of informality

The colonizer and a continuum of individuals living in the colony are the players of a one-shot game. They are placed in an area with plenty of resources. These resources can be present in different forms or types in nature, according to which they can be more or less easily exploited in an informal way. Let $\gamma \in [0, 1]$ be the amount of resources that are of the type exploitable for informal individuals, where total resources are normalized to be equal to one.

The colonizer and individuals in society play in two stages.[24] In the first stage the colonizer chooses an expropriation (tax) rate, τ, and a level of public good investment, g, which determine the degree of extraction of colonial institutions.[25] These institutions are persistent throughout the colonial period. In the second stage, individuals decide whether to be formal or informal according to individual payoffs in both sectors. Individuals are subject to the colonizer's rule in the short run ($t = 0$), but can gradually switch to informality until a long run equilibrium is achieved ($t = 1$).

Informal individuals perform productive activities for the economy, they do not steal from the formal sector but are not identified in this sector; that is, informal individuals by definition avoid taxes, and they are not users of public services. This implies that any strategy chosen by the colonizer only affects the formal economy: The colonizer can only expropriate formal individuals and the public good can only affect production in the formal sector (can be only considered a public good in that sector). In other words, it is not possible to avoid τ or to avoid being detected if the individual is user of the public good.[26]

Second stage

Individuals choose whether to stay in the formal sector and be taxed, or to escape taxation and work on their own (be informal). They are formal in the short run, when the colony is under full control by the colonizer. If the alternative of escaping the colonial

[24] My setup follows the model fashion in Nunn(2007) to some extent.

[25] Appendix 5 shows the first stage of the model for completeness.

[26] Such public good in the context of colonial Antioquia could have been the development of markets, where agents were required to pay with minted coins (not gold dust, as it was in the transactions between individual informal miners and merchants), the access to subsistence means, public legal services and education for taxpayers, among others. This assumption is consistent with the observation that colonial informal miners retracted from places where the main formal activity was established, and it is also in line with current literature on informality. It is argued in this literature that firms pay taxes and bear regulation costs in order to have expanded access to public goods, markets and financing sources (La Porta and Schleifer, 2008; 2014).

state is more profitable, individuals will move to informality until relative payoffs make them indifferent between both sectors. Denote the share of informal individuals in total population by Z.

All informal individuals can move their place of work so that they always secure an individual profit, as long as there are resources to be exploited in an informal way ($\gamma > 0$).

Total output produced by the informal sector at time t is given by:

$$Y_{I,t}(Z_t) = \gamma A_I Z_t^{\theta} \tag{2}$$

where $\theta \in (0,1)$, and A_I denotes total factor productivity in the informal sector.

Individual payoff in the informal sector is then:

$$\Pi_{I,t} = \frac{\gamma A_I Z_t^{\theta}}{Z_t} = \frac{\gamma A_I}{Z_t^{1-\theta}} \tag{3}$$

If $\gamma = 1$, all resources could be exploited in an informal way, and the informal sector could realize the whole potential product, provided its production technology. For $\gamma = 0$, it is not possible to exploit resources in an informal way and so payoff is zero.

Total output produced by the formal sector at time t is given by:

$$Y_{F,t}(g, Z_t) = A_F(g)\,[1 - Z_t] \tag{4}$$

where total factor productivity in the formal sector, $A_F(g)$, is affected by the public good, and $A'_F(g) > 0$. Note that the amount of resources that are also exploitable for informal individuals (γ) does not affect production in the formal economy, except for the fact that individuals can move to the informal sector. Note also that production technology in the formal economy allows for constant returns to scale. Full replicability of the production process is possible provided no limitations in the access to resources and public goods. On the other hand, crowding effects are possible in the informal economy since acting out of the law entails the need of being undetectable, and thus, there is no open access to resources, even if these are the type that could be exploited in an informal way.

Individual payoff in the formal sector is total production after extraction, divided by the number of formal individuals:

$$\Pi_{F,t} = [1 - \tau] A_F(g) \tag{5}$$

This payoff is increasing in g and decreasing in τ.

Finally, the colonizer payoff at a given time t is equal to extracted production minus the cost of the public good, which is normalized to be equal to g:

$$\Pi_{c,t} = \tau Y_{F,t}(g, Z_t) - g = \tau A_F(g)\left[1 - Z_t\right] - g \tag{6}$$

Individuals are indifferent between being formal or informal if the following condition holds:

$$1 - \frac{\gamma A_I}{A_F(g) Z_t^{1-\theta}} = \tau \tag{7}$$

In particular, we can distinguish between a full informality equilibrium and an interior equilibrium. A full informality equilibrium is achieved whenever:

$$1 - \frac{\gamma A_I}{A_F(g)} \leq \tau \tag{8}$$

Let us consider the case of Antiquia mentioned in section 2. There is a colonizer characterized by the almost absence of public goods investments and the imposition of a tax rate (equivalent to the *quinto real* or 20% of total outout). I will assume w.l.o.g. that $A_F(g) \geq A_I \ \forall g$, thereby indicating that total factor productivity in the formal sector is at its lowest level when the absence of the state, in terms of public goods, is comparable to that faced by informal individuals.[27] Thus, considering $A_F(g) = A_I$ as the Antioquia case in (7), the decision to become informal depends solely on how large is the extraction rate and how large are the possibilities to produce out of the formal economy (given by the amount of suitable resources, γ, and the size of the informal sector). This is depicted in Figure 3, where I plot payoffs in both sectors as a function of Z and allow variation in the parameter γ.

[27] This condition guarantees that $\frac{\gamma A_I}{A_F(g)} \in (0, 1] \ \forall \gamma \neq 0$ in (8).

