

Breaking from Colonial Institutions:

Haiti's Idle Land, 1928-1950

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Abstract

Economists and economic historians attribute long-term underdevelopment in former colonies to either persistent, bad institutions or to initial factor endowments that predisposed the colony to inequality. This paper uses a puzzle in Haiti's economic history to show that these frameworks are incomplete. In the early 20th century, large numbers of Haitian workers migrated abroad to work on plantations, even though lots of fertile land sat idle at home. This puzzling fact reflects two land institutions developed after Haiti's independence in 1804. First, lineages had joint claims over the alienation of land; one household could exploit land, but to sell it they needed agreement from a large number of extended kin. Second, the early-nineteenth century Haitian government had distributed land and banned land ownership by foreigners, preventing the creation of large holdings and establishing a checkerboard of landholdings with multiple claimants. To assess how this checkerboard led to idle land, I use data on 5,700 plots adopted over 22 years under a government rental program. A simple model of the optimal allocation of labor (between Haiti and elsewhere) and land (between subsistence holdings and plantations) implies that the checkerboard reduces land adoption and attenuates the extent to which new plantations develop after a migration cost shock. Data from settlement patterns in Haiti and a massacre in the Dominican Republic confirm these predictions. Using the institutional histories of the Dominican Republic and Jamaica as counterfactuals drives this point home: both countries lacked Haiti's checkerboard pattern and developed plantation agriculture. Haiti's experience shows that the conditions created by colonial governments did not necessarily constrain future institutional development. Haiti's post-independence institutional innovations undermined the conditions for development.

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Economists and economic historians attribute long-term underdevelopment in former colonies either to persistent, bad institutions or to initial factor endowments that predisposed the colony to inequality. This paper shows that Haiti fits neither of these stories. Since gaining independence in 1804, Haiti has lagged behind its Caribbean peers, in some instances missing obvious opportunities to raise national income. One missed opportunity seems particularly puzzling. In the early 20th century, approximately 20% of the prime-age male workforce worked outside of Haiti, but about 50% of its agricultural land sat unused.¹ Instead of cultivating the idle land, labor went to countries like the Dominican Republic (DR) where institutions allowed farmers to take advantage of increasing profits on sugar plantations. In Haiti, farmers could not reallocate land to sugar production because Haiti's post-colonial institutions induced high transaction costs to assembling large plots of land.

Although Haiti's government owned lots of idle land, it owned few large, contiguous tracts.. Private land was also distributed in a checkerboard fashion; rather than a few large landowners owning most of the land and running large haciendas, households dotted the land and farmed small plots. A 100 hectare area might have only 20 households, each farming 2 hectares. No one farmed the remaining 60 hectares, but the idle land did not exist in a single tract where an outsider could come cultivate it. In this sense, Haiti looked very different than many other Latin American countries.

This checkerboard pattern began right after independence when the government redistributed land held by the French. The farmers who obtained property then passed it to heirs through partible inheritance and gave multiple people claim to the same land. This complex property rights system prevented farmers or investors from reallocating land because any claimant could veto alienation of the property. Investors in the 19th century could have acquired the land before it became too costly, but the constitution banned foreigners from owning land, cutting off a key source of capital. Even though Haiti's factor endowments were favorable to sugar cultivation, getting the land to farm was difficult because of high transaction costs.

A simple model shows how transaction costs induced by the checkerboard of family holdings affect labor and land allocations. The model allocates land and labor to two domestic sectors—subsistence and plantation—and labor to a foreign sector to take advantage of an exogenous wage minus a migration cost. In equilibrium, farmers adopt less land in districts where the land-

¹I show how I arrived at these figures in Section 1.

holdings have a greater checkerboard pattern (i.e. more scattered holdings). The model also implies that without this checkerboard pattern an exogenous increase in migration costs causes farmers to cultivate more land in the more productive plantation sector. But when the checkerboard induces high transaction costs, the optimal allocation changes and farmers adopt more land under subsistence farming.

New data from a government land rental program permit a test of the model and illustrate the role Haiti's land institutions played in preventing plantation development. The data come from a reform implemented by American officials during the 1915-1934 occupation of Haiti and consist of over 5,700 plots adopted over 22 years. The data reveal three empirical patterns. First, under favorable rental conditions, farmers did not adopt much land. In a 22-year period, farmers adopted less than 30,000 hectares of the nearly one million hectares available. Second, farmers adopted small plots even when they had the chance to adopt more land. Nearly one half of the adopted plots bordered idle land that the farmer could have rented from the government. Finally, farmers adopted land in a pattern that indicates large contiguous government land did not exist. Half of all plots rented from the government bordered land not owned by the government; private plots were interspersed among the government-owned land, forcing anyone plantation investors seeking land from the government to also deal with the complex informal tenure system.

Two tests utilize the rental data to confirm the model's predictions. First, settlement patterns from a geodetic map show that districts with greater checkerboarding adopted less land under the rental program. Second, moving away from the static cross-sectional comparison and exploiting the panel data, I exploit a migration cost shock caused by a massacre in the Dominican Republic that targeted ethnic Haitians. After the massacre, land adoption in Haiti increased significantly, especially in areas that received a labor supply shock from refugees. With low transaction costs, the model predicts farmers will respond to this shock by creating productive large-scale farms. However, much of the newly-occupied land was just subsistence farming, more than what we would have expected from differences in productivity. That so much of the land was on such small plots indicates there must have been significant barriers to aggregating land.

Using the Dominican Republic and Jamaica as counterfactual histories provides further support for the role of institutions and transaction costs in establishing plantations. The DR shares the same island and agroclimatic conditions as Haiti, but the two countries followed different developmental

paths. The DR's institutional history led to a more clustered population and a greater openness to foreign investment. These factors allowed the DR to allocate resources to sugar production, where it quickly became the country's most important export even though it had little historical presence. The Jamaican counterfactual holds constant not only agroclimatic conditions, but also the heritage of slavery and land redistribution. The key difference with Haiti is foreign investment. Similar to Haiti, after emancipation the former slaves divided the plantations and shifted to small-scale agriculture. But Jamaica remained a part of the British Empire and could not ban foreigners from owning land. When commodity prices changed at the end of the 19th century, capital returned to the country and reinstated plantation agriculture. Under different institutional histories, Haiti could have looked like either of these countries.

This paper shows that the conditions created by colonial governments did not necessarily constrain future institutional development. There are two main frameworks on the historical roots of development. Acemoglu et al. (2001) argue that the disease environment induced high settler mortality, and settlers established poor institutions that persisted until today. On the other hand, Engerman and Sokoloff (2002) argue that factor endowments predisposed colonies to agricultural forms that create inequality, and this inequality gave rise to an elite who designed unequal institutions and depressed growth. Neither of these frameworks fit the Haitian case. Haiti intentionally broke away from its colonial institutions and established a new set of institutions rejecting the colonial order. The new institutions provided sufficient prosperity through the 19th century, but when global conditions changed Haiti could not adjust like its Caribbean peers. Even though slave plantations drove the colonial economy, the post-colonial reforms created an economy dominated by the family farms Engerman and Sokoloff argue lead to good institutions. But the family farms destroyed plantation profits and made politics the only place for the elites to capture rents, which created an instable and unequal government, thus still leading to large inequality and underdevelopment. Although these two frameworks might apply in other countries, in Haiti's case post-independence institutional innovations undermined the conditions for development.

This paper also demonstrates that property rights security is not a sufficient condition for development. Property rights must also be elastic enough to respond to economic changes. Property rights security benefits a range of economic outcomes, both in developed and developing countries.²

²For developed countries, see Hornbeck (2010), Libecap and Lueck (2011), North and Weingast (1989). For the

But economic development sometimes requires reallocating property rights, at times involuntarily, in response to changing economic conditions (Lamoreaux 2011). Three examples show how this principle worked around the world. First, Southern France’s pre-revolution agriculture failed to develop much needed irrigation because various parties held the property rights between the agriculture and the water source, but then irrigation developed after the French Revolution reallocated the rights (Rosenthal 1990). Second, British property rights became so specific that holders would not have taken advantage of industrialization opportunities had Parliament not provided a mechanism to alter the rights (Bogart and Richardson 2011). Finally, American borrowers faced lower costs than their British counterparts because property laws made American property easier to seize if the debtor defaulted (Priest 2006). These economies did not face problems because of low property right security, rather they had to overcome the problem that property rights were too strong.

Similarly, property rights policy in developing countries best assists development when it balances the security of property rights with making them elastic to changes in economic conditions. Haitian farmers could not transition to large-scale agriculture themselves because property rights were too secure: no one abrogated their rights, but they also could not easily sell their property because family members could veto the transfer. A titling program that gives all rightsholders a legal title to the land would not resolve this problem because too many people would still hold legal claim. The government would have to consolidate rights under single holders who possess all usufructuary and alienation rights, but doing so would entail expropriating rights from whole lineages and redistributing wealth to an extent beyond the capacity of most developing countries. A government with greater power to reallocate land to more productive uses could have helped the country capture profits from the sugar industry.

1 The Puzzle: High Labor Mobility and Idle Agricultural Land

In the early 20th century, large numbers of Haitian workers migrated to earn high wages abroad. Most went to the Dominican Republic, but a considerable number also went to Cuba. The porous border between the DR and Haiti allowed uninhibited and undocumented migration, and several

evidence in developing countries, see Alston et al. (1996), Banerjee et al. (2002), Besley (1995), Chernina et al. (2014), De Janvry et al. (2015), Field (2007), Goldstein and Udry (2008), Jacoby et al. (2002)

estimates put the flows at about 80,000-100,000 seasonal migrants.³ Plantations in the Dominican Republic paid twice the Haitian rural wage and workers incurred low migration costs.⁴ The flows to Cuba are better documented and between 10,000 and 25,000 migrants a year traveled there (Haiti Bureau du representant fiscal (1926) pp. 96).⁵ Even with the high migration costs, Haitians working in Cuba could get wages six times as large as the rural Haitian wage.⁶ Although many of these workers migrated on a seasonal basis, some stayed in the destination country.

