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Historical origins of land rights insecurity and implications for conflict in Thailand

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Abstract

This article explores the historical origins of land rights insecurity and its implications for landlessness, poverty, and contemporary conflict in Thailand. The Siamese (now Thai) government adopted the Torrens system of land administration in 1901 as part of a larger strategy to curb colonial territorial expansion in Southeast Asia. Although the Torrens system is generally associated with strong property rights, its incomplete and uneven adoption led to widespread and long-running land rights insecurity and landlessness. This article presents two case studies that demonstrate these consequences. First, the expropriation of land through the exploitation of ambiguous land rights and the implementation of new land laws. Second, the long-run associations between land rights insecurity, low levels of productive investments in agriculture, and poverty. Consequent landlessness and poverty in agricultural communities have, in turn, led to recent protests and violence in Thailand.

On July 13, 1893, three French gunboats sailed past the Paknam fortress and continued up the Chao Phraya River to Bangkok. The ensuing skirmish between the French gunboats and Siamese land and naval defenses resulted in several French casualties. The French made demands for reparations, including the secession of territories that make up present-day Laos and Cambodia. The "Paknam Incident" was the culmination of growing tensions and sporadic armed clashes between French and Siamese forces over contested areas on Siam's eastern frontier. The massive territorial losses that resulted from the Paknam Incident reparations and the recognition that Siam could not match the military power of the French and British colonists became the catalyst for King Chulalongkorn to implement a multi-pronged approach to establish and maintain Siam's sovereignty. The approaches included centralizing the Siamese government, diplomacy, the establishment of Western-style territorial borders, and the adoption of several Western institutions in order to gain international legitimacy.[1]

This article considers the last of these strategies. In particular, we argue that the 1901 Land Title Deed Act adoption of the Torrens system of land administration, as a strategic response to threats to sovereignty, has had long-run implications for landlessness, smallholder agricultural investments, rural poverty, and contemporary conflict. This article builds upon previous work on historical legacies of adopting colonial institutions on modern economic outcomes. Although never directly colonized, it was the bid for international legitimacy that led the Siamese government to adopt certain Western colonial institutions.[2]

The traditional land rights system limited landholdings and encouraged smallholder landownership and cultivation. In contrast the 1901 adopted Western land rights system allowed for accumulation and concentration of land. However, the uneven implementation of the new land law left many households, who had secure rights under the traditional land rights system, without any clear rights after 1901. This ambiguity led to many landowners losing their land to wealthy individuals, politically powerful actors, and even the Thai government. Furthermore, ambiguous and

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insecure land rights disincentivized smallholders from making costly productive agricultural investments. This situation has led to present-day landlessness, rural poverty, and conflict.

This article begins by providing an overview of the historical connection between national security, the adoption of a Western land code, and resulting widespread land rights insecurity. It then presents two illustrative case studies. The first demonstrates landlessness resulting from the exploitation of ambiguous land rights. The second illustrates the long-run negative effects of land rights insecurity upon productive investments in agriculture. The article concludes with a discussion about the connections between historical national security, land rights insecurity, and poverty—plus their implications for recent conflict.

Historical background

In the second half of the nineteenth century, the British and French progressively annexed the majority of mainland Southeast Asia. The governance structure of Siam (now Thailand) was a decentralized "mandala" state. A mandala state is characterized by the existence of independent kingdoms that are defined by their span of control over people, not territorial borders. Smaller states would have their own hereditary leaders, taxation, and laws but often paid tribute in the form of taxes or manpower to more powerful mandala polities in the region. Bangkok was one of the primary mandala centers in Southeast Asia during the second half of the nineteenth century with direct control over *muang* (small principalities) close to Siam's central region, and varying degrees of indirect control over areas further afield.[3]

The decentralized nature of the mandala polity system proved to be a weakness in the face of British and French territorial expansion. The Europeans conceptualized control in terms of territory that could be depicted on a map, whereas control for the Siamese government was conceptualized as the span of control over people and resources. These different conceptualizations of control came into conflict. Without demarcated borders, the French and British progressively annexed physically distant kingdoms that were in tributary relationships with Bangkok and increasingly engaged in frontier conflicts with Siamese troops.[4]

In the face of colonial threat, Thailand adopted a Western land titling system to provide international legitimacy for the Kingdom's borders and interior. Land titling activities slowed significantly after 1909 and remains incomplete, leaving many with land rights insecurity. Poverty and conflict effects are still being felt today.