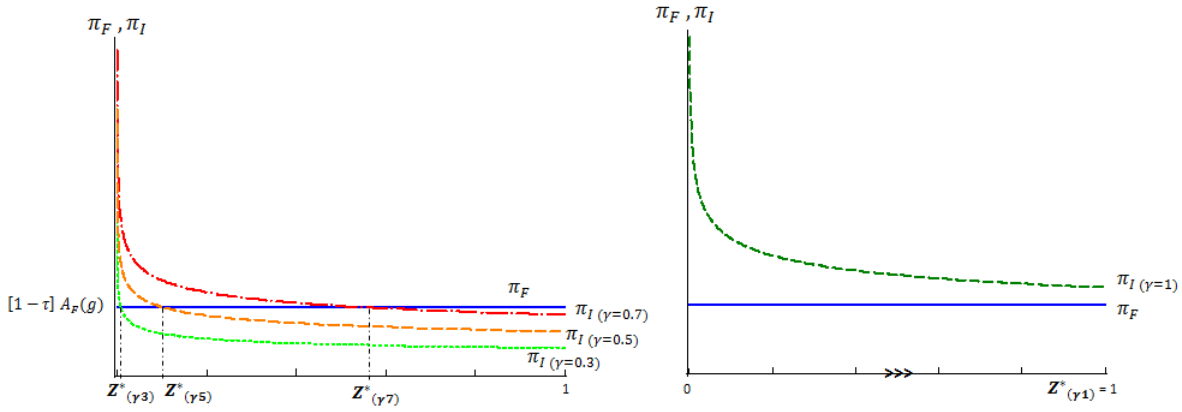

Figure 3: Equilibrium depending on the level of γ (τ and g fixed)
$[\tau = 0.2,\ \theta = 0.8,\ A_F(g) = A_I]$

As shown by Figure 3, there will be incentives to become informal for a larger share of the population, the higher is γ. This implies that places subject to the same colonial strategy and production functions can face different informality levels in equilibrium depending on their resources' characteristics: Where more resources can be extracted easily by informal individuals, more people will be in the informal sector. The persistence of these different informality levels is my testable hypothesis in the previous section of the paper, where τ and g are given and constant across places, and γ varies exogenously.

Social capital formation as a channel of persistence

Consider individuals living three periods. In the first period they are born and inherit from their parents a stock of social capital, which is defined by cultural values and social skills consistent with these values. This stock is comprised of a stock of values/skills towards formality and a stock of values/skills towards informality.[28] Denote it by $\phi = \{\phi_F, \phi_I\}$. In the second period, individuals decide whether to be formal or informal depending on individual payoffs in both sectors, and invest accordingly in sector-specific social capital, i.e. deepen values and increase social skills for the sector they chose to be. In the third period, individuals inherit their stock of social capital to their children.

As a consequence, ϕ depends on parents' investment in formal or informal social

[28] For example, knowing how to lie when reporting income without being detected is a social skill consistent with cultural values that favor informality.

capital in the previous period, and on parents' initial stock of social capital in that period; so, the social capital formation function for any sector $S \in \{F, I\}$ can be written as:[29]

$$\phi_{S,t} = f\left(\phi_{S,t-1}, \Omega_{S,t-1}\right) \tag{9}$$

where $\Omega_{S,t-1}$ are investments in social capital relevant for sector S that are realized while being in sector S in period $t-1$; $f'(\Omega_{S,t-1}) > 0$.

Total factor productivity in any given sector is now determined by a social capital component and a sector specific component. That is, individual payoffs depend on each sector's characteristics (that are common to all individuals), as well as on individual cultural values and social skills relevant to every sector. The intuition behind the social capital component is that stronger cultural values make individuals prone to put more effort on activities that are consistent with these values, and social skills give the know-how to be successful in that effort.

Total output produced by the informal economy is now:

$$Y_{I,t}(Z) = \gamma A_I \bar{\phi}_{I,t} Z_t^{\theta} \tag{10}$$

where

$$\bar{\phi}_{I,t} = \frac{1}{Z_t} \int_0^{Z_t} \phi_{I,t}^i d_i \tag{11}$$

is the general level of social capital relevant for the informal sector (i denoting individuals).

Individual payoff in the informal sector is then given by:

$$\Pi_{I,t}^i = \frac{\gamma A_I \phi_{I,t}^i}{Z_t^{1-\theta}} = \phi_{I,t}^i \Pi_{I,t} \tag{12}$$

Equivalently, individual payoff in the formal sector can be written as:

$$\Pi_{F,t}^i = \phi_{F,t}^i \Pi_{F,t} \tag{13}$$

Consider that an informality equilibrium $Z^* \in (0,1)$ is achieved in $t = 1$. This im-

[29] This is in line with the skills formation setting in Cunha, Heckman and Schennach (2010).

plies that from that period onwards, everything else constant, two types of cultural values and social skills (social capital) will develop in the population; one type that is relevant to be productive in the formal sector and another type that is relevant to be productive out of the law.

The older becomes a dynasty in the informal sector, the higher is the accumulated stock of informal values/skills relative to formal ones. Figure 4 shows payoffs for individuals that initially moved to the informal sector (that compose Z^* in $t = 1$). In the absence of changes in the incentives framework (τ, g), these individuals will only accumulate social capital for that sector.

Now, let us consider a change at time T from a low to a high payoff in the formal economy. This is introduced in the graph on the right hand side, where the new outside option for informal individuals is $\Pi'^{i}_{F} = \phi^{i}_{F,0}\Pi'_{F}$.

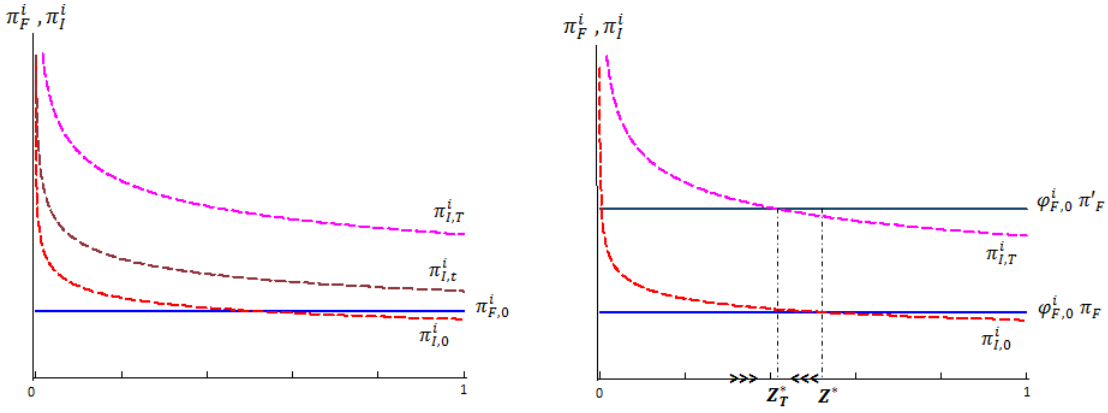

Figure 4: New equilibrium after a change in the formal economy
$[\gamma = 0.7,\ \theta = 0.8,\ A_F(g) \geq A_I,\ \phi^i_{I,T} > \phi^i_{I,T-1} > ... > \phi^i_{I,0}]$

This change in the formal economy would move back a large share of individuals to the formal sector in a scenario of no social capital formation. Yet, here, informal individuals and their dynasties have done a sufficient amount of investments in their informal values and social skills. As a consequence, only a very small portion of individuals would have incentives to move into the formal economy, while the majority will still perceive a higher payoff in the informal sector; that is, a high informality equilibrium persists.