High migration caused labor shortage problems in Haiti. If 100,000 workers migrated each year (a rough estimate of the combined flows to DR and Cuba) then foreign countries employed about 20% of Haiti's prime-age (25-55) male workforce. The workers' absence did not go unnoticed, and many villages lost a substantial amount of productivity to these plantations.⁷ For instance, in Aux Cayes, the fourth most populous district in the country, scarce male labor caused women and children fill the vacant positions.⁸ Not only did migration diminish the stock of labor, but it decreased the quality too as the healthiest and most able labor left.⁹

At the same time as these high migration flows, Haiti had lots of idle land available. At the beginning of the American occupation, the government owned approximately half of the country's area, but no one occupied or cultivated it (Millspaugh 1929). By Brisson (1968)'s estimates, the government and other large holders owned about 960,000 hectares of agricultural land, of which only 7% was under cultivation.¹⁰ Even small holders left land idle; one of the government's principal problems was inducing land owners to cultivate idle land.¹¹

The State owned many quality agricultural properties. Certainly some of the land was unfit for production (Lundahl 1996, Millspaugh 1929), but much of it was fertile. The State originally

³ (State Department 838.56/1)

⁴State Department 838.56/1

⁵However, some laborers could circumvent migration fees by taking unofficial boats, so the true flows were higher.

⁶On migration costs to Cuba, sugar companies paid the costs of travel, passport, and a bond for each laborer to insure the migrant's return upfront. These costs were not trivial—the United Fruit Company spent more than \$100,000 annually on 5,000 men (State Department 1924). The record is conflicted on how much the incidence of migration costs fell on the worker. Regarding wages, the average unskilled wage in Haiti was 1.00 to 1.50 Gdes per day but in Cuba it was 5.00 to 7.50 Gdes (Haiti Bureau du representant fiscal (1926) pp 97). Furthermore, the workers could purchase clothing from the company store at one third to one half the price of clothing in Haiti, which means the real wage was even higher (State Department 1924).

⁷See the editorial in *Le Temps*, Oct 1927

⁸State Department 838.504

⁹Recruiting agents for the United Fruit Company performed physicals and selected the strongest workers to come to Cuba.

¹⁰Lundahl (1996) argues that large, private land owners would have held very little of this land. The government held most of it.

¹¹Haiti Bureau du representant fiscal (1938) pp 99. See also Millspaugh (1929)

acquired the land when it confiscated the French plantations during the Haitian Revolution from 1792 to 1804 (Trouillot 1990, Millspaugh 1929). During the colonial period, farmers proved the land's productive value by using it to supply half of the world's coffee and sugar. Furthermore, the land sat fallow for 100 years, allowing it to regain its fertility.¹² Indeed, peasants found the land attractive compared to the land already under cultivation because generations of use had exhausted the privately held land. Some farmers even forfeited their private property to obtain the high-quality land owned by the state.¹³

Together these two facts present a puzzle in Haitian economic history: with so much idle land available, why did so much labor move abroad? Evidently Haitian labor was more productive abroad than at home. Yet, Haitian farmers could have increased their productivity by expanding production into the idle land. In fact, expanding domestic production would save migration costs and avoid the harsh working conditions abroad.

Contemporary observers struggled with this puzzle too. Legislators noted that migration removed agriculturalists from Haiti even though there was sufficient unused land to provide employment to all and tried to reduce migration through small changes in migration costs (State Department 838.504). Some officials observed that areas with high emigration rates also had lots of fertile, idle land (Casey 2012). Other officials believed that the revenue from employing the migrant labor on the idle domestic land would exceed migration incomes, but they had no recommendations for how to put the land into production.¹⁴

Differences in agricultural organization partially explain the puzzle of the DR and Cuba's higher labor demand. These countries produced sugar on large plantations while Haiti produced coffee on small farms. The different land size distributions, displayed in Figure 2 for Haiti and the DR, reflect the stark difference in agricultural organization. In Haiti, farms five hectares or smaller accounted for 86% of cultivated land, while in the DR farms that small contributed only 13%. Large-scale farms accounted for most of the DR's agriculture: farms 50 hectares or larger furnished 57% of cultivated land. This difference in land distribution meant the DR participated in large-scale, high

¹²Haiti Bureau du representant fiscal 1927 pp 137; Haiti Bureau du representant fiscal 1932 pp 28; see also Millspaugh 1929)

¹³ In fact, farmers, at one point under a government program, could exchange their privately-owned land for state-owned land (Renaud, 1934), and the program was so popular that the government had to shut it down because of the adverse selection problems it created Haiti Bureau du representant fiscal (1940) pp 121

¹⁴Haiti Bureau du representant fiscal (1930) pp 141

productivity agriculture while Haiti was locked in small-scale, lower productivity crops. But even though these differences in organization provide the proximate cause for productivity differences, we still need to understand the fundamental causes that prevented Haiti from developing the same agricultural organization. For this we turn to the checkerboard land distribution and its institutional roots.

2 The Institutional Roots of Checkerboard Landholdings

Haiti failed to switch to plantation farming on its abundant idle land because it had few tracts of *contiguous* idle land. Even though half of the agricultural land sat idle, this land did not exist on a frontier characterized by large spaces of unoccupied land.¹⁵ Farmers occupied the land like a checkerboard.

A map created by the U.S. Army Inter-American Geodetic Survey provides clear evidence of checkerboard holdings. Figure 2 displays a one square-kilometer excerpt from this map, where each dot represents a building. In this one square-kilometer (100 hectares), there are 25 buildings; and because the buildings represent households, we can infer there were even more individuals occupying the land. The average household farmed one to two hectares of land,¹⁶ so the residents probably cultivated only about one quarter to half of this square. Any farmer wanting to bring all 100 hectares into cultivation would have had to contract with each household or clear them. This shows that Haiti did not look like many Latin American countries with concentrated landholdings; anyone wanting to engage in plantation agriculture faced large costs to acquiring land.

The government published a full-page ad in 1934 that demonstrates the difficulty of finding large tracts of government-owned land. In this ad, the government listed 26 properties available for rent, but it presented few large properties—only five were larger than 100 hectares.¹⁷ Moreover, it listed 11 properties smaller than 10 hectares and even one that was only 0.36 hectares. One can assume that if the state held large, contiguous tracts of land, it would not have bothered to announce such small parcels.

Because of the checkerboard pattern, anyone wanting to establish a large plantation would have

¹⁵Moral (1961) argues that American capital went to other Caribbean countries because Haiti did not have large tracts of land owned by a single tenant (see pp. 64).

¹⁶Calculated from the 1950 Census.

¹⁷*Le Moniteur*, 1934 No. 24 (22 March 1934)

needed to evict or contract with the private farmers. Yet neither farmers nor investors, nor even the government, had the authority or power to evict farmers. At the beginning of the occupation, the government granted a few thousand acres to American companies, but many of them did not cultivate the land because of the difficulty evicting the small farmers (Casey 2012 pp 84). Companies could contract with individual farmers, but achieving the minimum efficient scale required contracting with too many parties. For example, the Standard Fruit Company tried to establish a 2,000 acre banana plantation, but “in order to secure enough land in fairly contiguous territory for efficient operations, the company has had to sign lease and share contracts with hundreds of little land owners” (Lundahl 1979, pp 286). Standard Fruit farmed around the households that declined contracts, but these farmers disputed Standard Fruit’s property rights and it incurred large costs resolving them. To this end, no one had access to a low cost solution to the prevalence of smallholders on agricultural land.

Although the government owned a lot of idle land, investors could not acquire large tracts without negotiating with or evicting tenants because private holders dotted the land in a checkerboard pattern. Other countries, like the DR, did not have this problem and shifted resources to sugar production. Haiti’s historical institutions explain how the property rights became so scattered.

2.1 Land Redistribution, Inheritance, and Persistence

The land tenure checkerboard reflects three historical influences. First, after independence the government redistributed old plantation land. Haiti gained independence from France in 1804, and by 1809 President Alexandre Petion began redistributing the land the government had confiscated from the plantation owners.¹⁸ Because Henri Christophe had separated the Northern portion of Haiti into a kingdom, for a short period it maintained plantation agriculture, but after Christophe’s death in the 1820’s the government had redistributed land throughout the entire country and plantations had disappeared.¹⁹ More than 450,000 former slaves lived in the country, and almost all gained land through official or unofficial channels.

Second, the properties obtained through this redistribution fell under the control of entire lineages. Dividing the land among so many small holders would by itself make aggregating land

¹⁸Petion first administered property to the revolutionary war veterans, granting 100,000 to the 2,300 officers, and then, under Petion and his successor Boyer, 6,000 soldiers received 6.5 hectare grants each (Thoby).

¹⁹When Boyer regained the North after Christophe’s death, he redistributed the land there too.

difficult; however, aggregation became even harder because most of the private land had multiple claimants. Property owners divided their land equally among heirs (Bastien 1985). Each heir received usufructuary rights over the inherited land, but the entire family held the alienation rights; thus, a farmer could choose to cultivate his plot as he wished, but if he wanted to sell it he had to receive approval from all of his siblings and even cousins. Some believe the emancipated slaves explicitly designed this practice as a device to commit future generations to remain on small farms and prevent large-scale agriculture from returning and destroying the way of life the early revolutionaries fought to create (Dubois 2012).

Third, the new Haitian government banned foreigners from owning property. Fearing foreign powers would reassert control over their newly independent nation, the Haitian founding fathers, in the 1805 constitution, put all former French properties into the State's hands and explicitly banned foreigners of any nation from acquiring property in Haiti.²⁰ The government strictly enforced this ban, and even when outsiders attempted to circumvent the law, the government stopped them.

These institutional innovations had an immediate effect on Haiti's agricultural structure. On the eve of the revolution, Haiti supplied half of the world's sugar and coffee. The revolution reduced sugar output by eliminating coerced labor and reducing the capital stock, but redistribution reinforced the decline.²¹ Land redistribution caused farmers to reallocate resources to coffee production because they could profitably cultivate coffee on small plots.²² By 1825, Haiti exported 44% of its pre-revolution coffee volume but only 0.6% of colonial sugar output. Redistribution destroyed sugar production, and it never recovered.

The redistribution weakened incentives for the Haitian government to engage in agricultural

²⁰In 1807, Haiti split into the Kingdom of Haiti in the north and the Republic of Haiti in the south, and both retained the ban in their constitutions (Janvier 1886).

²¹We can see the redistribution's effects in the export statistics: in 1789, the eve of the Revolution, Haiti exported 93.5 million pounds of sugar, but in 1801, just three years before independence, it had dropped to 18.5 million. , and by 1818 it was only 5.4 million pounds. We can disentangle the redistribution's effects from the Revolution by comparing the North and the South; Christophe in the North enforced a plantation regime while Petion in the South was redistributing land. In the South, sugar exports had practically disappeared: Les Cayes exported 24.5 million lbs in 1789 (Etat des Finances), but in 1811 exported less than 5,000. In the North, on the other hand, annual production from 1810 to 1820 averaged 2.5 million lbs. But in the year after Christophe's death, exports dropped from 2.1 million lbs to 500,000, and six years later, after Boyer redistributed the land, they were down to 30,000 (Mackenzie).

