Why Pay The Chief?

Land Rents and Political Selection in Indonesia

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Abstract

Much of modern development efforts are channeled through traditional local governance. Yet, despite their importance as politician-bureaucrats, local leaders are rarely paid a living wage. This paper studies the effect of awarding chiefs cultivation rights over village rice land, a stable revenue generating asset, during their term of office. I use a fuzzy spatial regression discontinuity design to exploit a historical natural experiment in Java where in the nineteenth century a homogeneous region was split, and in one part chiefs were awarded cultivation rights but not in the other. To measure political outcomes, I collect original data from the field tracing the modern electoral history of 931 chiefs in 193 villages. Higher land rents cause positive chief performance and economic development. Chiefs raise more funds and construct more public goods such that areas under their control are richer and more developed even today. I find evidence consistent with historically positive political selection as a key mechanism. Higher rents attracted better quality chiefs in the past. These chiefs were so effective at educational provision that the entire village today remains more educated. As a result, despite higher land rents attracting a higher quality pool of candidates today, neither candidates nor chiefs today are more selected compared to the average villager. Instead, positive development outcomes today are shaped by the selection of chiefs whose interests are aligned away from supra-village elite interests. Overall, my findings provide evidence that paying local leaders from a stable source of local revenue can be good for economic development.

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1 Introduction

> "*(Kami) tidak ada bengkok tapi kerja sampe bengkok.* We (in this village) don't have *bengkok* (crooked) land but we've worked (all our lives) until our backs are bent."
>
> - Pak Acep (Rice farmer, Sumberjaya village)

Traditional local leaders are important for rural development. They perform state-like functions and are responsible for development in rural areas where modern state bureaucracy does not exist. Yet, positions of traditional local leadership are rarely paid and local leaders are typically appointed to de facto or de jure hereditary positions. The absence of these features of modern governance poses a central challenge to development economists: despite the association between local leaders and underdevelopment (Acemoglu et al., 2014; Anderson et al., 2015; Banerjee and Iyer, 2005), there are few settings in which we can study how increasing rents might improve local governance. Variation in rents alone is also insufficient. For higher rents to have any bite, we need robust selection mechanisms to be in place. More broadly, we have no clear evidence on the long-run effects of higher political pay on the performance of executive leaders at any level (Besley, 2005; Dal Bó and Finan, 2018; Besley, 2004). This challenge is further compounded by the lack of systematic data on compensation and characteristics of individuals who stand for office in rural village settings.

My paper answers the following question: In the context of locally elected leaders, how do persistent differences in political land rents affect performance and long-run economic development? Using a fuzzy spatial regression discontinuity design, I find that higher rents cause better chief performance and entire villages are richer and more developed even today. Ex ante, however, the effect of higher rents on development is ambiguous. On one hand, much of the literature has documented the widespread capture of public goods or civil society by traditional local leaders (Acemoglu et al., 2014; Anderson et al., 2015; Banerjee and Iyer, 2005). In these settings of weak state capacity, higher rents might simply lead to greater capture and worse development. On the other hand, higher rents in urban municipalities are associated with positive performance of city legislators and mayors. Increases in rents cause positive selection of Italian mayors who reduce the

size of municipal government (Gagliarducci and Nannicini, 2013). Similarly, higher rents lead to positive selection of Brazilian municipal legislators who construct more public goods (Ferraz and Finan, 2009b). Due to the short time horizon, however, these papers do not examine downstream impacts on economic development. My contribution is to clearly identify how higher rents for local leaders drive long-run economic development.

I do so by studying a historical natural experiment in which cultivation rights over village rice land, or *tanah bengkok*, were awarded to village chiefs in Indonesia. Chiefs, in turn, are obligated to sharecrop or lease out the land to villagers at fixed prices and sales from the rice harvest serve as their rents from office. My analysis focuses on plausibly exogenous variation in higher rents that arose during the Dutch Cultivation System where some, but not all, chiefs were awarded *bengkok* rights in return for enforcing the cultivation of export crops.[1] Furthermore, Indonesia is well-suited to studying the effects of higher rents. It is one of the few countries with genuine elections at the village level. Chief elections were introduced by Dutch colonial powers in the early nineteenth century and, under Dutch rule, chiefs were elected to positions for life. In 1979, however, national laws were amended and chiefs today are elected to fixed terms of 6-8 years each. The absence of re-election incentives before 1979 will be crucial for interpretation of later results.

Research on local governance is often stymied by limited data.[2] To explore political outcomes, I build an original dataset of modern village electoral history (1979-2014) from oral and written histories of 931 chiefs in 193 villages collected through thousands of hours of in-depth qualitative interviews. The final dataset includes detailed biographical information on all 2,297 candidates who ever ran for village office including education and previous occupation. I combine my survey data with administrative data to capture measures of chief performance and village development.