In a bid to curb colonial interests in the region, and establish Western style sovereignty, the Siamese government pursued a diverse set of strategic policies, including the promulgation of the 1901 Land Title Deed Act. The Act resulted in the adoption of the Torrens system of land administration with land titling based on cadastral surveys. The Siamese government adopted this Western land code both as a tool to establish Siam's international legitimacy as a modern nation, and also as a tool to limit colonial influence within Siam. In 1885, Britain's Bowring Treaty with Siam, and subsequent comparable treaties with other foreign powers, guaranteed extraterritorial rights to foreign residents residing within Siam's territory. This posed a significant problem for the Siamese government, since many residents in areas under Bangkok's influence claimed connections with kingdoms annexed by the British and French. This meant that land claims by "alien Asiatics" under Siam's traditional land rights system fell under foreign legal jurisdiction, effectively allowing the French and British to colonize Siam from within. The adoption of an internationally recognized Western land code accomplished two things: First, it made it difficult for foreign powers to refute ownership rights for individuals who now possessed land title deeds issued under an international standard; and second, it allowed the Siamese government to better control landownership by preventing land registration by foreign nationals.[5]

Siam's traditional land rights prior to 1901 were based on rights of usufruct. Households were free to claim unused land for cultivation. Once a household could prove to the government that they had made the land productive, the government would then issue a land deed that served as both an ownership document and a

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tax document. The household would retain rights to the land as long as they continued to cultivate the plot and paid annual taxes to the government. Land rights under the traditional system were secure and often upheld in court. Since the size of land claims were limited by how much households could comfortably cultivate, the land rights institutions in the nineteenth century resulted in a pattern of smallholder agriculture with many landowners holding modest-sized plots. There were few legal avenues under the traditional land rights system to make larger land claims and engage in plantation agriculture.[6]

The land rights bestowed on landowners after 1901 differed from traditional land rights in an important way. Land no longer needed to be utilized in the specific activities stated on the land deeds. For example, under the traditional land rights system, a landowner who was issued an orchard deed must utilize their land as an orchard, or else the landowner would risk competing claims by third parties or expropriation by the government. Deeds issued after 1901 under the Western land rights system guaranteed fully alienable rights with no land use restrictions. Thus, under the new system, a buyer could acquire unlimited (deeded) property within the land market. In the early twentieth century, the Government and government advisors expressed concerns that the new land laws would open up the possibility of foreign corporate land grabs that could potentially lead to the demise of Siam's smallholder agricultural economy. These concerns led to restrictions on new claims of unoccupied lands, but accumulation of land could still be achieved through the land market. Evidence of land accumulation through the market mechanism can be seen in Bangkok in the years immediately after the promulgation of the 1901 law. In a sample of over 10,000 orchard land deeds issued in Bangkok in the 1880s, 1,287 properties recorded transfers to new non-institutional owners between 1884 and 1909. Twenty percent of property owners for land purchased before the implementation of the 1901 law acquired more than one property. In contrast, 33 percent of owners who bought properties after 1901 acquired more than one, with one owner accumulating a total of 12 properties.[7]

After 1901, the Siamese government made a concerted effort to implement the law. Between 1901 and 1909, the government established 11 land offices (nine in the central region and two in the north) and was highly active in cadastral surveying, land registration, and issuing title deeds. Cadastral survey and land titling activities slowed significantly after 1909, coinciding with the decline of the colonial threat in the region following the 1909 treaty with Great Britain. It remained slow until the 1970s. It is argued that Siam's failure to complete the land registration process across Thailand was the product of insufficient state capacity at the central level and, given that property rights enforcement and land tax collection on *unregistered* land occurred at the local level, that there were few incentives for local officials to encourage land registration. By the mid-twentieth century most land in Thailand still remained untitled, despite the fact that full ownership rights could now only be bestowed following a survey and registration with the central land registry. In fact, only 12 percent of land had full title deeds and 65 percent had no documentation (i.e., tax receipts) at all. Furthermore, by 1970, less than 5 percent of all land had been surveyed in areas outside of central Thailand, meaning that most of the country continued to have ambiguous land rights.