²²Like it did to sugar production, the Revolution also greatly reduced coffee production: in 1789 Haiti exported 76.8 million lbs of coffee, and by 1818 it had dropped to 26.1 million. But from 1820 to 1825, its average annual exports were 33.9 million lbs, or 44% of 1789 production. Over the same time period, its average annual sugar exports were only 0.6% of 1789 production (Mackenzie). Coffee cultivation maintained its dominance through the 19th century, and by 1920 coffee contributed 70% of export revenues.

policy. Because everyone owned land, the elites lost their source of cheap labor and with it the profits from owning large agricultural land.²³ The elites moved out of agriculture, and from 1850 to 1915, they constantly fought for control of the government and political rents. This periodic conflict distracted the government from taking an active role in agricultural policy. Meanwhile, peasants had no political power and did not actively seek it, so no one lobbied for government action.²⁴

In fact, the only policy that the government actively maintained was the ban on foreign property ownership. For example, an 1860 law specified that in a marriage between a foreign man and a Haitian woman, only the wife could purchase and hold property (Janvier 1886). Merchants exploited this loophole and acquired property through their new Haitian wives, but this strategy soon became popular enough to worry the government. The 1879 constitution stripped women married to foreigners of their Haitian citizenship, required them to sell any property within three months of the marriage, and forbade them from acquiring property in the future. In the event of the husband's death, the woman could only regain her citizenship and property rights if the couple had no children (Dubois 2012, Janvier 1886).

The ban introduced a crippling hysteresis by cutting-off a key source of capital that could have aggregated land before it became too costly. The US eliminated the ban in 1918, but because the Haitian government enforced it for 100 years after it redistributed the land, removing it did not change the agricultural organization. Without the foreign property ownership ban, a deep-pocketed investor might have purchased large tracts before subsistence farmers captured them. But the government enforced the ban, and the population grew and populated the land, dividing the land amongst more claimants. Once the U.S. removed the ban, investors could not purchase land without dispossessing many farmers.

Dispossessing farmers was a difficult route because the government had weak eminent domain powers. There are many accounts of the government expropriating wealth from peasants, but there are few confirmed instances prior to the occupation of it confiscating peasant land. Indeed, in a detailed study of one area, Murray (1977)²⁵ could not find a single instance of the government or elite expropriating land. In some cases, the government claimed peasant land, but the owner successfully

²³The transition from Saint Domingue to Haiti is a perfect example of Domar's trilemma.

²⁴See Chapter 7 of Lundahl (1979) for a more complete treatment of Haiti's passive government.

²⁵pp. 341-342

challenged it in court and won.²⁶ Some U.S. officials complained that the government needed to reform its eminent domain law to make eviction easier.²⁷ Other officials wanted to maintain support from the masses and refused to force peasants to sell their land to large American companies (Schmidt 1971, pp 179). Not until the 1940s did the government successfully and consistently obtain large tracts of land through evicting smallholders.

In summary, historical institutions divided the land among the population and created forces that prevented the government or investors from consolidating it. By the beginning of the 20th century, smallholders dotted the country like a checkerboard. I now turn to a model of how this checkerboard affects the distribution of land and labor to derive testable predictions that I can take to the data.

3 Model of Subsistence and Plantation Agriculture

I develop a simple model that allows me to infer information about transaction costs from land adoption patterns. The model allocates resources to different productive sectors, and transaction costs determine how farmers use the land.

3.1 Three sectors: subsistence, plantations, and migration

The country's labor endowment (E^L) can be employed on domestic farms or migrate to the foreign labor market. Workers can earn an exogenous wage w , but they must pay a migration cost c , so that the return to migration is $w - c$.

There are two types of domestic farms: subsistence (S) and plantation (P). Each farm i of type J uses labor (L) and land (T) in a production function $A_J F(L_{Ji}, T_{Ji})$, which follows the standard production function assumptions: increasing in land and labor, continuous, and twice differentiable. The two types of farms differ in their technology, with $A_P > A_S$, and they also differ in how they combine land. Subsistence farms can cultivate disparate plots at no cost, but plantations must farm a contiguous tract of land at least T_{min} hectares big.

Land is held under two tenure types. A fraction of the land p is owned by the State, and $1 - p$ is owned by private claimants. Land quality is homogenous across tenure types. Farms can rent

²⁶Haiti Bureau du representant fiscal (1928) pp 74

²⁷Haiti Bureau du representant fiscal (1938) pp 99

land for r per hectare, but on the private plots to remove claimants the farmer would have to pay additional transaction costs.

3.2 Transaction costs

The transaction costs for acquiring land for a given farm depend on the farm's type and the total amount of land already dedicated to that farm type. The transaction cost function for farmer i is $\phi_{Ji}(t_{Ji}; T_{Ji})$, where t_i is the amount of land on the i th farm of type J and T_{Ji} is how much land has been adopted by all the farmers before i (i.e. $T_{Ji} = \sum_{h=1}^{i-1} t_{Jh}$). The function is increasing in t_i because acquiring more land requires expending more transaction costs. It is increasing in T_{Ji} because farmers begin by selecting the lowest cost land, and subsequent farms must pay more. These costs differ by farm type because of the land requirements. Subsistence farms can farm in small, disparate plots, so the transaction costs do not rise quickly. Plantations, on the other hand, must find at least T_{min} of contiguous land.

There are three parameters that affect $\phi_{Ji}(t_i; T_i)$ through marginal transaction costs $\phi'_{Ji}(t_i; T_i)$. First, marginal transaction costs are increasing in the expected number of households per unit of land (μ), since clearly as more households are on the land the farmer must expend more transaction costs to get them to sell. Second, the marginal transaction costs are decreasing in how spread out the households are (σ); holding μ constant, the greater the spread the more land there is with few inhabitants. Finally, the marginal costs are increasing in the average household size (δ), since each household has more claimants.

In the equilibrium below, we are interested in the total land in each farm type J . We can represent the total transaction costs spent to acquire $T_J = \sum t_{Ji}$ as

$$\phi_J(T_J) = \min_{I, \{t_{Ji}\}} \sum^I \phi_{Ji}(t_{Ji}; T_{Ji}) \text{ s.t. } \sum^I t_{Ji} = T_J \quad (1)$$

$$t_{Ji} \geq T_{min}.$$

Note that because $\phi_J(T_J)$ is the sum of each $\phi_{Ji}(t_{Ji}; T_{Ji})$, it is also increasing in μ and δ and decreasing in σ . In Figure 3 I show two simulated transaction cost functions²⁸ with the same μ but different values of σ to show how a greater spread leads to lower costs.

²⁸See table notes for simulation details.

3.3 Equilibrium

There are two equilibrium conditions. First, the labor market clears ($L_P + L_S + L_M = E^L$), where L_J is the amount of labor in either plantations, subsistence, or on the foreign market (M). Second, there is a free entry condition where farmers continue to enter until there are no positive profits. In the plantation sector the last plantation could be making a profit, but because of the minimum size requirement the next plantation would make a negative profit.

For the purpose of this paper, I do not need prices, only allocations. Thus, I focus on the social planner's equilibrium. The social planner maximizes the sum of output on subsistence farms and plantations and the income derived from the foreign labor market subject to the labor constraint. Furthermore, the planner cannot avoid the transaction costs. Thus, the planner's problem is

$$\max_{\{L_{Ji}, T_{Ji}\}} \left(\sum_J \sum_i A_J F(L_{Ji}, T_{Ji}) + (w - c)L_M - \sum_J \phi_J(T_J) \right) \text{ s.t. } L_P + L_S + L_M = E^L \quad (2)$$

where $L_J = \sum L_{Ji}$ and $T_J = \sum T_{Ji}$. At the optimum, the full labor endowment is used, so we can simplify the problem by solving the labor constraint for L_M and substituting it into the problem:

$$\max_{\{L_{Ji}, T_{Ji}\}} \left(\sum_J \sum_i A_J F(L_{Ji}, T_{Ji}) + (w - c)(E^L - L_P - L_S) - \sum_J \phi_J(T_J) \right). \quad (3)$$

We can further simplify the problem by assuming $F(L, T)$ is a constant returns to scale Cobb-Douglas production function. The problem is then expressed as

$$\max_{\{L_{Ji}, T_{Ji}\}} \left(\sum_J \sum_i A_J L_{Ji}^\alpha T_{Ji}^{1-\alpha} + (w - c)(E^L - L_P - L_S) - \sum_J \phi_J(T_J) \right). \quad (4)$$

The first-order condition for labor on farm i of type J is then

$$\alpha A_J \left(\frac{T_{Ji}}{L_{Ji}} \right)^{1-\alpha} = w - c. \quad (5)$$

We can solve for L_{Ji}

$$L_{Ji} = \left(\frac{A_J \alpha}{w - c} \right)^{\frac{1}{1-\alpha}} T_{Ji} \quad (6)$$

and substitute this expression back into the production function. Then the output on farm i in

sector J can be written as a function of how much land it uses

$$F_J(L_{Ji}, T_{Ji}) = F_J(T_{Ji}) = \left(A_J \left(\frac{\alpha}{w-c} \right)^\alpha \right)^{\frac{1}{1-\alpha}} T_{Ji}. \quad (7)$$

We can substitute Equations 6 and 7 into Equation 4. These substitutions reduce the dimensionality of the problem and allow us to solve it just in terms of how much total land is allocated to each sector

$$\max_{T_P, T_S} \left(\sum_J \left(\left(A_J \left(\frac{\alpha}{w-c} \right)^\alpha \right)^{\frac{1}{1-\alpha}} T_J \right) + w \left(E^L - \sum_J \left(\frac{A_J \alpha}{w-c} \right)^{\frac{1}{1-\alpha}} T_J \right) - \phi_P(T_P) - \phi_S(T_S) \right). \quad (8)$$

The necessary condition for the optimal amount of land in each farm type is

$$\phi'_J(T_J) = ((\alpha^\alpha - \alpha) A_J (w-c)^{-\alpha})^{\frac{1}{1-\alpha}}. \quad (9)$$

Implication 1 (Settlement Patterns): The amount of land adopted in each farm type is decreasing in μ and δ and increasing in σ . We can derive this from the first order condition taking the implicit derivative with respect to each parameter (μ, δ , and σ). The comparative statics all take the same form; for example, the comparative static for μ is

$$\frac{\partial T_J}{\partial \mu} = -\frac{1}{\phi'(T_J)} \frac{\partial \phi'(T_J)}{\partial \mu}. \quad (10)$$

The first term ($-\frac{1}{\phi'(T_J)}$) is the same across all three parameters, but the second term differs across parameters and is the derivative of $\phi'(T_J)$ with respect to the parameter. The direction of the effect is determined by this second term and differs across parameters, which as described above is negative for μ and δ and positive for σ .