This scenario can be traced in the Colombian context, as colonial policies in the country began to change at the end of the colonial period. Historical evidence reports adjustments in colonial gold taxes since the late 17th century. On the other hand,

agriculture and trade started to be promoted, yet only at the end of the 18th century.[30] However, there is no evidence in Antioquia of a reversion in informality during the colonial period, nor after independence: It is estimated that 60% of all gold production was informal in the second half of the 18th century (Poveda, 1981), and this share was likely higher few decades after independence, when about 80% of all miners were informal (Restrepo, 1888).

Historical accounts also point out important extensions of the social capital channel proposed here, by showing several events in which the prevalence of informality also caused formal institutions to deviate from their legal mandate. Volunteer liberations of slaves since the end of the 18th century, despite being considered subversive by colonial authorities (Poveda, 1981), the illegal regulation of prices in the benefit of miners, and the no application of penalties by local justice when merchants openly refused to pay gold taxes between 1786 and 1803 (Alvarez and Uribe, 1985) are some examples.

5 Conclusion

This paper argues that informality is not a recent feature of underdevelopment, but an underlying historical cause of underdevelopment today, which emerged as a reaction to escape adverse formal institutions in the past. I present historical qualitative evidence for the emergence of an informal sector due to a colonial extractive state, considering the case of Antioquia, a large gold producer under Spanish colonial rule, now a Colombian department. I find empirical evidence for a persistent link between colonial informal mining and current informality levels within Antioquia that is not explained by persistent geographical conditions favoring production out of the formal sector. Finally, I argue that informality has been persistent through the channel of social capital formation, and provide a theoretical model.

The emergence of informality as a consequence of extractive states is interesting in the light of the economics literature, as it implies that these states not only set conditions for bad institutions, but also give incentives to stay out of the law. In particular, this paper's findings imply that colonial extractive states in the past have also caused underdevelopment through a persistent gap between de jure and de facto institutions.

The argument in this study sheds light on structural features and mechanisms of persistence of informality. It also highlights how the abundance and type of resources were important to enable individuals to escape the state, produce outside the formal economy and consolidate an informal sector in the past.

[30] See González (1983).

Informality can be understood as a response to overcome the negative effects of extractive institutions. However, informality is detrimental for economic development, as it may be related with criminal (unproductive) activities, and lead, among other outcomes, to insecure property rights, uncertainty in markets, and low public goods provision. Thus, informality may have had a different effect on economic growth in different times. The literature notes that informal miners gave gold mining the character of an egalitarian and popular activity in Antioquia during the colonial period. This significantly pushed the independence movement, in particular due to former slaves' support (Poveda, 1981). Moreover, a higher economic power of a broader share of the population in the informal economy had effects on the way institutions performed. Not only individuals were informal, but formal institutions deviated from their legal command. Institutions performing outside the law might have allowed economic growth given a law that was defined for the interests of a colonial extractive state, but neglecting the law as a persistent feature of de facto institutions is now detrimental for economic growth and welfare.

Incentives to become informal considered in this paper are also relevant for other events in history or in the present involving extractive institutions. Modern states may come close to be extractive if public goods are clearly underprovided compared to tax levels, thereby making informality an attractive option. Hence, state failures causing this gap, such as corruption, may have larger and more persistent detrimental effects than expected.

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Tables

Table 1. Antioquia. Share of molten gold by miners and traders by decades, 1670 -1800.

Decade	Miners share in molten gold	Traders share in molten gold
1670	46,9%	53,1%
1680	24,0%	76,0%
1690	27,4%	72,6%
1700	10,9%	89,1%
1710	40,3%	59,7%
1720	19,4%	80,6%
1730	20,6%	79,4%
1740	14,5%	85,5%
1750	31,6%	68,4%
1760	3,0%	97,0%
1770	0,4%	99,6%
1780	5,7%	94,3%
1790	4,2%	95,8%
1800	10,2%	89,8%

Source: Twinam (1985), Table 3, p.70.

Table 2. Descriptive statistics

	colonial placer mines = 0			colonial placer mines > 0			Total sample		
	N	mean	sd	N	mean	sd	N	mean	sd
no health or pension system	86	0.6794	0.0105	39	0.6812	0.0147	125	0.6800	0.0119
formal employment contract	26	0.231	0.181	15	0.303	0.193	41	0.257	0.186
child labor	26	0.160	0.120	15	0.106	0.081	41	0.140	0.109
placer mines (1739-1810)***	86	0	0	39	3.3590	2.9063	125	1.0480	2.2428
total mines (1739-1810)***	86	0.4302	1.5072	39	10.6667	9.1085	125	3.6240	7.0467
placer mines(1811-1900)***	86	13.2558	50.7713	39	54.8205	71.9301	125	26.2240	61.0441
total mines (1811-1900)***	86	41.1744	133.4357	39	133.3590	130.4043	125	69.9360	138.7633
Socioeconomic control variables									
presence of natives in first half of 16th century	86	0.5233	0.5024	39	0.5128	0.5064	125	0.5200	0.5016
population size	86	26901.1	49869.2	39	84308.0	352300.8	125	44812.1	201130.2
share of urban population	86	0.4602	0.1945	39	0.4203	0.2007	125	0.4477	0.1965
population density	85	248.7	1180.0	39	409.6	1190.0	124	299.3	1180.7
share of immigrants	86	0.3297	0.1239	39	0.3258	0.1469	125	0.3285	0.1309
share of forced migration	86	0.0155	0.0287	39	0.0180	0.0224	125	0.0163	0.0268
share of ethnic population	86	0.1101	0.1487	39	0.0893	0.1329	125	0.1036	0.1437
literacy rate	86	0.7374	0.0677	39	0.7550	0.0789	125	0.7429	0.0715
share secondary/university education	86	0.1949	0.0822	39	0.2232	0.1230	125	0.2037	0.0971
employment rate	86	0.9654	0.0223	39	0.9665	0.0155	125	0.9657	0.0204
mean unsatisfied basic needs index*	85	50.0492	18.6841	39	43.7966	17.1213	124	48.0826	18.3703
distance to department capital city***	85	151.8353	104.7152	39	90.8718	62.1607	124	132.6613	97.4167
mean coca-farmed area	86	39.8962	131.7487	39	58.1561	202.1636	125	45.5933	156.5097
presence of guerrilla	86	0.6395	0.4830	39	0.6154	0.4929	125	0.6320	0.4842
presence of paramilitaries	86	0.4419	0.4995	39	0.4872	0.5064	125	0.4560	0.5001
Geographic control variables									
presence of river	86	0.8256	0.3817	39	0.8974	0.3074	125	0.8480	0.3605
(log) altitude**	85	6.4482	1.8646	39	7.1924	0.7791	124	6.6823	1.6377
presence of gold**	85	0.3412	0.4769	39	0.5385	0.5050	124	0.4032	0.4925
presence of coal	85	0.0353	0.1856	39	0.0513	0.2235	124	0.0403	0.1975
presence of oil	85	0.0353	0.1856	39	0	0	124	0.0242	0.1543

Notes: Municipalities are divided into treatment and control group, according to the availability of placer mines in the colonial period 1739-1810. Difference in means between treated and control municipalities is: ***statistically significant at the 1% level; **statistically significant at the 5% level; *statistically significant at the 10% level.