In all, the ability to accumulate land under the Western land code coupled with widespread land rights insecurity (stemming from the incomplete implementation of the land law), laid the foundation for land loss and disincentivized smallholders from making productive land investments. These processes are illustrated in the two case studies below.[8]

Case study 1: Exploitation of ambiguous land rights in Nakhon Nayok

The lack of central government capacity and the complexity of registering land meant that most land occupants were unable to acquire new survey-based title deeds. Landowners unable to secure proper land registration were at risk of losing their land claims due to insufficient documentation. The following early twentieth-century case between the people of Nakhon Nayok province and the Siam Canals, Lands and

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Irrigation Company emphasizes the risk of land loss for such landowners.[9]

The case began in 1916 when the people from two districts in Nakhon Nayok province filed a complaint with the Ministry of Agriculture. The complaint alleged that local government authorities, along with individuals associated with the Siam Canals, Lands and Irrigation Company, ejected many households from their land and prevented people from having any further access to their property. During the investigation, multiple individuals stated that they had been farming their respective land plots for a decade or more and had always paid their yearly land taxes to the local government authority (this was later corroborated by the village headmen). The company dug canals in the area and demarcated plots of land in the canal's vicinity at the beginning of the project. At the conclusion of the canal construction, they did not conduct any further work or maintenance on the canals and the farmers continued to cultivate their land as they always had. However, a decade later, the company returned to demand rent from farmers.[10]

The company's land claims were based on the conditions of the original contract signed with the government in 1904. Two provisions led to the land dispute with the Nakhon Nayok community. First, the government granted the company unoccupied land up to 1.6 kilometers on either side of the canal. Second, where land was already occupied, the company could not displace the original occupants, but could charge a fee of THB 4 per *rai* (1,600 square meters) for digging the irrigation canal. These conditions, guaranteeing future income through land sales and fees, were included as enticements to invest in the irrigation canal project.

The problem facing the farmers in 1916 was proving that they occupied the land at the time the company signed its contract with the government. Under the traditional land rights system, occupancy and cultivation for a period of time were sufficient to establish land rights. After 1901, proof of ownership required land registration, but the government had failed to survey and issue title deeds to the occupants of Nakhon Nayok. Taking advantage of the farmers' land rights insecurity, the company evicted them from their farmland in order to resell the land.

In this example we see how the ineffectual implementation of the 1901 Land Title Deed Act failed to provide its intended secure land rights. Instead it caused land rights insecurity and landlessness for many farmers—a situation exploited by both private and state actors.

The following case study develops this by considering the implications of land rights insecurity on agricultural investment.

Case study 2: Agricultural land investments under land rights insecurity

The progress of surveys and the issuance of land deeds post-1909 was slow and occurred mostly in places that were in close proximity to existing land offices—leaving the majority of Thailand's agricultural land insecure and without official title throughout the twentieth century. In consequence, agriculturists who perceive their land rights as insecure tend to make fewer productivity-enhancing investments. This in turn has negative implications for agricultural output and income for farm households.[11]

Historically in Thailand, the traditional usufruct land rights were perceived as secure and encouraged significant long-term investments during the nineteenth century, such as in orchard crops (particularly among women). Following the ownership uncertainties created by the incomplete implementation of the 1901 land code, a program known as SPK4-01 was instigated in 1975. This program issued partial land rights deeds and was followed by observable increases in productive investments in agricultural land.[12]

To demonstrate the long-running negative relationship between productive agricultural investments and land rights insecurity (stemming from the uneven and incomplete implementation of the 1901 land code), the authors analyzed behavior in 1965 (i.e., prior to SPK4-01). The details of this analysis can be found in Appendix A. In short, distance from early land offices was used as a proxy for the likelihood of having title, and irrigation as a proxy for productive agricultural investment. The analysis indicated that:

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- In the central region of Thailand, for every 10 kilometers further a district is located from an early land office, the proportion of agricultural land that is irrigated drops by 1.6 percent.
- Districts in the central region located further away from early land offices have smaller average landholdings.

This negative correlation between land rights insecurity/ability to accumulate larger landholdings and agricultural investment clearly implies negative implications for agricultural earnings and the welfare of those reliant upon them.

Long-run implications for poverty and land-related conflicts

The case studies presented above demonstrate how the uneven and incomplete implementation of the Western land code has led to land loss and dampened agricultural investments in areas that were largely excluded from early land titling activities. Increasing landlessness and growing economic difficulties stemming from land rights insecurity that has its origins in colonial-era land laws has potentially led to higher levels of poverty in areas excluded from land titling activities and, ultimately, incidents of unrest.

The regression results summarized in the previous section (and detailed in Appendix A) suggest lower levels of agricultural investments in areas that were less likely to gain land titles. Taking this result to its logical end, one would expect higher levels of rural poverty in areas with fewer land titles. Through the analysis described in Appendix B, this article shows that, indeed, on average rural poverty today is 0.2 percentage points higher for every 10 kilometers further a district is located from an early land office.