Implication 2 (Migration Cost Shock): An increase in migration costs will increase land adopted in both farm types, but the distribution across farm types is determined by relative productivities and transaction costs. Taking the implicit derivative of the first order condition with respect to c yields the prediction that adoption increases for both farm types:

$$\frac{\partial T_J}{\partial c} = \frac{A_J^{\frac{1}{1-\alpha}}}{\phi''_J(T_J)} ((\alpha^\alpha - \alpha)(w-c)^{-\alpha})^{\frac{1}{1-\alpha}} > 0 \quad (11)$$

Then taking the ratio of the two changes yields

$$\frac{\partial T_P / \partial c}{\partial T_S / \partial c} = \left(\frac{A_P}{A_S} \right)^{\frac{1}{1-\alpha}} \frac{\phi_S''(T_S)}{\phi_P''(T_P)}. \quad (12)$$

The ratio of total land adopted in plantation and subsistence agriculture is determined by the difference in sectoral productivities and the transaction cost slope. Because $A_P > A_S$, with transaction costs in both sectors, the economy responds to a change in wages by allocating more land to plantation than to subsistence. However, transaction costs attenuate this response and if they are high enough can divert more land to subsistence farming. Using parameters from Adamopoulos and Restuccia (2014), without transaction costs, $\frac{\partial T_P / \partial c}{\partial T_S / \partial c} \in (3.8, 7.3)$.²⁹

4 Occupation, Reforms, and Data

New data from a 1927 land reform initiated by the U.S. occupation presents an opportunity to test the model. In 1914, the U.S. Marine Corp extended its Caribbean strategy and began occupying Haiti.³⁰ The marines initially intended to leave quickly, but the occupation lasted until 1934 because officials feared creating instability if the U.S. withdrew too soon.³¹ In extending the occupation, American officials gained greater control over policymaking,³² and one of the top priorities became strengthening the government through increased internal revenues.

Instead of internal revenues, Haiti's government relied almost exclusively on volatile customs receipts for its revenues.³³ Seeking a more stable source of internal revenue, the Financial Adviser,

²⁹Adamopoulos and Restuccia (2014) find that the factor difference between 50 hectare farms and 5 hectare farms is 2.22. Assuming $\alpha \in [.4, .6]$ produces the range.

³⁰The Caribbean was a key commercial and military location because of the Panama Canal and the islands' strategic positions. To protect US interests, the military secured nearly every major territory in the region. In the early 20th century, the U.S. was present in Cuba, Puerto Rico, Nicaragua, the Dominican Republic, and Haiti (Schmidt 1971). Haiti was an especially important location because of its strong German presence and its chronic political instability (Heinl 1996).

³¹ The grassroots Haitian resistance forces were rising again and causing problems for the American soldiers. Officials believed that withdrawing without establishing stronger institutions would leave the island in chaos (Schmidt 1971)

³²Schmidt (1971) argues that the U.S. leaders extended the Progressive movement and implemented technocratic reforms to eliminate corruption and improve efficiency. Many reforms were effective and greatly reduced corruption; even U.S. firms had trouble gaining special privileges (Millspaugh 1929, Schmidt 1971). In their reports we can see that officials were constantly looking for inefficiencies to resolve.

³³From 1911 to 1915, over 97% of government revenue came from customs receipts. The dependency decreased after the U.S. entered, but even in 1926 customs still comprised 86% of revenues. A study published at the time, cited by the Financial Adviser's report, claimed Haiti was the country most dependent on customs receipts; its reliance far exceeded the next two highest: Salvador (66%) and the Dominican Republic (50%).

a position created and occupied by the Americans to control Haiti’s finances, believed the government could increase land revenues.³⁴ Land was the country’s principal source of wealth, but the government faced significant barriers to deriving greater revenue from it. Haiti had no land tax and, more importantly, no cadaster to even indicate who owned land. Instead of instituting radical, divisive new land programs, the American officials decided to reform an old land rental program.

4.1 Land rental program

Since 1877, the government had made land available to rent, but it had administered the program poorly. The program was a bureaucratic mess; as one official said, “It would be hard to devise a system more susceptible to fraud or more difficult to administer properly”.³⁵ The American reforms clarified the organization, corrected price distortions, and created incentives to invest.³⁶ For example, one feature of the reform guaranteed the tenant could farm the land for 20 years and receive only one rent increase (to keep up with inflation). Because the rent increase could not capitalize any investments made on the plot, the tenant became the residual claimant on land investments. The American officials hoped that fixing these issues would quickly supply the government with revenue.

The land rental program provides new data on land adoption patterns in Haiti. The land rental law required the government to publish a notification every time a farmer adopted idle land. The rental program published land rental notifications in its official gazette, *Le Moniteur*,³⁷ and kept it in the paper for at least three months. Notifications appeared only when land was adopted for the first time. I have collected the universe of notifications published from 1928 to 1950. Farmers adopted 5,792 agricultural plots during this period.³⁸ Each notification contained key descriptive information about the requested land. It listed the plot’s location in one of Haiti’s 105 administrative districts (*communes*), and also described the plot’s size and the neighbors—i.e. what was located on the north, south, east, and west side of the plot—to facilitate locating it. Finally, it also listed the

³⁴Haiti Bureau du representant fiscal (1927) pp 65

³⁵Haiti Bureau du representant fiscal (1925) pp 119

³⁶See the Appendix for more details.

³⁷As a civil law country, Haiti regularly publishes notices of government action in its gazette. *Le Moniteur* mainly published laws and presidential decrees, but one can also find notices that affect only one person, such as citizenship declarations or check cancellations.

³⁸Every notification lists the first date it was published, which allows me to explore gaps to confirm there are no missing notifications. Because all notifications are published for at least three months, I can use multiple issues to double check notifications and avoid missing data that might result from damaged or missing issues.

renter's name and the date he or she requested the land.

4.2 New Patterns from the Rental Data

With this new data, I find three new empirical patterns about land use in Haiti. These patterns come with a caveat: they are derived from land observed because it was adopted under this program and do not apply to all state owned land. Nevertheless, they provide evidence consistent with high transaction costs to adopting large tracts of land.

First, under favorable rental conditions, farmers did not adopt much land. The nearly 5,800 plots together constituted about 30,000 hectares, an unremarkable figure compared to the nearly 960,000 hectares available (Brisson 1968). To put this in context, consider that the land adopted did nothing to change the fact that farmers cultivated only 64% of the land cultivated by colonists.³⁹ Despite the government's efforts to induce farmers to cultivate the idle land, farmers adopted little. Farmers establishing plantations could have quickly put large amounts of land into cultivation, yet that few took advantage of the program indicates there must have been something outside of it stopping them.

Second, farmers adopted small plots even when they had the chance to adopt more land. Figure 4 shows the plot size distribution, and we can see most of the mass at the low end, with the median plot equal to 1.29 hectares.⁴⁰ Nevertheless, we observe a full range of plot sizes, even into the hundreds of hectares. The law did not dictate or limit plot sizes; the distribution confirms farmers did not face legal size limits, but their preference for small plots indicates that other constraints existed.

Farmers did not choose small plots because they had no room to expand; in fact, some farmers could have chosen larger plots but did not. Often the notification described idle land next to the adopted plot. Figure 5 gives a stylized map created from the notifications that demonstrates these idle neighbors. Pauleon has adopted one hectare, and Ulysse cultivated state-owned land to the south; but no one occupied the state-owned land on the north, west, or east sides. Thus Pauleon

³⁹Colonists cultivated one million hectares (McClellan 2010, pp 64), and Brisson (1968) calculated that four departments cultivated 496,000 hectares, which was 40% of the arable land in these departments. He estimated in the fifth department there was 354,000 hectares of arable land. Applying the same 40% figure to this department yields 141,000 hectares, making the total cultivated land 637,000. Hence, the farmers only cultivated 64% of the total land cultivated by colonists.

⁴⁰The Haitian standard unit of land was the *carreaux*, which is equal to 1.29 hectares.

could have adopted more land in three directions but chose to adopt only one hectare. In fact, 15% of plots have at least one neighbor listed as “unoccupied state land,” and 31% of plots have at least one neighbor listed as “rest of the land” or simply “the State.” Together this means that 46% of renters had the opportunity to choose larger plots but did not. By a revealed preference argument, these subsistence farmers selected the optimal farm size subject to their constraints. This choice to stay on small plots helps motivate the model’s assumptions, because it shows that farmers could not capture economies of scale by expanding a small plot.

Finally, farmers adopted many state plots that bordered private land, which suggests that farmers could not find large tracts of land because state and private land coexisted in a checkerboard. The notification’s description often mentioned whether the government owned land bordering the plot or not. If we assume the notification always explicitly said when the government owned the neighboring plot, then 67% of plots had at least one neighbor not owned by it. But the notification’s writer might have assumed that the reader knew the government owned the surrounding land, meaning this figure overestimates the prevalence of private land. A more conservative estimate looks just at how many plots had at least one neighbor owned by the government and at least one neighbor not owned by it. In this case, 48% of plots were bordered by both private and state land.

These findings together illustrate that farmers could not find contiguous agricultural land. But we can get a greater sense of the transaction costs by using the data to explore the model’s testable implications.

5 Two tests of the model

5.1 Settlement Patterns and Adoption

The model makes two predictions about how the checkerboard will affect land adoption. First, a higher average spatial population density will lead to less adoption because there are more people to clear. Second, keeping the average constant, a greater variance in the density within an administrative district will lead to more adoption because the population is more concentrated in some areas and sparser in others.