Table 3. OLS estimates for the baseline model

	no health or pension system			formal employment contract			child labor		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
placer mines	0.0014	0.0013	0.0023**	-0.0544**	-0.0166	-0.0295*	0.0278***	0.0199*	0.0152
(1739-1810)	(0.0010)	(0.0011)	(0.0011)	(0.0264)	(0.0203)	(0.0157)	(0.0074)	(0.0108)	(0.0185)
total mines	-0.0005	-0.0005	-0.0008**	0.0189***	0.0043	0.0094*	-0.0090***	-0.0064**	-0.0053
(1739-1810)	(0.0003)	(0.0003)	(0.0004)	(0.0065)	(0.0057)	(0.0051)	(0.0020)	(0.0028)	(0.0061)
Control variables									
Geographic	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Socioeconomic	No	No	Yes	No	No	Yes	No	No	Yes
Unit of observation		Municipality			Individual			Individual	
Obs	123	123	123	19419	19419	19419	5739	5739	5739
R^2	0.0116	0.0497	0.1836	0.0287	0.0634	0.1156	0.0107	0.0213	0.0450
Mean dependent variable	0.680	0.680	0.680	0.257	0.257	0.257	0.140	0.140	0.140

In columns (1)-(3): Robust standard errors in parentheses. In columns (4)-(9): Robust standard errors (in parentheses) clustered at the municipality level. Geographic control variables: (log) altitude, presence of a river, as well as presence of gold, coal, and oil (2002). Socioeconomic control variables: (2005) population size, share of urban population, share of immigrants from other municipalities, share of forced migration, share of the population that belongs to an ethnic group, literacy rate, share of individuals with secondary/university education, employment rate; presence of indigenous population in the first half of the 16th century, distance to the department capital city, population density (2008), mean unsatisfied basic needs index (1985-2002), mean coca-farmed area (2000-2008), high/low presence of guerrilla groups (1993-2010) and high/low presence of auc paramilitary goup (1993-2010). ***Statistically significant at the 1% level. **Statistically significant at the 5% level. *Statistically significant at the 10% level.

Table 4. OLS regressions controlling for mines after independence

	no health or pension system			formal employment contract			child labor		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
placer mines (1739-1810)	0.0014	0.0014	0.0023**	-0.0588***	-0.0387**	-0.0576***	0.0253**	0.0252*	0.0511***
	(0.0010)	(0.0011)	(0.0011)	(0.0170)	(0.0185)	(0.0147)	(0.0113)	(0.0136)	(0.0157)
total mines (1739-1810)	-0.0006*	-0.0006*	-0.0008**	0.0244***	0.0151**	0.0208***	-0.0097***	-0.0093***	-0.0196***
	(0.0003)	(0.0003)	(0.0004)	(0.0043)	(0.0060)	(0.0050)	(0.0026)	(0.0034)	(0.0053)
placer mines (1811-1900)	-0.0001*	-0.0001	-0.0001	0.0005	0.0004	-0.0008*	-0.0004	-0.0004	-0.0000
	(0.0000)	(0.0000)	(0.0001)	(0.0006)	(0.0010)	(0.0005)	(0.0007)	(0.0009)	(0.0004)
total mines (1811-1900)	0.0000	0.0000	0.0000	-0.0014***	-0.0013**	-0.0002	0.0005	0.0005	0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0004)	(0.0005)	(0.0003)	(0.0003)	(0.0003)	(0.0002)
Control variables									
Geographic	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Socioeconomic	No	No	Yes	No	No	Yes	No	No	Yes
Unit of observation		Municipality			Individual			Individual	
Obs	123	123	123	19419	19419	19419	5739	5739	5739
R^2	0.0351	0.0696	0.2005	0.0525	0.0781	0.1170	0.0176	0.0261	0.0492
Mean dependent variable	0.680	0.680	0.680	0.257	0.257	0.257	0.140	0.140	0.140

In columns (1)-(3): Robust standard errors in parentheses. In columns (4)-(9): Robust standard errors (in parentheses) clustered at the municipality level. Geographic control variables: (log) altitude, presence of a river, as well as presence of gold, coal, and oil (2002). Socioeconomic control variables: (2005) population size, share of urban population, share of immigrants from other municipalities, share of forced migration, share of the population that belongs to an ethnic group, literacy rate, share of individuals with secondary/university education, employment rate; presence of indigenous population in the first half of the 16th century, distance to the department capital city, population density (2008), mean unsatisfied basic needs index (1985-2002), mean coca-farmed area (2000-2008), high/low presence of guerrilla groups (1993-2010) and high/low presence of auc paramilitary goup (1993-2010). ***Statistically significant at the 1% level. **Statistically significant at the 5% level. *Statistically significant at the 10% level.

Table 5. OLS regressions among municipalities with no gold today or only municipalities with colonial gold mining.

	no health or pension system		**formal employment contract**		**child labor**	
	With no gold today	Only colonial	With no gold today	Only colonial	With no gold today	Only colonial
	(1)	(2)	(3)	(4)	(5)	(6)
placer mines (1739-1810)	0.0018	0.0014	-0.1208**	-0.0167**	0.0428**	0.1295***
	(0.0013)	(0.0016)	(0.0495)	(0.0070)	(0.0175)	(0.0050)
total mines (1739-1810)	-0.0006**	-0.0003	0.0419**	0.0077**	-0.0055	-0.0437***
	(0.0002)	(0.0005)	(0.0185)	(0.0028)	(0.0055)	(0.0034)
placer mines (1811-1900)	0.0001	-0.0001	0.0003	0.0034***	-0.0093***	0.0155***
	(0.0002)	(0.0002)	(0.0077)	(0.0003)	(0.0016)	(0.0006)
total mines (1811-1900)	-0.0000	0.0000	-0.0034	-0.0026***	0.0029***	-0.0080***
	(0.0001)	(0.0001)	(0.0023)	(0.0002)	(0.0005)	(0.0005)
Control variables						
Geographic	Yes	Yes	Yes	Yes	Yes	Yes
Socioeconomic	No	Yes	No	Yes	No	Yes
Unit of observation	Municipality		Individual		Individual	
Obs	73	52	16918	16985	4743	4827
R^2	0.0657	0.4102	0.0321	0.0871	0.0224	0.0521
Mean dependent variable	0.680	0.680	0.257	0.257	0.140	0.140