Given the relationship between land rights and poverty, it is not surprising that there have been several incidents of unrest and violence related to land rights in recent decades. For example, in 1974, thousands of farmers from the north and central regions organized a march to Bangkok demanding that the government address persistent issues of landlessness, high agricultural land rents, and a poor agricultural market. Although the government responded to the protesters by introducing price and rent controls, the measures were not fully implemented and the root causes of farmers' difficulties were not addressed.[13]

A second example illustrates conflict stemming from land appropriation through the exploitation of ambiguous land rights. Landless villagers in Buriram Province (400 kilometers northeast of Bangkok) were granted cleared forest land by the government in exchange for their cooperation during the communist insurgency in the 1970s. However, the government never granted formal land titles to the villagers, leaving their land rights unclear. In absence of documentation, the villagers were forced off the land to make way for a private company to commercially cultivate eucalyptus trees under a concession awarded by the government in the 1980s. After multiple clashes between the villagers and the local government, as well as sabotage of the commercial plantations, a group of 4,500 individuals marched to Bangkok to demand justice—eventually leading the government to suspend the eucalyptus program in 1992.[14]

The following final example demonstrates the complexities of solving the problem and the violence that can erupt. The Klong Sai Pattana community in Surat Thani sued Jiew Kang Jue Pattana Co Ltd palm oil company in 2005 for illegal trespassing and land encroachment upon the community. The company lost the case at both the provincial and supreme courts in 2007 and 2014. During this period, four people were murdered and others injured by gun violence linked to the dispute. After the success of the first court case, hundreds of landless farmers promised land allotments settled on the disputed land, began to build houses, and grow small crops. However, the stage was set for continuing disputes and violence when, in 2016, the Agricultural Land Reform Office decided to redistribute the land to landless individuals who had registered for land allocations in Surat Thani. Without proper land registration, the villagers who had won the court battle now faced eviction again. To date, the case has not been resolved.[15]

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Conclusion

This article explores Siam's adoption of a Western land code as part of a strategy to establish sovereignty under the threat of French and British colonization, and its implications for long-run land rights insecurity, contemporary poverty, and conflicts over land in Thailand. The promulgation of the 1901 Land Title Deed Act introduced the prospect for landowners to accumulate large tracts of land—something impossible under the traditional land rights system. However, the incomplete implementation of the 1901 law introduced land rights insecurity to households who were not issued title deeds for their land. This left them vulnerable to land loss and less likely to make productive agricultural investments. Such issues have led to economic hardship and inevitably triggered conflict and violence that continues to this day.

Various Thai government regimes have recognized the problems of landlessness and economic hardships facing agricultural households as a result of land rights insecurity. Several policies have been proposed and implemented to remedy problems caused by incomplete land titling in Thailand, including the introduction of partial land rights (SPK4-01) in the 1970s, rent controls, and community land rights schemes. There is evidence that these schemes have positive outcomes for the targeted agricultural communities *where these schemes are applied*. However, the problem of widespread landlessness and land rights insecurity persists, and reneged promises concerning land rights across administrations continue to be a problem. It is now over a century since the colonial threat passed, yet its mitigation has led to conflict ever since, which, without a solution, will likely continue.[16]

Notes

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1. Present day: Terwiel (2005, p. 212). Centralizing: Bunnag (1977); Paik and Vechbanyongratana (2019). Diplomacy: Jeshurun (1970). Borders: Winichakul (1994). Institutions: Larsson (2012).
2. Torrens: Under the Torrens system, ownership is based on a cadastral survey and land title recorded in a central land registry. The "title deed" is a document issued by the government that refers to a plot's registration in the registry, but does not act as proof of ownership on its own. In this article, possession of title deeds refers to complete registration in the central land registry. Previous work: The seminal paper by Acemoglu, Johnson, and Robinson (2001) shows that weak property rights institutions introduced by colonizers have had long-run negative effects on the economic development of former colonies. In the same vein, Nunn (2007) develops a theoretical model that shows that extractive activities accompanied by weak property rights enforcement under colonial rule can lead to a constant state of low production in the post-colonial period. Empirical work by Bertocchi and Canova (2002) on post-colonial economic growth in Africa is consistent with Nunn's model predictions. A directly related micro-level study by Banerjee and Iyer (2005) finds that land institutions established in India by the colonial government favoring landlords over smallholders had negative effects on agricultural investments and output, as well as negative long-run implications for education and health. Similar to Banerjee and Iyer (2005), the Western land rights institutions adopted in 1901 represent a structural break from traditional land rights institutions, potentially having long-run implications on Thailand's economy. Legitimacy: Larsson (2012).
3. Tambiah (1977); Wolters (1999).
4. Winichakul (1994).
5. Larsson (2007; 2012). In fact, the land title deeds issued after 1901 explicitly state that landowners are "subjects of Siam".
6. Traditional system: Chankrajang and Vechbanyongratana (2017; n.d.). Plantation agriculture: Feeny (1982).
7. Land grabs: Larsson (2007, pp.789–797). Orchards: Chankrajang and Vechbanyongratana (2017). Multiple