To measure variation in settlement patterns, I use the U.S. Army Inter-American Geodetic

Survey.⁴¹ The 1956 survey created a detailed map using aerial photographs of the island and marked the location of buildings and huts. The more detailed map (at 1:25,000 scale) covers about 60 districts and gives no additional information on landholdings beyond the building locations. The map gives the most detailed record of the population's spatial distribution available. The government never kept a detailed cadaster, and attempts to create them failed.⁴²

I measure the checkerboard using a random sample from the map. The survey partitioned the country into 160 local maps that each cover about 122 km², though some of the covered area includes oceans and the Dominican Republic. I randomly sampled 80 maps, and then within each map I randomly sampled 25 one-kilometer squares. I discarded all squares that were predominantly water or the DR (17%), and with the remaining squares ($N = 1,660$) counted the number of buildings in each square. The selected squares fell into 41 different administrative districts. For each district I calculate the distribution of buildings within a square, both the average and standard deviation.

Table 4 shows the regression of total land adopted in each district from 1928 to 1950 on the settlement patterns. Consistent with the model, higher average density leads to lower adoption and higher variance leads to more adoption. The coefficients hold (but statistical significance decreases) even when controlling for other factors such as population, the total land in the district, and the average terrain slope.

A negative relationship between building density and land adoption will arise if denser communes had less idle land. Communes with denser populations might have adopted a greater proportion of the available land but had less land available. However, the adopted land as a fraction of the total idle land is so small that land availability could not have been a binding constraint. For five districts I can construct a lower bound estimate of the total land available using the 1934 advertisement mentioned earlier. Because this is a single advertisement, and assuming the government made more land available in other years, we can take it as a lower bound estimate of available land. Table 3 shows that in most districts farmers did not even adopt in 16 years as much as land as was available in this one year. This proves that land availability was not a binding constraint and does not drive Table 4's results.

⁴¹The map is available at the Digital Library of the Caribbean www.dloc.com.

⁴²The U.S. tried to create a cadaster using aerial photography, but the building containing the photographs burned down under mysterious circumstances (Schmidt 1971 pp 179).

5.2 Change in migration costs - Trujillo Massacre

The model's second testable prediction states that an increase in migration costs will increase land adoption in both subsistence and plantation agriculture, but that farmers should adopt more land under plantation agriculture if transaction costs are low. To test this prediction, I use an exogenous change in migration costs looking at the 1937 Trujillo massacre. In October 1937, Dominicans, sanctioned by their President Rafael Trujillo, slaughtered Haitians living in the DR. The exact number of deaths is unknown, and estimates vary widely; however, the most reasonable estimates count 12,000 deaths over a few days (Vega 1988). The massacre came as a complete surprise.

The massacre had two effects on the Haitian labor market. First, it increased the cost to Haitians of being in the DR. Any Haitian travelling to the DR now risked death, and surviving Haitians left the country in droves.⁴³ Workers left behind land and livestock (Turits 2003, Palmer 1976) and refused to accept higher wages.⁴⁴

The DR census data demonstrate the increased risk to Haitian labor. In the 1935 Dominican Republic Census, the government counted almost 53,000 Haitians in the country, but in the 1950 Census the government found less than 19,000. Within 15 years, the DR lost 64% of its Haitian population. The loss occurred throughout the country, but, as seen in Table 1, the border areas saw some of the largest losses.⁴⁵ The census numbers underestimate the massacre's effect on Haitian workers because they do not reflect the change in seasonal migration or the Haitians who would have gone to the DR but chose not to because of the increased cost.

Second, the massacre created a large labor supply increase in Haitian border districts. The government was unprepared to receive the many refugees who arrived injured and penniless.⁴⁶ It attempted to solve the problem by sanctioning five refugee camps, called "agricultural colonies," in the border where it could better coordinate aid and public goods.⁴⁷ Although the government's

⁴³This refugee influx was the first evidence the Haitian government received that something had gone wrong; in the first week alone, at various points along the border, at least 2,000 refugees entered Haiti.

⁴⁴The Haitian government sent buses to aid refugees leaving the country, and of the 2,000 passengers on one, sugar company recruiters convinced only three to stay (Vega 1988).

⁴⁵The count in 1935 for the north-western border provinces where the massacres were concentrated—Libertador, Monte Cristi, and San Rafael—included more than 7,000 Haitians, but in 1950 it was only seven. Even in the southern province of Barahona, where we have no reports of mass killings, almost 6,000 Haitians disappeared in the intercensal years.

⁴⁶Haiti Bureau du representant fiscal (1938) pp 89

⁴⁷The government regularly received updates on the agricultural colonies, but they short reports focused mostly on activities at the schools. For an example, see Republic of Haiti (1939).

investment in the refugee camps did not last long (Lundahl 1979), the refugees stayed in the border districts and could be found there decades later (Derby and Turits 1993).

Contemporary officials documented the initial refugee influx, but we must use the Dominican census to approximate the total magnitude. Between the 1935 and 1950 Dominican censuses 34,000 Haitians disappeared. From this figure we can subtract the Vega (1988) estimate of 12,000 deaths, leaving 22,000 refugees. Using the 1950 Haitian population numbers for the border districts, 22,000 migrants would constitute about 6% of the population, making the shock similar in size to the Mariel boatlift in Miami (Card, 1990).

The model shows that the massacre's effect on the labor market also has implications for the land market. First, because migration costs increased for all Haitians, the demand for land in Haiti should have increased everywhere. Second, because the border districts received a larger labor supply shock, they should have experienced an even larger increase in demand than the interior districts. Theoretically, if transaction costs do not impede land aggregation, then investors, seeing the refugee influx, should buy land and hire the unemployed labor on plantations. Indeed, these laborers migrated to the DR to work on plantations, so they are exactly the kind of workers the investors would have wanted to hire. However, if transaction costs create barriers, then we would expect to see a disproportionate increase in subsistence farming.

5.2.1 Farmers adopted more land after the massacre

I isolate the massacre's causal effect on land adoption by comparing the border and interior districts,⁴⁸ shown in Figure 6, in a difference-in-differences analysis. A graphical analysis of the trends displayed in Figure 7 indicate that requests for land were nearly identical before 1938.⁴⁹ In the post-massacre period, however, the border districts diverge from the interior districts. The graphical evidence supports a difference-in-differences approach.

The regression analysis confirms that the border districts experienced a large change after the massacre. As shown in Table 4, after the massacre, the entire country experienced a 6.5% increase in land requests and experienced a 5.7% increase in area adopted. But the effect was four times larger in the border districts where refugees settled. These results remain after including year and

⁴⁸I define border districts as any district touching the border or hosting a refugee camp.

⁴⁹The 1934 spike in the border districts is related to a homesteading program featured in another chapter in my dissertation.

district fixed effects.

Migration had a causal effect on Haitian land use. Before the massacre, Haitian workers did not adopt idle land because they could obtain a higher return working abroad. When that opportunity disappeared, land adoption increased. But how they adopted land once the labor market disappeared tells us about the barriers they faced. As we will see, the evidence suggests transaction costs prevented farmers from taking full advantage of this labor supply increase.

5.2.2 Land in subsistence and plantation agriculture

The model shows that the ratio of plantation to subsistence land reflects differences in productivity and transaction costs. As discussed in the model section, the ratio should fall between 3.8 and 7.3, but transaction costs can attenuate that figure. Table 3 shows how much land farmers adopted under large-scale plots (50 ha or more) and small-scale plots (5 ha or less) after the massacre until 1942.

Farmers adopted significantly more land under subsistence farming. Throughout the country, farmers adopted 3,800 hectares, but only one quarter of that land went to farms larger than 50 hectares. In the border regions, where most of the labor settled, farmers adopted 33 times as much land in subsistence farming as they did in large-scale agriculture. The interior districts must have had lower transaction costs because farmers adopted more large-scale plots there, but they still did not adopt as much as the model predicts.

A simple thought experiment highlights the role of transaction costs. From 1938 to 1942, farmers adopted almost 3,000 hectares on farms that were five hectares or less. Imagine that instead of spreading this land over 1,800 farms, investors formed 30 100-hectare farms. The productivity on the handful of large farms would exceed the output of the subsistence farms. Yet this more productive organization did not happen, and therefore farmers must have faced high costs to acquiring large tracts of land.

5.3 Other barriers to adopting large plots

Farmers adopted much more land into subsistence farming than into large-scale farming, because transaction costs prevented them from obtaining large plots. Other barriers could skew the distribution towards small farms, but here I address some alternative explanations.

5.3.1 Monopoly pricing

Farmers might not adopt large tracts of land because the government can extract additional rents on this land. Suppose the checkerboard did not exist and the State had a monopoly over plantation-sized tracts. The government could exercise its monopoly power and set prices to extract rents from the cultivators. Because it does not have a monopoly in the subsistence land market, the government might set prices on small plots close to the competitive rate, but it could restrict the supply of large land and set prices high.

Data on the prices for some of these plot rentals allow me to test the monopoly pricing hypothesis. For 346 plots adopted from 1928 to 1950, I know the original rental rate and size.⁵⁰ I can test for whether the government charged above market rates by comparing the per hectare prices on small plots with the prices on large plots.

Figure 9 shows a scatterplot of prices and area with a line showing predicted prices if the government applied the same per hectare rate for all plots as it did for the plots smaller than five hectares. On average, the government charged small plots US\$3.12 per hectare.⁵¹ For the six and seven hectare plots, applying this rate tends to overestimate the price. For the three plots above 10 hectares, this rate greatly overestimates the true prices. The government charge much less for these large plots, only about \$1 per hectare. The government did not overcharge farmers for these plots relative to the rates on small farms; in fact, it might have subsidized them.⁵²

Poor land quality on large plots could explain the low per hectare prices. Small-scale farmers can select the highest quality land with great precision, but on large farms farmers must mix high and low quality land. These prices might indicate that the average quality on large idle land is lower than the quality of a small farm. And low average quality could explain why no one cultivated the land in the first place. But this argument strengthens the checkerboard hypothesis because it means households occupied the highest quality land, making forming a plantation on quality land even more costly.

⁵⁰These prices come from local tax archives in three districts in the *Département du Nord*: Acul du Nord, Grande Riviere, and Dondon.

⁵¹The exchange rate was 1 US\$ for 5 Haitain gourdes.

⁵²One might ask why someone does not rent the large plots at the low per hectare price, divide the tract into small plots, and then lease them to other farmers at a higher rate. The property rights outlined by the law did not allow for such entrepreneurial activity.

5.3.2 Capital constraints

Capital constraints could have prevented farmers from adopting large farms. Without capital, farmers could not establish plantations because they could not have had the equipment for processing crops. Capital constraints could especially cause problems for the post-massacre period because the Depression made capital harder to obtain.