In columns (1)-(2): Robust standard errors in parentheses. In columns (3)-(6): Robust standard errors (in parentheses) clustered at the municipality level. Geographic control variables: (log) altitude, presence of a river, as well as presence of gold, coal, and oil (2002). Socioeconomic control variables: (2005) population size, share of urban population, share of immigrants from other municipalities, share of forced migration, share of the population that belongs to an ethnic group, literacy rate, share of individuals with secondary/university education, employment rate; presence of indigenous population in the first half of the 16th century, distance to the department capital city, population density (2008), mean unsatisfied basic needs index (1985-2002), mean coca-farmed area (2000-2008), high/low presence of guerrilla groups (1993-2010) and high/low presence of auc paramilitary goup (1993-2010). ***Statistically significant at the 1% level. **Statistically significant at the 5% level. *Statistically significant at the 10% level.

Appendix

Table A1. Descriptive statistics for municipalities with colonial gold mining

	colonial placer mines = 0			colonial placer mines > 0			Total sample		
	N	mean	sd	N	mean	sd	N	mean	sd
no health or pension system	13	0.6745	0.0072	39	0.6812	0.0147	52	0.6795	0.0134
formal employment contract	5	0.3476	0.2381	15	0.3032	0.1926	20	0.3143	0.1992
child labor	5	0.1616	0.0939	15	0.1056	0.0806	20	0.1196	0.0852
placer mines (1739-1810)***	13	0.0000	0.0000	39	3.3590	2.9063	52	2.5192	2.9070
total mines (1739-1810)***	13	2.8462	2.9396	39	10.6667	9.1085	52	8.7115	8.6915
placer mines(1811-1900)	13	40.6154	84.5069	39	54.8205	71.9301	52	51.2692	74.6593
total mines (1811-1900)	13	117.5385	186.4759	39	133.3590	130.4043	52	129.4038	144.5697
Socioeconomic control variables									
presence of natives in first half of 16th century	13	0.6154	0.5064	39	0.5128	0.5064	52	0.5385	0.5034
population size	13	37696	62018.6	39	84308	352300.8	52	72655	306266.0
share of urban population	13	0.4917	0.2209	39	0.4203	0.2007	52	0.4381	0.2061
population density	13	907.1392	2874.5220	39	409.5944	1189.9830	52	533.9806	1745.4620
share of immigrants	13	0.3415	0.1578	39	0.3258	0.1469	52	0.3297	0.1482
share of forced migration*	13	0.0068	0.0041	39	0.0180	0.0224	52	0.0152	0.0200
share of ethnic population	13	0.0597	0.0617	39	0.0893	0.1329	52	0.0819	0.1193
literacy rate	13	0.7791	0.0723	39	0.7550	0.0789	52	0.7610	0.0774
share secondary/university education	13	0.2269	0.1168	39	0.2232	0.1230	52	0.2241	0.1203
employment rate	13	0.9698	0.0115	39	0.9665	0.0155	52	0.9674	0.0145
mean unsatisfied basic needs index	13	39.1938	17.0746	39	43.7966	17.1213	52	42.6459	17.0607
distance to department capital city	13	76.9231	52.9944	39	90.8718	62.1607	52	87.3846	59.8082
mean coca-farmed area	13	12.8652	46.2194	39	58.1561	202.1636	52	46.8333	177.0510
presence of guerrilla	13	0.5385	0.5189	39	0.6154	0.4929	52	0.5962	0.4955
presence of paramilitaries	13	0.4615	0.5189	39	0.4872	0.5064	52	0.4808	0.5045
Geographic control variables									
presence of river	13	0.9231	0.2774	39	0.8974	0.3074	52	0.9038	0.2977
(log) altitude	13	7.3696	0.3858	39	7.1924	0.7791	52	7.2367	0.7024
presence of gold	13	0.3077	0.4804	39	0.5385	0.5050	52	0.4808	0.5045
presence of coal	13	0	0	39	0.0513	0.2235	52	0.0385	0.1942
presence of oil	13	0	0	39	0	0	52	0	0

Notes: Municipalities are divided into treatment and control group, according to the availability of placer mines in the colonial period 1739-1810. Difference in means between treated and control municipalities is: ***Statistically significant at the 1% level; *statistically significant at the 10% level.

Table A2. Logit estimates for the baseline model

	formal employment contract			child labor		
	(1)	(2)	(3)	(4)	(5)	(6)
placer mines (1739-1810)	-0.2442*	-0.0749	-0.1045	0.2599***	0.1971**	0.1916
	(0.1266)	(0.0971)	(0.1046)	(0.0643)	(0.0878)	(0.1712)
total mines (1739-1810)	0.0845***	0.0182	0.0363	-0.0855***	-0.0641***	-0.0641
	(0.0315)	(0.0255)	(0.0328)	(0.0174)	(0.0228)	(0.0558)
Control variables						
Geographic	No	Yes	Yes	No	Yes	Yes
Socioeconomic	No	No	Yes	No	No	Yes
Obs	19419	19419	19419	5739	5739	5739
Mean dependent variable	0.257	0.257	0.257	0.140	0.140	0.140

Robust standard errors (in parentheses) clustered at the municipality level. Geographic control variables: (log) altitude, presence of a river, as well as presence of gold, coal, and oil (2002). Socioeconomic control variables: (2005) population size, share of urban population, share of immigrants from other municipalities, share of forced migration, share of the population that belongs to an ethnic group, literacy rate, share of individuals with secondary/university education, employment rate; presence of indigenous population in the first half of the 16th century, distance to the department capital city, population density (2008), mean unsatisfied basic needs index (1985-2002), mean coca-farmed area (2000-2008), high/low presence of guerrilla groups (1993-2010) and high/low presence of auc paramilitary goup (1993-2010). ***Statistically significant at the 1% level. **Statistically significant at the 5% level. *Statistically significant at the 10% level.