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purchases: Authors' calculation based on the dataset used and described in Chankrajang and Vechbanyongratana (2017).

8. Efforts: Feeny (1982). Failure: Vandergeest and Paluso (1995). Titling: Ingram (1971). Documentation: Ingram (1971, p. 266); Feeny (1982, p. 97). Five percent: Vandergeest and Peluso (1995).

9. The case file is part of the document collection at the Department of Lands Museum under the Ministry of Interior in Bangkok, Thailand. The 268-page report details the "Thung Nakhon Nayok Project"—an irrigation canal project initiated by the Siam Canals, Lands and Irrigation Company in the province of Nakhon Nayok at the beginning of the twentieth century. The report consists of correspondence letters between experts, company officials, government officials, and official testimonies of villagers and village headmen. Nakhon Nayok province is located approximately 110 kilometers northeast of Bangkok.

10. Land tax receipts for taxes paid to the local government officials are often used as proof of landownership at the local level in the absence of government-issued land deeds. See Vandergeest and Paluso (1995).

11. 1909 treaty: Larsson (2012). Productivity: For example, Deininger and Jin (2006) find that perceived land security is associated with productivity enhancing land terracing in Ethiopia. Gavian and Fafchamps (1996) find that manuring is more prevalent on owned versus rented land in Niger. In an attempt to harmonize often conflicting results for West Africa, Fenske (2011) shows a general positive relationship across nine datasets between tenure security and fallowing and tree planting.

12. Usufruct: Chankrajang and Vechbanyongratana (n.d.). Investment: Feder et al. (1988); Chankrajang (2015).

13. Baker and Phongpaichit (2009).

14. Land grant: Dechalert (1999); Suspension: See Phongpaichit and Baker (1995).

15. Tang (2016),

16. For examples of positive outcomes Chankrajang (2015) and Chankrajang (2019).

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Appendix A: Analysis of prevalence of land title versus agricultural investment

We relate the prevalence of titled land to the magnitude of productive agricultural investments at the district level in 1965. The year 1965 is chosen because it is prior to a major change to the land law in 1975 that introduced partial land rights (SPK4-01) that provided households with land rights security (reduced expropriation risk), but did not allow for the sale or transfer of land. This is also the first year (to our knowledge) that district-level data is available on irrigated agricultural land (specifically the proportion of agricultural land within a district that is irrigated), which can be used as a proxy for productive agricultural investments across Thailand. While the government invested in several large-scale irrigation projects in the Central Plain in the late-nineteenth and early twentieth centuries, individual farmers still needed to cut smaller channels to join up with the canal ways or rivers. Thus, the percentage of agricultural land that is irrigated should largely capture average productive investments made by individual agriculturalists. Ideally one would compare agricultural investments before and after the implementation of the 1901 land law. However, since Thailand's territories were not fully brought under centralized control until 1915 (Bunnag 1977), systematic sub-national data covering the whole country are not available.

Unfortunately, 1960s land titling data at the district level is difficult if not impossible to obtain. In absence of direct measures of land titling, we use two historical facts to construct a proxy for the likelihood that land would be cadastral surveyed and granted a land deed. First, we know from Larsson (2012) that after 1909 cadastral survey and titling declined significantly and funding for land administration declined sharply. Also, Feeny (1982, p. 97) states (1982, p. 97), "[t]he land titling system…has not been successfully applied to all areas, but has been more successful in the area where it was first applied—the Central Plain". Thus, we use a district's distance to the closest government land office established by 1909 as a proxy for the likelihood that a land deed would be issued for land in that district. The early government land offices include: Bangkok, Ayutthaya, Chonburi, Nakhon Chaisi, Chachoengsao, Prachinburi, Phichai, Phitsanulok, Supanburi, Lopburi, and Angthong (Feeny 1982, p. 97). With the exceptions of Phichai and Phitsanulok in the north, all early land offices were established in the central region, which was the area under direct political control of Bangkok at the turn of the twentieth century. Early land offices were not established in peripheral areas located in formerly autonomous tributary states.