Specifically, I study the effects of differences in *bengkok* rights across a historical border – between two Dutch administrative units of Priangan and Cirebon – in West Java that arose due to Dutch perceptions of differences in traditional systems of remuneration. Crucially, this border did not exist prior to Dutch intervention. A frontier region, the entire Priangan-Cirebon border was

[1] It is well-documented that the largest and worst incidences of famine in colonial Java occurred during this time period as farmers were forced to give up land and labor for the cultivation of lucrative cash crops for Dutch export. See, amongst others, Van Niel (1972) and Fasseur (1992) for an overview of the impact of the Cultivation system on Java. Notably, Dell and Olken (2017) documents positive modern-day development outcomes arising from persistence in Dutch infrastructure constructed during the Cultivation System.

[2] An exception is Acemoglu et al. (2014) that collected detailed oral histories on the families of all paramount chiefs in Sierra Leone.

relatively homogenous with little village administration and no history of *bengkok*. It was only with the need to streamline administration that the region was split into two parts, and lacking knowledge on the interior of Java, the Dutch simply drew borders based on salient geographical features. These arbitrary borders, however, formed the basis for the differential reward and persistence of *bengkok* rights throughout Cirebon but not in Priangan. *Bengkok* was imposed up to the borders of Cirebon due to the pre-existence of *bengkok* practices in *central* Cirebon. *Bengkok* was not extended across the border to Priangan because it did not exist anywhere there and was deemed foreign to natives. These differences in bengkok and land rents still exist today and leaves us with both a treatment and control group.

The Dutch drew much of the border following salient geographical features of mountains and rivers. To address potential confounding factors from differences in geography, I focus exclusively on the southern portion of the historical boundary that transects mountain ranges, and I show that villages along this border are balanced on pre-determined geographical characteristics and rice fertility. Historical evidence suggests that variation in *bengkok* rights was the only difference in historical colonial policy across my study border. To address concerns regarding other possible cross-border differences in colonial policy, I digitize 1853 and 1945 Dutch Colonial maps and show that my results are robust to controlling for any differences in historical colonial infrastructure investment. Relatedly, the historical colonial border lives on as a modern-day district administrative border. Qualitative fieldwork, however, suggests that there were no differences in the extent to which district governments provided public goods to rural villages. I investigate this using detailed local roads data and I show that there continue to be no modern-day differences in the top-down provision of these roads across my study borders.

Two features of my setting allow me to isolate higher land rents as the most salient effect of *bengkok*. First, individual property rights of farmers in Indonesia are relatively secure. Together with ownership rights of *bengkok* land belonging to the village and not the chief, this rules out greater security of property rights over *bengkok* land as a possible mechanism.[3] Second, *bengkok* plots are relatively small. Across villages, the average size of *bengkok* land under chief control is 1.6

[3]The existence of secure individual property rights of farmers in the Indonesian setting contrasts markedly from Goldstein and Udry (2008) who show that, within a context of insecure property rights, traditional political authority in Ghanaian villages gives traditional chiefs more secure land rights over agricultural land plots. With more secure land rights, chiefs are more willing to fallow their land for longer periods of time. This results in greater agricultural productivity of chief land compared to land owned by ordinary farmers.

ha compared to 158 ha of cultivable rice land under individual ownership of farmers. The small size of *bengkok* plots rules out changes in land inequality as a downstream effect of larger *bengkok* land rights.

Importantly, *bengkok* is not an institution unique to Indonesia. Throughout medieval Europe, it was common for sovereigns to grant taxation or land rights (*apanage*) to nobles or military personnel to compensate them for their duties in administering different parts of the kingdom (Darling, 1996). Similar practices existed in India where upper caste members and government officials were granted land rights in return for performing administrative duties (Sharma, 1957). What is unique to Indonesia is the persistence of these practices. This allows me to investigate how the use of land rents as compensation has affected modern-day outcomes on local governance and development.

My findings point to a strong positive effect of *bengkok* land rents on contemporary economic development. *Bengkok* villages today continue to exhibit stronger nighttime light intensity and *all* villagers, on average, continue to enjoy lower child mortality and higher years of education. Positive development outcomes are a result of better chief performance. Villages where chiefs are paid higher *bengkok* rents receive more funds from both higher levels of government and from villagers. This suggests that chiefs are better at both lobbying and raising funds from local villagers. Along with the ability to raise more revenue, chiefs in *bengkok* villages provide more public goods: An increase in 1 hectare of *bengkok* leads to a 0.22 standard deviation increase in village infrastructure public goods such as access to roads, safe water and safe garbage disposal.

Why do chiefs today continue to perform better? I find evidence consistent with historically positive political selection of chiefs. As mentioned above, prior to 1979, chiefs were elected for life. Hence, in the absence of re-election incentives, any positive outcomes of chief effort we observe during this period of time would almost surely have to be a result of political selection. I do not, however, observe characteristics of chiefs who took office before 1979. Instead, to test for historical political selection, I examine differences in pre-1979 village school construction and educational outcomes of villagers. In the complete absence of top-down school provision before the late 1970s (Aritonang, 1994; Duflo, 2001; Djajadiningrat, 1940), the construction of village schools were led entirely by bottom-up chief efforts. Indeed, I find that *bengkok* villages report a greater number of historical village schools. More village schools translates into actual educational outcomes. Using 100% count census data, I document that *bengkok* villagers have consistently higher years of educa-

tion going as far back as the 1920s: cohorts born in 1920 have 1.2 more years of education relative to a mean of 3.6 years. These results suggest that persistently higher land rents attracted higher quality chiefs in the past who were better able to lead historical school construction efforts.