Table A3. Logit regressions controlling for mines after independence

	formal employment contract			child labor		
	(1)	(2)	(3)	(4)	(5)	(6)
placer mines (1739-1810)	-0.2925***	-0.2426**	-0.3396***	0.2526***	0.2475**	0.4726***
	(0.0953)	(0.0954)	(0.0850)	(0.0842)	(0.1062)	(0.1389)
total mines (1739-1810)	0.1252***	0.0942***	0.1341***	-0.0953***	-0.0907***	-0.1759***
	(0.0234)	(0.0299)	(0.0287)	(0.0198)	(0.0277)	(0.0456)
placer mines (1811-1900)	0.0032	0.0054	-0.0038	-0.0025	-0.0021	0.0011
	(0.0053)	(0.0066)	(0.0038)	(0.0045)	(0.0064)	(0.0036)
total mines (1811-1900)	-0.0087***	-0.0103***	-0.0033*	0.0036*	0.0037*	0.0052***
	(0.0028)	(0.0038)	(0.0020)	(0.0019)	(0.0022)	(0.0020)
Control variables						
Geographic	No	Yes	Yes	No	Yes	Yes
Socioeconomic	No	No	Yes	No	No	Yes
Obs	19419	19419	19419	5739	5739	5739
Mean dependent variable	0.257	0.257	0.257	0.140	0.140	0.140

Robust standard errors (in parentheses) clustered at the municipality level. Geographic control variables: (log) altitude, presence of a river, as well as presence of gold, coal, and oil (2002). Socioeconomic control variables: (2005) population size, share of urban population, share of immigrants from other municipalities, share of forced migration, share of the population that belongs to an ethnic group, literacy rate, share of individuals with secondary/university education, employment rate; presence of indigenous population in the first half of the 16th century, distance to the department capital city, population density (2008), mean unsatisfied basic needs index (1985-2002), mean coca-farmed area (2000-2008), high/low presence of guerrilla groups (1993-2010) and high/low presence of auc paramilitary goup (1993-2010). ***Statistically significant at the 1% level. **Statistically significant at the 5% level. *Statistically significant at the 10% level.

Table A4. Logit regressions with other robustness checks

	formal employment contract		child labor	
	(1)	(2)	(3)	(4)
placer mines (1739-1810)	-0.3249***	-0.5216**	0.2622***	0.4200**
	(0.0816)	(0.2321)	(0.0792)	(0.2094)
total mines (1739-1810)	0.1203***	0.1827**	-0.0994***	-0.0491
	(0.0237)	(0.0906)	(0.0212)	(0.0728)
placer mines (1811-1900)	0.0043	0.0013	-0.0026	-0.1035***
	(0.0124)	(0.0334)	(0.0066)	(0.0295)
total mines (1811-1900)	-0.0114*	-0.0151	0.0030	0.0326***
	(0.0064)	(0.0100)	(0.0024)	(0.0092)
Samples				
Sample only with colonial mining	✓		✓	
Sample without gold today		✓		✓
Observations	16985	16918	4827	4743

Robust standard errors (in parentheses) clustered at the municipality level. Geographic control variables: (log) altitude, presence of a river, as well as presence of gold, coal, and oil (2002). ***Statistically significant at the 1% level. **Statistically significant at the 5% level. *Statistically significant at the 10% level.

A5. The colonizer's choice

This appendix section wants to motivate the colonizer's decision for completeness of the model presented in section 4.

Before coming to the first stage, we can think of the case of a non-extractive state in terms of the model. Figure 5 considers two types of colonizers, where γ is fixed, and there is variation in the level of public goods investment relative to the same τ.

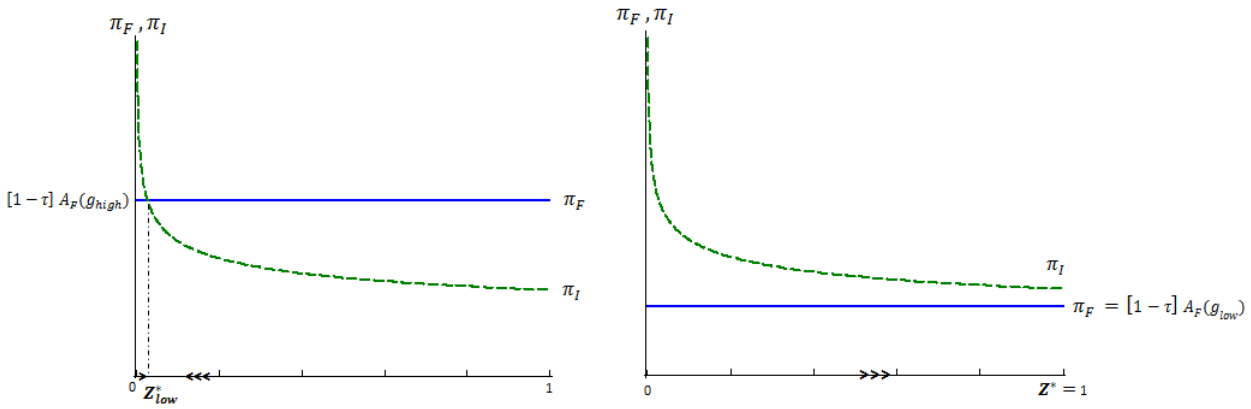

Figure 5: Equilibrium depending on the level of g
$[\tau = 0.2,\ \gamma = 1,\ \theta = 0.8,\ A_F(g_{low}) = A_I]$

If there is the possibility to exploit resources out of the formal sector ($\gamma > 0$), individuals will have incentives to become informal, but this high payoff will fall rapidly as they have to compete for resources. If the colony is under a non-extractive colonizer (in this Figure: Under a high g), individual payoff in the formal sector will be high enough to make individuals indifferent between sectors at a very small Z level. This yields a stable low informality equilibrium Z^*_{low}. If the colony faces an extractive colonizer, formal payoff is low, and Z can grow until a full informality equilibrium, $Z^* = 1$, depending on γ and τ. This equilibrium is also stable.

First stage

In the first stage, the colony faces a colonizer that can vary in his degree of farsightedness, and this determines his level of extraction. The colonizer maximizes his total payoff over the present and future period:

$$\sum_{t=0}^{1} \delta^t \Pi_{c,t} = \Pi_{c,0} + \delta \Pi_{c,1} \tag{14}$$

where $\delta < 1$ is the factor by which the colonizer discounts his payoff in the future. Provided $\gamma > 0$, $\Pi_{c,0}$ is higher than $\Pi_{c,1}$, as $Z = 0$ in $t = 0$. Once an informality equilibrium is achieved, the colonizer payoff will be affected by this Z level. Hence:

$$\sum_{t=0}^{1} \delta^t \Pi_{c,t} = \tau A_F(g) - g + \delta \left(\tau A_F(g) \left[1 - Z_1(\tau, g) \right] - g \right) \tag{15}$$

Consider a strategy (τ^{ss}, g^{ss}), such that $\Pi_I > \Pi_F \; \forall Z$, versus a less extractive strategy (τ^{fs}, g^{fs}), for which $\Pi_I > \Pi_F \; \forall Z$ is not fulfilled.