We control for geographic factors that are normally associated with irrigation, including the prevalence of agriculture in the district, distance to the nearest river, elevation, and the standard deviation of elevation. We also control for variables correlated with market access, which can influence the decision to make productive agricultural investments, including population density, distance to the provincial capital, distance to the coast, and an indicator for railway access. With nine out of the 11 early land offices located in the central region, it is clear that the distribution of early land offices across Thailand is not random. In part this is due to the fact that the Bangkok government did not have direct control over many areas outside the Central Plain as late as 1915 (Bunnag 1977). Also, the central region close to Bangkok was primarily engaged in rice cultivation due to its favorable geography and climate combined with its greater integration with world markets. Feeny (1982) argues that the lucrative and growing rice export market in the second half of the nineteenth century resulted in demand for land rights by elites in the central region. Since selection is a concern, we run two additional specifications that (1) considers only provinces located in the central region, and (2) considers provinces located in the central region of Thailand that had early land offices. The central region includes the following provinces: Samut Prakan, Nonthaburi, Pathum Thani, Ayutthaya, Ang Thong, Lop Buri, Sing Buri, Chai Nat, Saraburi, Chon Buri, Rayong, Chanthaburi, Trat, Chachoengsao, Prachin Buri, Nakhon Nayok, Sa Kaeo, Ratchaburi, Kanchanaburi, Suphan Buri, Nakhon Pathom, Samut Sakhon, Samut Songkhram, Phetchaburi, and Prachuap Khiri Khan. Bangkok is excluded from the analysis. Summary statistics for the full and select samples are reported in Table A1.

In 1965, on average 36 percent of land in each district was used for agriculture in Thailand, of which 47 percent

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was irrigated. As expected, the values for the rice-growing central region are higher than for the country as a whole: on average 59 percent of land in each district was used for agriculture, 56 percent of which was irrigated in each district. Also as expected, due to a lack of land offices established in peripheral areas under tenuous control by Bangkok, the average distance to a land office for the entire sample is 245 kilometers, compared to only 56 kilometers in the central region that was under direct Bangkok control at the turn of the twentieth century.

Table A1: Summary statistics

	All Districts	*Central Region*	*Provinces in Central Region with Early Land Offices*	*Sources*
Irrigated Agricultural Land (% of Total Agricultural Land)	46.842 (33.984)	56.386 (36.241)	64.475 (31.673)	NSO, USOM, DLA (1965)
Average Size of Agricultural Landholdings (Rai)	22.275 (13.294)	27.180 (9.525)	28.695 (8.486)	NSO, USOM, DLA (1965)
Distance to Closest Early Land Office (10s kms)	24.528 (21.997)	5.550 (5.704)	2.119 (1.431)	Feeny (1982); ICTC (n.d.)
Agricultural Land (% of Total District Land)	35.773 (28.627)	58.627 (33.88)	70.639 (31.757)	NSO, USOM, DLA (1965)
Distance to River (km 10s)	0.482 (0.516)	0.343 (0.378)	0.33 (0.415)	ICTC (n.d.)
Elevation (m)	192.950 (196.584)	67.795 (108.11)	35.781 (64.316)	ICTC (n.d.)
Standard Deviation of Elevation	89.465 (93.537)	54.367 (82.247)	27.398 (52.516)	ICTC (n.d.)
Population Density	95.251 (137.485)	149.966 (131.919)	162.382 (106.111)	NSO, USOM, DLA (1965)
Distance to provincial center (km)	10.361 (17.560)	6.057 (16.486)	4.707 (7.882)	ICTC (n.d.)
Distance to Coast (km 10s)	17.601 (13.404)	7.326 (5.304)	8.566 (4.607)	ICTC (n.d.)
Railway Indicator	0.283 (0.451)	0.379 (0.487)	0.344 (0.479)	Whyte (2010)
Observations	512	153	61	

Notes: The table reports means and standard deviations (in parentheses) for variables used in the regression analysis. Bangkok is excluded. NSO is National Statistical Office; USOM is United States Operations Mission; DLA is Department of Local Affairs; ICTC is Information and Communication Technology Center (Thailand).

To test the relationship between titled land (proxied by distance to the nearest early land office) and the share of agricultural land that was irrigated in a district, we run the following ordinary least squares (OLS) regression. Standard errors are clustered at the provincial level for the full sample. Robust standard errors are used for the select sample due to a small number of provincial clusters.