But capital constraints cannot completely explain the patterns I observe. First, although agricultural capital dropped at the beginning of the Depression, it recovered quickly. By 1934, Haiti's agricultural machinery imports had recovered to their pre-Depression levels. The Depression did not stop the Standard Fruit and Steamship Company from obtaining land for a banana plantation in the 1930s; in fact, the company attributed its failure to the abundance of small-holders (Lundahl 1979).

If capital constraints were the only problem, then we would have observed more investors establishing plantations during the 1920s. In the better economic conditions of the 1920s, Americans made big investments in other Caribbean countries. Even when investors had more access to capital, they still could not setup large farms because of all the smallholders. Capital constraints complement the checkerboard story but cannot replace it.

5.4 Timing of the Ban on Foreign Property Ownership Mattered

The next two sections move away from the land rental data and consider the foreign property ban's role on agricultural development. Removing the property ban has a small effect on the agricultural structure if the population has already spread over the land. Once the population creates a checkerboard, the main source of transaction costs comes from dealing with the households spread over the land. Removing the foreign ban will change the pool of investors who could potentially purchase the property, but it does nothing to reduce the cost of contracting with individual parties. In Haiti, removing the ban did nothing to the agricultural organization. But plantation agriculture in the Dominican Republic and Jamaica owes its success to these allowing foreigners to invest in land early. These histories illustrate what Haiti might have looked like had it not banned foreigners.

5.4.1 Dominican Republic as counterfactual

The differences between property rights in Haiti and the DR extend back to colonial times. While Haiti generated large profits for French investors, the Dominican Republic⁵³ played a peripheral role in Spain's empire because the Spanish could easily extract wealth from its other colonies abundant in minerals and labor. But by the beginning of the 20th century, the countries had switched roles, with sugar becoming the Dominican Republic's top export while in Haiti its value was only 2% of coffee exports.

The DR adapted to sugar production because its colonial economy produced more concentrated land holdings and a lower population density. The DR's economy did not depend on labor intensive industries. Farmers cultivated some cash crops using slave labor, but cattle raising generated the most economic activity. Ranchers needed large, open pastures for grazing, so the population did not spread over the land and create costly property rights.

A greater acceptance to foreign investment also helped the DR adopt sugar plantations. Less than three months after the Dominican Republic declared independence from Spain in November 1821, Haiti, acting on fears of a French invasion through the newly independent state, conquered the entire island of Hispaniola. After gaining independence in 1844, the DR protected itself from another invasion by opening itself to foreigners.⁵⁴ By the end of the century investors bought large tracts of land on the Dominican frontier, demanded clear property rights and received preferential treatment (Martinez 1999, Moya Pons 1985). Thus, both countries feared foreign invasions, but they reacted in opposite ways and generated completely different institutions.

5.4.2 The Ban and Bananas - Jamaica as counterfactual

In many ways, Jamaica serves as an even better counterfactual. Although it does not share the island with Haiti, Jamaica is close, and its factor endowments are also well-suited for cash crop cultivation. Importantly, Jamaica's colonial economy relied on slave labor to produce sugar. Like Haiti, Jamaica also experienced a shift to small-scale farming after emancipation as former slaves

⁵³ then Santo Domingo

⁵⁴In 1861, the Dominican Republic voluntarily returned to being a Spanish colony—the only Latin American country to do so after gaining independence—but then declared independence in 1865 (Sagas 1994). Next, Dominicans tried to persuade the United States to annex it. The effort ultimately failed, but the government had already made large land concessions to Americans (Pinkett 1941).

divided the plantations.⁵⁵ Like Haiti, Jamaica’s informal tenure system relied on joint ownership by extended family members.⁵⁶ But unlike Haiti, Jamaica could not ban foreigners from owning property.

Emancipation did not remove Jamaica from the British Empire, and the freed slaves could not ban the the British from owning land. Many British property owners left because the plantations’ profitability decreased, but the option to buy property if it ever became profitable remained.

Plantation agriculture returned to Jamaica because the former slaves could not ban foreign investment. In the late 19th century, banana prices increased significantly. In Jamaica, foreign investors monopolized shipping,⁵⁷ and then bought large tracts of land for banana plantations. The large plantations increased land prices, and smallholders sold their plots and worked on banana farms (Holt 1992). Large plantations returned to Jamaica through early foreign investment.

6 Conclusion

Haiti’s agricultural structure has a large effect on its poverty. This agricultural distribution is the result of institutions implemented after independence in 1804. Farmers could not establish large-scale farms because of the high transaction costs involved with acquiring land. Using new data I collected, I show that the transaction costs prevented investors from establishing large-scale agriculture, even when land and labor were available. Comparing Haiti’s history to other Caribbean countries shows that the land institutions indeed played a large role in Haiti’s underdevelopment.

⁵⁵No longer bound to the land, the former slaves cultivated their own land. Instead of the government redistributing the plantation land, parties would pool resources and purchase entire plantations then divide the land. The freeholders chose similar plot sizes to their Haitian counterparts: the modal plot was between one and two hectares (Holt 1992). Decreasing sugar prices in the 19th century reinforced the decline of sugar plantations and the rise of smallholdings (Dippel et al. 2016).

⁵⁶Jamaicans developed a tenure system called “family lands,” where kinship groups shared ownership of property (Stanfield et al. 2003). All offspring had claim to the land, and no one could sell or subdivide it. Absentee family members do not lose their claim on the land. The complex tenure arrangements impede the land market.

⁵⁷Bananas became a valuable commodity, but farmers need to be able to quickly get their fruit to the market because it spoils so quickly after being harvested. Producers who monopolize shipping can lower production costs, and the lower costs lead to economies of scale on the cultivation side.

7 Appendix

7.1 Land Rental Program Details

The 1927 land rental reform consisted of three key components. First, it consolidated the program under one department. Instead of one department in charge of registration and another in charge of collection, administration fell under a single department. This consolidation eliminated coordination issues and allowed the department for the first time to analyze collections data and monitor the program's administration.

Second, the reform allowed rents to reflect market values. The prior law set rents the same for the whole country, meaning a property in the populous capital Port-au-Prince cost the same as a property in the isolated rural areas of Camp Perrin. These price distortions affected rental adoption and rental revenues. Under the reform, rents would be determined by information from local markets. After receiving a request for land, the local administrators office would dispatch a surveyor to appraise the property. The surveyor was instructed to account for the land's quality and compare it to similar properties available in local markets. After the surveyor determined the property's market value, by law the rent was 6% of the appraised value.

The legislators set the rental rate to subsidize plot rentals. One of the program administrators wrote that reformers chose the rate explicitly to be lower than market mortgage rates (Millsbaugh 1929). Farmers looking to acquire property in the market might need to finance it with a mortgage with a 10% annual interest rate, for example. The State's goal was to present another option to acquire land at a lower rate, making the State's program more attractive. Other evidence from a survey in 1950 indicates that this rate was possibly half of the expected annual cost of land⁵⁸.

The reform's third key component was to make the tenant the residual claimant for investments made on the land. By law, once the government appraised the land and set rent for a new contract, as long as the farmer paid, the rent was fixed for 10 years. After the initial decade, the government could reappraise the plot and set a new rent, but the reappraisal could not account for any improvements the farmer had made. The surveyor had to imagine the farmer had never rented the plot and assess this counterfactual plot's value on the current market. This one time adjustment prevented inflation

⁵⁸In a 1949 agricultural survey, extension agents imputed the opportunity cost of owned land as 12% of the land's market value.

from eroding the government's revenue. After 20 years, or any time a new tenant took the land, the law allowed the government to fully reappraise the plot and capitalize the improvements. Thus, while the tenant did not formally own the land, the law protected his cultivation rights and made him the residual claimant on any investments.

After the reform, public land rental revenues increased. Initially, the increases came because of improvements in the program's administration. In Figure 9 I plot some of the statistics reported by the financial adviser. In 9a we can see that the number of tenants jumped significantly from 1927 to 1928, but for the next four years the number of tenants stayed flat. Based on the data described below, the jump after the reform comes from better record keeping, not from additional tenants. But in 9b we can see the total rent due to the State increases throughout the period. Because the number of tenants is flat through this period, the additional rent due must come from reappraising rents on plots already in the program. Even though rent due increased, 9c shows that the amount collected stayed flat until 1933. This increase came both from more tenants renting from the State and more tenants paying their rents. Although the program was not an immediate success, the reforms were effective.

7.2 The Causes of the Trujillo Massacre

Prior to the Trujillo massacre, the Dominican Republic and Haiti experienced border issues, but they used diplomacy to settle it. To clarify the border, a 1929 treaty established an exploratory commission, and in 1936 the countries agreed on a clear border (Roorda 1996)⁵⁹. Nothing indicated that a year later one of them would commit a tremendous atrocity.

The massacre was unrelated to conditions in Haiti. When searching for what caused the massacre to happen in the Fall of 1937, a natural source is economic shocks. For example, U.S. officials explaining the massacre blamed low sugar prices and high Dominican unemployment⁶⁰. But these reasons and the available evidence are inconsistent. First, the large decline in sugar prices occurred from 1929 to 1933, and in fact in 1937 sugar prices increased by 26% (Anuario Estadístico 1938 vol 2, pp 205). If sugar revenues were the problem, it is more likely that something would have occurred when sugar export values dropped by 65%, not when they were on the rise. Second, Dominican

⁵⁹They achieved such a peaceful settlement that the two presidents received 14 nominations for a joint Nobel Peace Prize See http://www.nobelprize.org/nomination/archive/show_people.php?id=9662 accessed 22 Aug 2016

⁶⁰Haiti Bureau du representant fiscal (1938) pp 78

unemployment cannot be the cause because Trujillo was not trying to replace Haitian labor with Dominican labor; in fact, he tried to fill demand by recruiting labor from Puerto Rico (Roorda 1996). So far, no one has attributed the massacre to a credible economic cause, and even the racial motivations are hard to find⁶¹. The consensus on the massacre's causes is best expressed by Turits (2003)⁶², "What caused Trujillo to order the 1937 massacre will probably remain forever obscure." Hence, the massacre provides exogenous variation to examine the land market.

⁶¹ Anti-Haitianism was not substantially a problem in the DR until after the massacre (Turits 2003, Derby 1994).