(τ^{ss}, g^{ss}) then satisfies:

$$1 - \frac{\gamma A_I}{A_F(g^{ss})} < \tau^{ss} \tag{16}$$

Under (τ^{ss}, g^{ss}), the colonizer total payoff will be:

$$\tau^{ss} A_F(g^{ss}) - g^{ss} - \delta g^{ss} = \Pi_{c,0}^{ss} - \delta g^{ss} \tag{17}$$

as $Z(\tau^{ss}, g^{ss}) = 1$ in $t = 1$. Note that the colonizer is incurring losses for the future period, as long as he wants to stay in the colony. This can be explained by the need to maintain a military and state infrastructure, without which the colonizer would not be able to stay.

It can be shown that this payoff is higher than any other obtained with a less extractive strategy (τ^{fs}, g^{fs}) if δ satisfies:

$$\delta < \frac{\Pi_{c,0}^{ss} - \Pi_{c,0}^{fs}}{\Pi_{c,1}^{fs} + g^{ss}} = \check{\delta} \tag{18}$$

I thus call (τ^{ss}, g^{ss}) a short-sighted strategy, where the colonizer only cares about his present payoff, leading the economy to a full informality equilibrium, $Z^* = 1$, after that. On the contrary, a far-sighted colonizer (with δ sufficiently higher than $\check{\delta}$) optimally chooses a low extraction in order to obtain significant gains in the future period.

A6. Can state presence explain informality persistence?

The degree of control that the colonial state had over the population and its legitimacy may have persisted over time and translated into local state capacity, even after independence from the colonial power. Thus, I argue that the capacity of a state involves not only its size, but its validity in society and real ability to make individuals comply with the law. Under this view, the channels of social capital and state capacity can be seen as two sides of the same story, where the development of each channel is endogenous to the other: Informal behavior reduces the ability of a state to control its population; moreover, the functioning of state institutions may adjust to these conditions. On the other hand, low-legitimacy states are weak to enforce the law and this allows the presence of informality.

A plausible consequence of this is the lack of incentives to build state presence, provided low expected returns in the future.[31] So, it seems worth disentangling the independent effect of state presence or size from the more complex concepts of legitimacy and social capital put forward along the paper. I stress that state presence is only one dimension of state capacity, given that it does not necessarily imply the legitimacy and well-functioning of the state. Thus, the idea of testing this dimension is to establish the extent to which the simple physical presence of the state can account for the colonial informality treatment effect, as opposed to the social capital channel presented in the paper. In other words, we would like to know what is the relative importance of state size, vs. another channel in explaining persistence, e.g. the de-facto functioning of institutions influenced by a rooted informal behavior. At the end of this section, I come again to the historical literature in order to complement the understanding of these channels.

In order to test the independent effect of state presence I use historical measures of this variable, that is, measures of the local state in the colonial period. First, it is reasonable to assume that they are sources for the development of state presence, since colonial state infrastructure was likely taken on after independence, and it allowed to build easily on a previous state. We can believe these sources are exogenous as these variables are not affected by current informality levels, although they should in fact be affected by colonial informality in order to be valid as a channel. I first check the relationship between these measures and the treatment; then I report reduced form regressions; and finally, I use these historical measures as instruments for a current

[31] For studies investigating the process of state building, see, among others, Acemoglu (2005), Besley and Persson (2009), Sánchez de la Sierra (2013), Acemoglu et al. (2014).

measure of local state presence, controlling for colonial placer mines in both stages of the IV estimation.

Historical data on the Spanish colonial state are documented by Durán y Díaz (1794). From these records, Acemoglu et al. (2012) have compiled municipality-level data on the number of colonial officials and the presence of several local state offices, namely, post office, *alcabala*-tax (sales tax) collection agency, as well as agencies in charge of managing state monopolies over tobacco, playing cards, liquor and gunpowder. Indicators on the presence of local state offices are aggregated in a single index. I will use the number of *colonial officials* and the index (*colonial state presence*) in the proposed exercise above.

In Table A6-1 I study the relationship between the treatment and historical local presence of the state, where I only control for observables in the colonial period (total gold mines in 1739-1810, presence of native population in the first half of the 16th century) and altitude. I find that the treatment, i.e. the number of placer mines, is in general related to a lower number of colonial officials and a lower index of colonial state presence, although it is only significant to explain the latter outcome. On the other hand, a higher total number of gold mines is significantly associated with a larger presence of the state. Hence, the sign of coefficients indicates the expected relationship between the potential channel and the treatment.

[Table A6-1 here]

In Table A6-2 I include the same historical measures of state presence as explanatory variables for informality outcomes. Columns (1), (4) and (7) include these measures only, whereas the remaining columns include both the treatment and the historical state measures. If informality during the colonial period is solely operating through the channel of a lower state presence, historical measures of the state should be negatively associated with informality levels today and they should remove the effect of the colonial placer mines treatment. Estimates indicate, however, that variables of colonial state presence are generally not significant to explain informality outcomes. Direction and significance of the placer mines treatment effect remain unchanged.

[Table A6-2 here]

In an additional exercise, I use a current measure of local state size in order to verify this potential channel. Data on state presence at the municipality level in 1995 are available from a detailed study developed by Fundación Social, a Colombian NGO, that covers all municipalities in Antioquia. I build a measure of local state presence, as the

mean of per capita local public employees, tax collection offices, deed registry offices, notary offices, public health centers, health posts and public schools. This measure (*local state presence 1995*) is used as explanatory variable in Table A6-3. Given that current state presence is endogenous to informality levels today, I use historical state presence variables from the previous exercise as instruments. I report in Table A6-3 first stage regressions, as well as second stage and OLS estimates for every outcome variable. I control in both stages for placer and total colonial mines, mines after independence and the set of geographic characteristics.

OLS estimates indicate that current state presence is associated with lower informality levels. Nevertheless, state presence is no longer significant under the IV estimation. It must be noted that historical state presence measures are weak instruments. In this scenario, conventional inference may be misleading, therefore, I further perform a robust significance test[32] of the coefficients for local state presence in the second stage. It suggests that local state presence is significantly associated to a higher probability of child labor, which goes opposite to OLS estimates.

Placer mines during the colonial period are mostly significant under OLS or IV estimates for the formal employment contract variable, and the coefficients' sign and magnitude remain stable.