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$$irrpc = \alpha_0 + \alpha_1 dist + A'\beta + M'\gamma + \varepsilon$$

The variable *irrpc* is the percentage of a district's agricultural land under irrigation, *dist* is the distance in kilometers to the nearest early land office, *A* is a vector of geographical variables related to irrigation, and *M* is a vector of variables that capture market access described above. The results are reported in Table A2.

The first specification includes all districts in Thailand. The coefficient estimate indicates that for every 10 kilometers further from a land office a district is located, the area of farmland that is irrigated is reduced by 0.29 percent. Due to Thailand's geographic and agricultural heterogeneity, many agricultural crops in peripheral parts of the country may have different irrigation needs. Also, as discussed above, the concentration of early land offices in the central region causes concern about selection. To address these concerns, we limit the sample to the central region in the second specification. By limiting the sample to the central region, the coefficient estimate for the distance to an early land office increases in magnitude to -1.6. This means that for every 10 kilometers further a district is located from a land office, the proportion of agricultural land that is irrigated drops by 1.6 percent. The mean distance from a land office is 55.5 kilometers, which translates to 8.9 percent less agricultural land under irrigation than a district with a land office. Finally, we look at only the eight provinces in the central region that had early land offices. Conditional on an early land office being established within the same province, a district located 10 kilometers from a land office on average has 11.5 percent less irrigated agricultural land.

In absence of direct measures of land titling, the negative relationship between the distance from a land office and irrigated agricultural land is suggestive that land rights insecurity is associated with lower levels of productive agricultural investment. This result is consistent with recent work by Chankrajang (2015) that finds a positive relationship between agricultural investments and the strengthening of land rights security through the SPK4-01 program introduced in 1975 and accelerated in the 1990s. The long-run negative correlation between land rights insecurity and productive agricultural investments has implications for agricultural earnings and welfare. Agriculturalists without land rights and few avenues to achieve secure rights will have fewer incentives to make productive investments, which in turn leads to lower productivity and output, putting farmers with ambiguous or insecure land rights at a perpetual earnings disadvantage.

Another potential mechanism for the observed relationship between close proximity to land offices and higher irrigation investments is through land accumulation and efficiencies that come with farming at a larger scale. As argued earlier, land accumulation and large-scale farming became possible in areas where land titles were issued. The 1965 district-level data from the agricultural census provides figures on average agricultural landholdings. Model 4 reported in Table A3 suggests that districts in the central region located further away from early land offices have smaller average landholdings. Likewise, the raw correlation (not reported) between average size of agricultural landholdings and the proportion of agricultural land under irrigation is positive, providing evidence of enhanced agricultural investments in areas where large-scale farming was possible in the mid-twentieth century.

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Table A2: Proximity to early land offices and prevalence of irrigated farmland, and average agricultural holdings, 1965

	(1)	*(2)*	*(3)*	*(4)*
	Dependent Variable: Irrigated Agricultural Land (% of Total Agricultural Land)			*Dependent Variable: Average Size of Agricultural Landholdings (Rai)*
	All Districts	*Central Region*	*Central Region Provinces with Early Land Offices*	*Central Region*
Distance to Closest Early Land Office (10s kms)	-0.287*** (0.095)	-1.602*** (0.511)	-11.459*** (4.131)	-0.354*** (0.110)
Agricultural Land (% of Total District Land)	0.481*** (0.079)	0.406*** (0.076)	0.359*** (0.109)	0.094*** (0.023)
District Distance to River (km 10s)	-7.303*** (2.594)	-13.788** (6.545)	-16.562** (7.021)	-5.221*** (1.022)
Elevation (m)	0.082*** (0.016)	0.079 (0.056)	0.142 (0.218)	-0.037*** (0.010)
Standard Deviation of District Elevation (m)	0.009 (0.032)	-0.141** (0.071)	-0.285 (0.247)	0.028* (0.016)
District Population Density	0.023 (0.015)	0.027 (0.017)	-0.060* (0.035)	-0.063*** (0.009)
Distance to provincial center (km)	-0.122 (0.087)	0.239 (0.181)	0.985 (0.647)	0.033 (0.030)
District Distance to Coast (km 10s)	-0.437** (0.187)	-0.348 (0.499)	0.349 (0.795)	-0.147 (0.104)
Railway Indicator	-2.103 (4.534)	-1.184 (4.752)	5.665 (6.432)	1.498 (1.130)
Constant	30.769*** (8.240)	45.938*** (9.426)	71.682*** (15.938)	36.172*** (1.978)
Observations	512	153	61	153
Adjusted R-squared	0.257	0.474	0.399	0.481

Notes: The table reports ordinary least squares regression coefficients, and clustered standard errors at the provincial level (specification 1) and robust standard errors (specifications 2 through 4) in parentheses. *** p<0.01 ** p<0.05 * p<0.1.