⁶² pp 179

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8 Tables and Figures

Table 1: Distribution of Haitians in DR by Province, 1935 and 1950

Relative to Haiti	Province	1935	1950	Change	% Change
Border	Barahona	7,327	1,658	-5,669	-77%
	Independencia	1,491	648	-843	-57%
	Libertador	2,444	1	-2,443	-100%
	Montecristi	1,372	2	-1,370	-100%
	San Rafael	3,442	4	-3,438	-100%
Near Border	Bahoruco	9,647	2,989	-6,658	-69%
	Benefactor	1,785	20	-1,765	-99%
	Puerto Plata	2,313	226	-2,087	-90%
	Santiago	1,255	14	-1241	-99%
East	Azua	29	5	-24	-83%
	Distrito de Santo Domingo	928	1,178	250	27%
	Duarte	278	8	-270	-97%
	El Seibo	7,620	4,667	-2,953	-39%
	Espailat	112	0	-112	-100%
	La Altagracia	5,514	3,437	-2,077	-38%
	La Vega	264	22	-242	-92%
	Samana	92	18	-74	-80%
	San Pedro de Macoris	6,357	2,702	-3,655	-57%
	Trujillo	223	1,167	944	423%
Trujillo Valdez	167	6	-161	-96%	
Total		52,660	18,772	-33,888	-64%

Source: Anuario Estadístico de la República Dominicana 1938 V 1; República Dominicana Tercer Censo Nacional de Población 1950

Table 2: The effect of clustering and population density on the total land adopted in a district, 1928-1950

	(1)	(2)	(3)
E(Buildings/km2)	-0.125*** [0.0432]	-0.109** [0.0470]	-0.100* [0.0533]
SD(Buildings/km2)	0.115*** [0.0354]	0.0864** [0.0409]	0.0833* [0.0449]
Log(Population)		0.152 [0.427]	0.172 [0.403]
Log(district Area)		0.595 [0.578]	0.592 [0.580]
Border			0.0577 [0.523]
Log(Slope)			-0.335 [0.575]
Districts	42	41	41
R-squared	0.186	0.272	0.280

Notes: E(Dots/km2) represents the average number of buildings per square in a district, and SD(Dots/km2) is the standard deviation. Bootstrapped standard errors (1000 replications) in brackets.

Table 3: Comparing Land Available in 1934 to All Land Rented from 1934 to 1950

Departement	District	Available (1934)	Adopted (1934-1950)
Ouest	Croix-des-Bouquets	470	94
Nord	Fort Liberte	1,593	1,077
Ouest	Thomazeau	223	610
Ouest	Petionville	301	37
Ouest	Ganthier	168	532

Notes: All figures are in hectares. Available land comes from a 1934 advertisement. All years means 1928 to 1944.

Table 4: The Effect of the Refugee Influx on Annual Land Requests and Adoption, 1928-1950

	Requests		Area Adopted	
	OLS	FE	OLS	FE
Post Massacre X Border	0.221* [0.131]	0.221* [0.131]	0.313* [0.159]	0.313* [0.160]
Border	0.0288 [0.0310]		0.0502 [0.0591]	
Post Massacre	0.0649*** [0.0180]		0.0566* [0.0329]	
N	1,768	1,768	1,768	1,768
R-squared	0.068	0.088	0.068	0.088

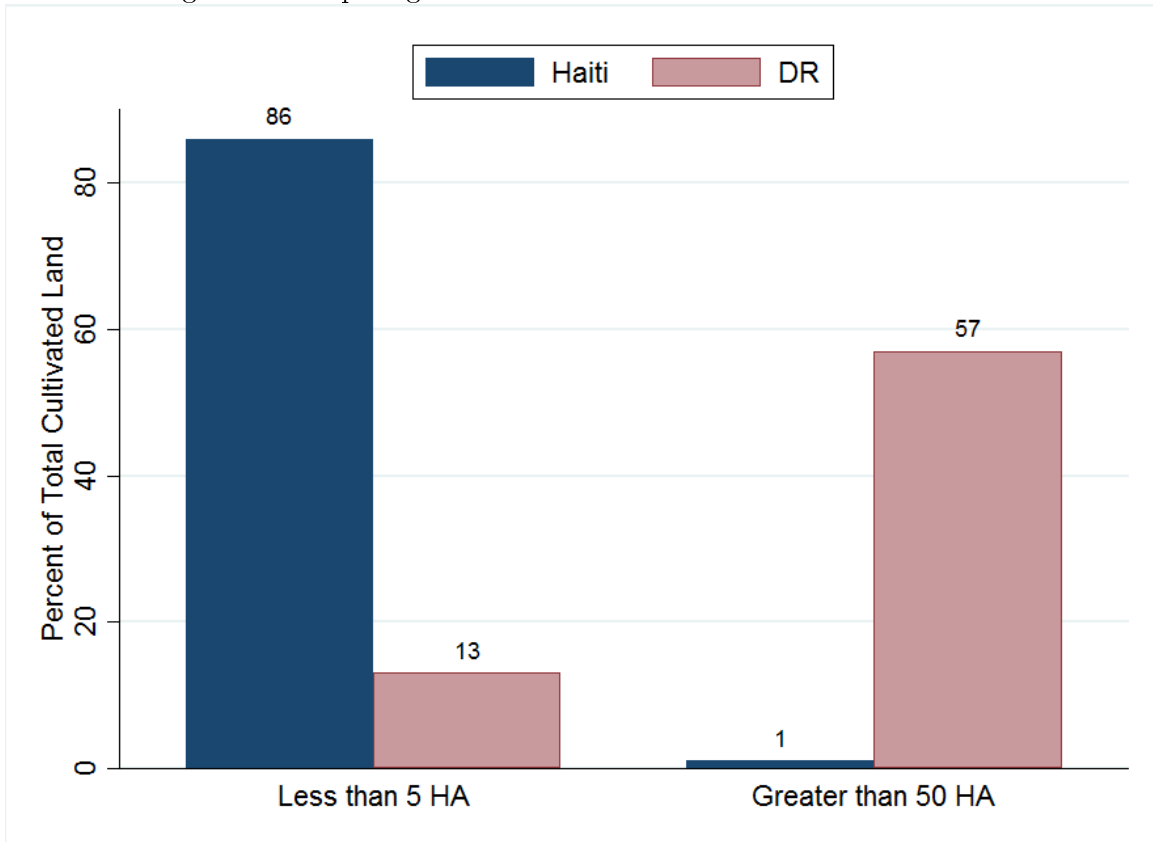
Notes: The massacre occurred at the end of 1937. Dependent variable is the inverse hyperbolic sine of the requests and area adopted per capita; the coefficients are interpreted as percent changes. Standard errors clustered at the district level.

Table 5: Total hectares adopted under each farm type after the massacre, 1938-1942

	Small-Scale	Large-Scale	Ratio	95% CI
Total	2,888	953	0.33	(0.02,0.75)
Border	1,395	50	0.04	(0,0.14)
Interior	1,492	903	0.61	(0,1.89)

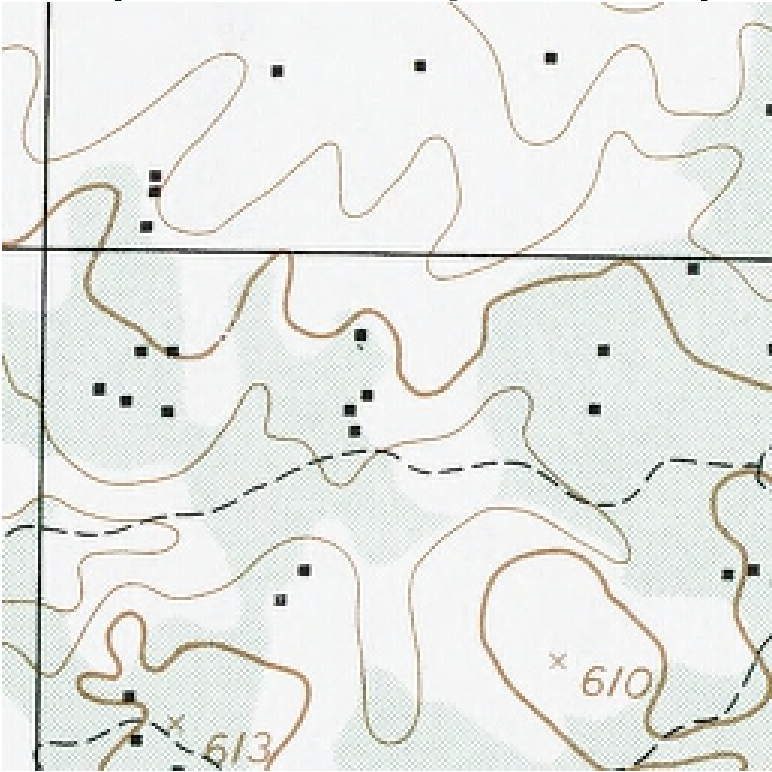
Notes: Large-scale is defined as greater than or equal to 50 hectares; small-scale is less than or equal to 50 hectares. Confidence interval obtained through bootstrapping.

Figure 1: Comparing 1970 distribution of land in Haiti and the DR



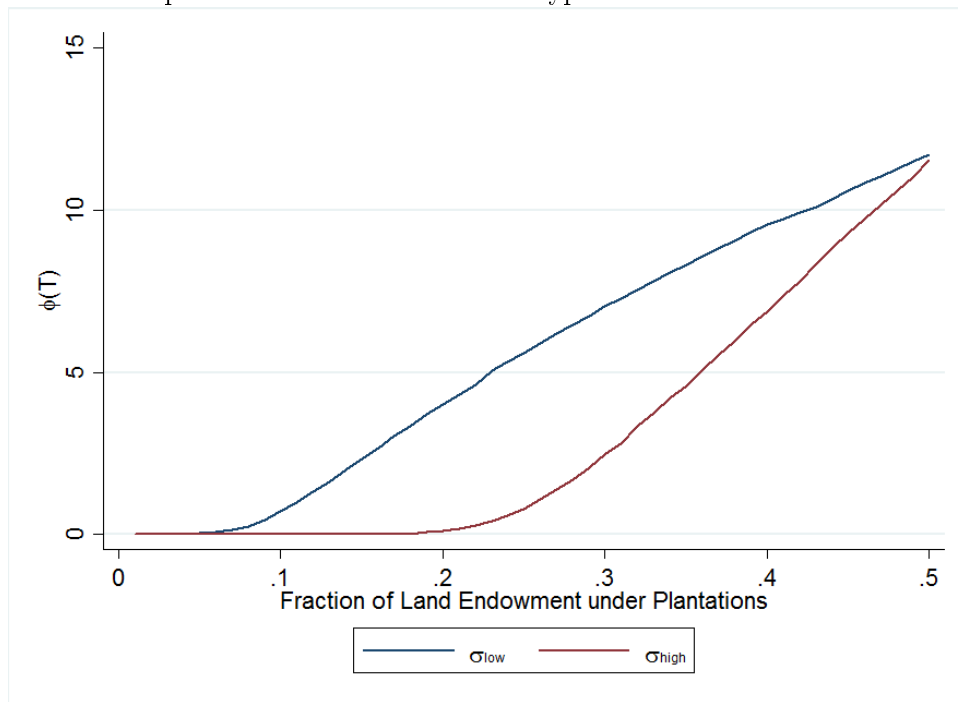
Notes: Figure gives the fraction of all cultivated land that occurs on each farm size.