[Table A6-3 here]

In sum, there is no conclusive evidence in favor of the physical presence of the state as a channel. State capacity defined as legitimacy and well-functioning of the state would be supported by historical evidence as a more likely channel, which definitely depends on the de facto institutions governing local states' performance. The historical literature can provide important insights on the way informal behaviors greatly influenced the functioning of institutions. One important change occurred in slavery: Whereas slavery was abolished in 1813 in Antioquia (38 years before than in the whole country), there were already registered volunteer liberations of slaves since the end of the 18th century, despite being considered subversive by colonial authorities (Poveda, 1981). The literature also notes, although very briefly, several events in which informality implied changes beyond the mining industry and tax evasion. Some were related to an improved political representation of creoles (Spanish descendants born in the colony) and an increased power of miners and merchants. Creole people became a majority in

[32] I perform the Conditional Likelyhood Ratio test (CLR) suggested by Moreira (2003) and Andrews et al. (2006).

the Medellín administrative council -*cabildo*- since 1789[33], and policies applied by this council reflected prevalent miners' interests, even going against the colonial law. The illegal regulation of prices in the benefit of miners is one example of permeability in the functioning of institutions to informality. It is also known that there was no penalty applied by local justice when merchants openly refused to pay gold taxes between 1786 and 1803 (Alvarez and Uribe, 1985).

[33]Twinam (1985), cited by Alvarez and Uribe (1985), p. 75.

Table A6-1. OLS regressions for historical state presence outcomes

	colonial officials	**colonial state presence**
	(1)	(2)
placer mines (1739-1810)	-0.5816	-0.1984*
	(0.4388)	(0.1120)
total mines (1739-1810)	0.2877	0.1250***
	(0.1753)	(0.0373)
Obs	123	123
R^2	0.2024	0.3501
Mean dependent variable	0.5484	0.4839

Robust standard errors in parentheses. Units of observation are municipalities. All specifications controlling for presence of indigenous population in the first half of the 16th century and (log) altitude. ***Statistically significant at the 1% level. *Statistically significant at the 10% level.

Table A6-2. OLS regressions - with historical measures of state presence as explanatory variables

	no health or pension system			formal employment contract			child labor		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
colonial officials	-0.0000	0.0001	0.0002	-0.0012	-0.0094**	0.0146	-0.0017	0.0042	0.0040
	(0.0004)	(0.0004)	(0.0008)	(0.0051)	(0.0045)	(0.0148)	(0.0041)	(0.0030)	(0.0144)
colonial state presence	-0.0012	-0.0009	0.0004	0.0307	0.0238	-0.0277	0.0021	0.0146	0.0167
	(0.0019)	(0.0018)	(0.0023)	(0.0352)	(0.0271)	(0.0313)	(0.0268)	(0.0255)	(0.0346)
total mines (1739-1810)	-0.0001	-0.0005	-0.0009**	0.0022	0.0255**	0.0253***	-0.0017	-0.0214***	-0.0224***
	(0.0002)	(0.0004)	(0.0004)	(0.0019)	(0.0100)	(0.0071)	(0.0023)	(0.0060)	(0.0079)
placer mines (1739-1810)		0.0012	0.0025**		-0.0663**	-0.0701***		0.0568***	0.0576**
		(0.0011)	(0.0012)		(0.0268)	(0.0207)		(0.0172)	(0.0222)
Control variables									
Geographic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Socioeconomic	No	No	Yes	No	No	Yes	No	No	Yes
Unit of observation		Municipality			Individual			Individual	
Obs	123	123	123	19419	19419	19419	5739	5739	5739
R^2	0.0644	0.0716	0.2019	0.0767	0.0796	0.1172	0.0235	0.0284	0.0498
Mean dependent variable	0.680	0.680	0.680	0.257	0.257	0.257	0.140	0.140	0.140

In columns (1)-(3): Robust standard errors in parentheses. In columns (4)-(9): Robust standard errors (in parentheses) clustered at the municipality level. All regressions also controlling for mines after independence. Geographic control variables: (log) altitude, presence of a river, as well as presence of gold, coal, and oil (2002). Socioeconomic control variables: (2005) population size, share of urban population, share of immigrants from other municipalities, share of forced migration, share of the population that belongs to an ethnic group, literacy rate, share of individuals with secondary/university education, employment rate; presence of indigenous population in the first half of the 16th century, distance to the department capital city, population density (2008), mean unsatisfied basic needs index (1985-2002), mean coca-farmed area (2000-2008), high/low presence of guerrilla groups (1993-2010) and high/low presence of auc paramilitary goup (1993-2010). ***Statistically significant at the 1% level. **Statistically significant at the 5% level.

Table A6-3. IV/OLS regressions - instrumenting local state presence in 1995.

	no health or pension system			**formal employment contract**			**child labor**		
	First stage	IV	OLS	First stage	IV	OLS	First stage	IV	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
local state presence 1995		-0.1265	-0.0624**		0.0891	0.3617		1.4474	-0.3241
		(0.2155)	(0.0265)		(1.2037)	(0.8422)		(1.3406)	(0.5569)
placer mines (1739-1810)	0.0010	0.0013	0.0014	0.0197**	-0.0393*	-0.0411**	0.0139*	0.0236	0.0255*
	(0.0041)	(0.0010)	(0.0010)	(0.0078)	(0.0205)	(0.0176)	(0.0074)	(0.0166)	(0.0135)
total mines (1739-1810)	-0.0001	-0.0005	-0.0005*	-0.0069**	0.0152**	0.0156***	-0.0050*	-0.0095**	-0.0093**
	(0.0017)	(0.0004)	(0.0003)	(0.0027)	(0.0064)	(0.0058)	(0.0026)	(0.0042)	(0.0035)
colonial officials	0.0008			0.0001			0.0000		
	(0.0017)			(0.0010)			(0.0008)		
colonial state presence	0.0039			0.0194***			0.0169**		
	(0.0081)			(0.0073)			(0.0080)		
F stat for instruments	0.39			5.15			3.41		
p-value for CLR		0.814			0.721			0.054	
Unit of observation		Municipality			Individual			Individual	
Obs	123	123	123	19419	19419	19419	5739	5739	5739
R^2	0.1462	0.0678	0.1026	0.5590	0.0782	0.0783	0.5529	0.0167	0.0264
Mean dependent variable	0.040	0.680	0.680	0.040	0.257	0.257	0.040	0.140	0.140

In columns (1)-(3): Robust standard errors in parentheses. In columns (4)-(9): Robust standard errors (in parentheses) clustered at the municipality level. All regressions controlling for mines after independence and geographic control variables: (log) altitude, presence of a river, as well as presence of gold, coal, and oil (2002).***Statistically significant at the 1% level. **Statistically significant at the 5% level. *Statistically significant at the 10% level.