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Appendix B: Proximity to early land offices and prevalence of rural poverty

Table B1 provides OLS regression results showing the relationship between the proximity to an early land office and the percentage of the rural population in a district that is deemed to be below the government's poverty line in 2017 (National Statistical Office 2020).

Table B1. Proximity to early land offices and prevalence of rural poverty, 2017

	(1)	*(2)*	*(3)*
	Dependent variable: Percentage of rural district population living in poverty		
	All Districts	*Central Region*	*Central Region Provinces with Early Land Offices*
Distance to Closest Early Land Office (10s kms)	0.019 (0.015)	0.204*** (0.029)	0.230 (0.207)
Proportion of District Households in Agriculture	0.860 (1.026)	1.241 (0.996)	1.826 (1.337)
District Distance to River (km 10s)	0.037 (0.248)	0.223 (0.292)	0.447 (0.349)
District Elevation Mean (m 100s)	0.604*** (0.204)	0.013 (0.521)	-1.441 (1.125)
District Elevation Standard Deviation	0.002 (0.003)	-0.000 (0.006)	0.021 (0.014)
District Population Density	-0.000 (0.004)	0.003* (0.002)	0.003 (0.004)
Distance to Amphoe Muang District (km 100s)	0.597 (1.149)	0.634 (0.848)	-3.412 (2.567)
District Distance to Coast (km 10s)	-0.019 (0.024)	0.372*** (0.029)	0.380*** (0.039)
District Railway Indicator	-0.058 (0.342)	-0.635** (0.320)	-0.453 (0.391)
Constant	2.444** (0.961)	-1.488** (0.603)	-1.533 (1.017)
Observations	862	207	79
Adjusted R-squared	0.200	0.582	0.626

Notes: The table reports ordinary least squares regression coefficients, and clustered standard errors at the provincial level (specification 1) and robust standard errors (specifications 2 and 3) in parentheses. *** p<0.01 ** p<0.05 * p<0.1.

The results for the central region show a positive relationship between distance from an early land office and the percentage of rural inhabitants in a district living below the government mandated poverty line. The coefficient on the distance variable for the central region is 0.204. This implies that on average poverty increases by 0.204 percentage points for every 10 kilometers further a district is located from an early land office. The average rural

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poverty rate at the district level in the central region is 3.9 percent, thus this persistent relationship between less access to land titling and rural poverty is not negligible.

For information, the summary statistics for table B1 are given in table B2 below:

Table B2. Summary statistics for table B1

	All Districts	*Central Region*	*Provinces in Central Region with Early Land Offices*	*Sources*
Percentage of District Population Below Poverty Line in 2017	4.592 (3.088)	3.589 (2.907)	3.526 (2.589)	NSO (2020)
Distance to Closest Early Land Office (10s kms)	26.434 (21.033)	6.219 (5.849)	2.752 (1.988)	Feeny (1982); ICTC (n.d.)
Percentage of Households in Agriculture in 2011	63.966 (20.499)	44.718 (21.275)	43.372 (18.456)	NRD (2011)
Distance to River (km 10s)	0.589 (0.583)	0.485 (0.532)	0.425 (0.495)	ICTC (n.d.)
Elevation (m)	2.005 (1.907)	0.757 (1.089)	0.434 (0.700)	ICTC (n.d.)
Standard Deviation of Elevation	84.29 (93.549)	58.249 (80.597)	30.837 (54.399)	ICTC (n.d.)
Population Density in 2011	83.622 (60.134)	111.083 (92.167)	120.224 (79.659)	NRD (2011)
Distance to provincial center (km)	0.149 (0.205)	0.102 (0.200)	0.083 (0.115)	ICTC (n.d.)
Distance to Coast (km 10s)	19.76 (13.600)	7.723 (5.517)	9.053 (5.136)	ICTC (n.d.)
Railway Indicator	0.206 (0.405)	0.306 (0.462)	0.287 (0.455)	Whyte (2010)
Observations	869	209	80	

Notes: Standard deviations reported in parentheses. Bangkok is excluded. NSO = National Statistical Office; NRD = National Rural Development Survey, Ministry of Interior; ICTC = Information and Communication Technology Center (Thailand).