Figure 2: Example of checkerboard holdings on a 100 hectare piece of land



Notes: Brown lines are contour lines; dashed lines are dirt roads.

Figure 3: Total transaction costs as a function of the fraction of the land endowment in the plantation sector, under different spatial distributions of tenure types



Notes: The simulation started with 10,000 hectares and randomly assigned occupants to every 100 hectares drawing from a normal distribution with mean μ and variance σ^2 . Any draws less than zero were assigned zero occupants. I assume transaction costs are proportional to the number of occupants on the land, and the transaction cost function then comes from starting with the land with the least occupants on it and moving up. The results in the graph come from averaging over 1,000 simulations.

Figure 4: Distribution of adopted plot size, 1928-1950

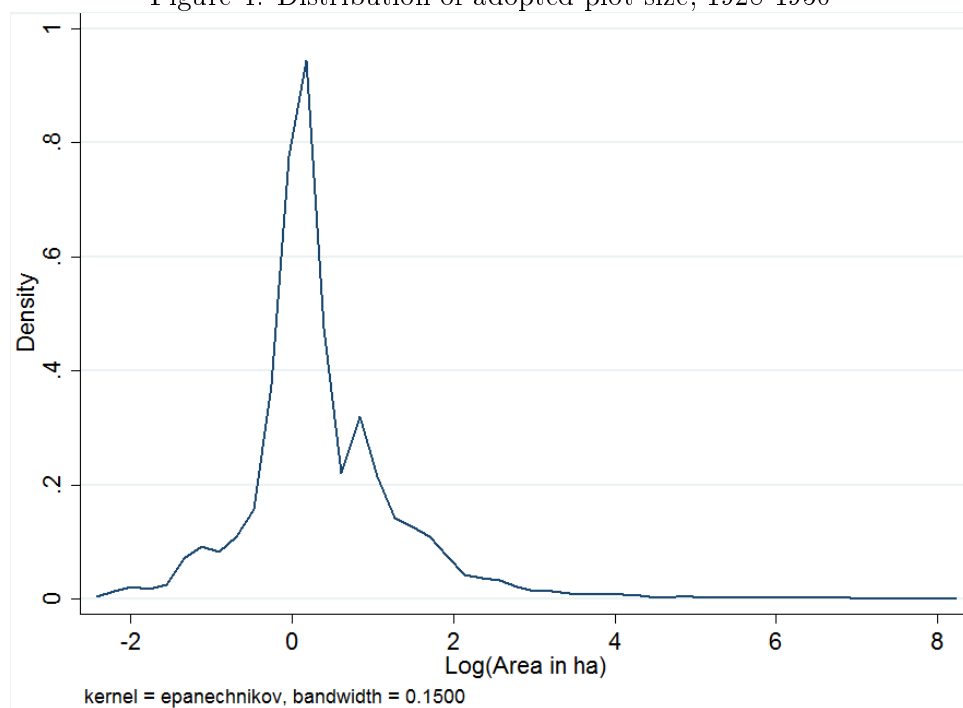
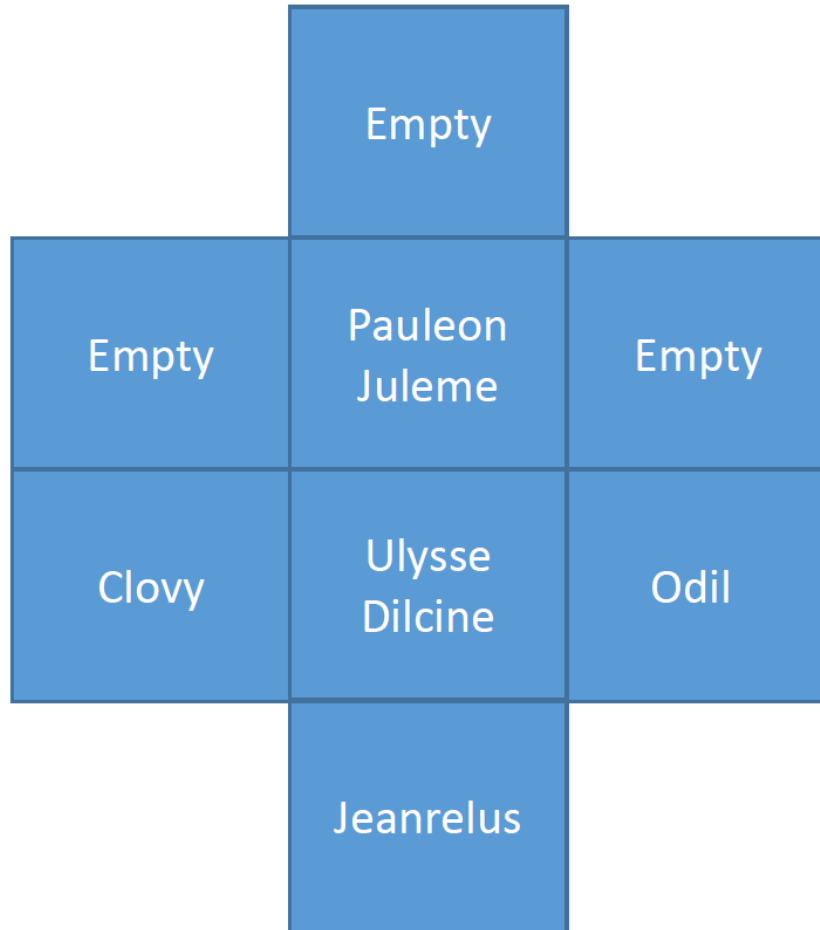


Figure 5: Stylized map of two announcements



Notes: The map is based off of two plot announcements, one for Pauleon Juleme and one for Ulysse Dilcine.

Figure 6: Treatment and control regions for the difference-in-differences analysis



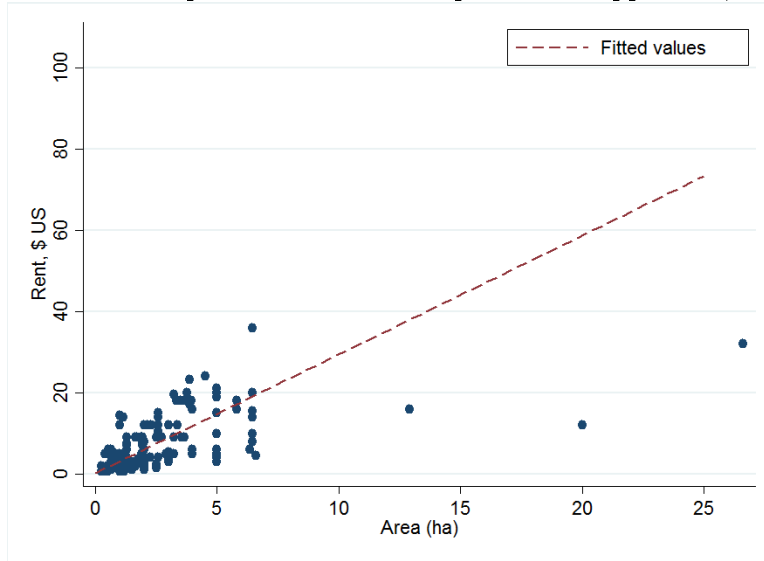
Notes: Border districts (in white) are districts that touch the Dominican border or hosted a refugee camp.

Figure 7: The effect of the Trujillo Massacre on rental plot requests per capita, 1928-1950



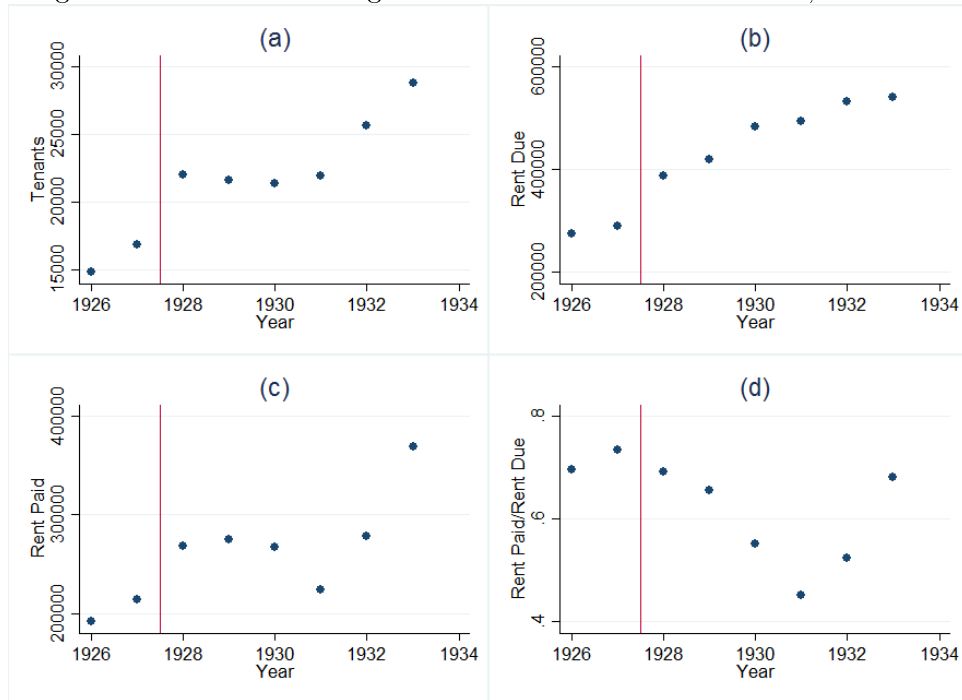
Notes: Border districts are any districts that touched the Dominican border.

Figure 8: Prices and plot sizes from a sample of land appraisals, 1928-1950



Notes: The projection line is based on the prices for plots under 5 hectares.

Figure 9: Land Rental Program Performance Around Reform, 1926-1933



Notes: (a) Number of tenants on state land. (b) Total rent due to the state. (c) Total rent collected. (d) Ratio of rent collected to rent due. Vertical red line indicates when the reform was passed.