Persistently higher villager education has positive spillovers on the quality of the entire candidate pool today. Original survey data shows that the entire candidate pool in *bengkok* villages today is marginally more highly educated and more likely to be drawn from civil service occupations. Specifically, an increase in 1 hectare of *bengkok* leads to the entire candidate pool having 0.3 years more education relative to a mean of 11 years. Candidates are also 3.6pp more likely to have previous occupations as civil servants relative to a mean of 21%. Once I account for the average education of all villagers, however, *bengkok* candidates are not more educated nor selected from civil service occupations in comparison to non-*bengkok* candidates. In other words, persistently higher *bengkok* land rents attracted better quality chiefs *historically*. These chiefs were so effective at providing village schools that *bengkok* villagers became persistently more educated over time and those who stand for chief elections today are no more educated than the average villager.

As mentioned above, chiefs today are no longer elected for life but are elected to fixed terms of 6-8 years each. This suggests that better performance of *bengkok* chiefs today could also be driven by enhanced re-election incentives. I do not find evidence for this. On average, only 18% of incumbent chiefs re-run for office and an increase in *bengkok* rents is not associated with an increase in the probability that a chief re-runs for office. This is despite the fact that an incumbent who re-runs for office has a re-election probability of 46% and this is somewhat higher for *bengkok* chiefs. The lack of re-election incentives is consistent with observations from the field. Ex-village chiefs frequently cite heavy chief responsibilities and insufficient remuneration as reasons for not choosing to run for a second term.

I close by investigating why, in the absence of re-election incentives and contemporary selection on observable education and occupation, *bengkok* land rents continue to cause positive development. One possibility is that the *within-village nature* of *bengkok* land could have attracted chiefs who are more oriented towards local villager interests and away from the interests of external elites. Indeed, I find that *bengkok* villages are less likely to vote for Golkar, a party synonymous with Suharto's authoritarian rule from 1965 - 1998. Given rich literature documenting the role of chiefs in turning out the vote for Golkar, these findings are consistent with *bengkok* rents strengthening the

chief position and attracting chiefs who are less dependent on both supra-village government and village elite interests. Instead, *bengkok* rents attracts chiefs whose interests consistently align with village development.

The positive association between *bengkok* rents and economic development contrasts with the well-established hypothesis that areas governed through traditional local governance (indirect colonial rule) perform more poorly, on average, compared to regions directly governed through colonial administrators (direct colonial rule) (Mamdani, 1997). Why did indirect colonial rule through *bengkok* chiefs not lead to worse outcomes? The reason is that across Java the Dutch ruled entirely through local leaders. Hence, the counterfactual to *bengkok* chiefs was not direct governance by colonial administrators. Instead, in places without *bengkok*, qualitative literature suggests that villagers often elected the village fool to office (Antlöv, 1994). In contrast, I show that *bengkok* rents attracted higher quality chiefs who constructed more village schools and brought about greater long-run development.

Consistent with Olson (1993) theory of "stationary bandits", the *stable, within-village* nature of *bengkok* rents could also have attracted chiefs whose incentives are more aligned to those of their villages and who are more inclined to invest in productive village assets. This seems counterintuitive: a large literature shows that landowners and political elites are typically unwilling to provide public goods such as schools (Bates, 2014; Acemoglu et al., 2007), given potential increases in wages and reductions in land rents. The key difference is institutional: *bengkok* chiefs are constrained in the prices at which they can sharecrop or lease out *bengkok* land. Qualitative fieldwork reveals that prices are often tied down by traditional agreements and hence, given fixed costs, *bengkok* chiefs, unlike traditional landlords, would have had less of an incentive to withhold investments in public goods.

This study contributes to the political economy of development literature in a number of ways. First, it contributes to the literature on (pre-)colonial political institutions and long-run economic development. Appointed by hereditary rule or empowered to collect taxes without accountability mechanisms, local leaders in many parts of the developing world today continue to capture local public goods and civil society, leading to worse development outcomes (Acemoglu et al., 2014; Anderson et al., 2015; Banerjee and Iyer, 2005). In contrast, I show that local leaders empowered through land rents *can* have positive effects on long-run development. Despite initial motives for

increasing extraction, persistently higher land rents for village chiefs outlived the Dutch. These rents, together with Dutch-instituted elections, created a robust mechanism for the positive selection of local leaders and alignment of incentives that continue to have positive effects on development today.

Second, this study contributes to a largely theoretical literature on the effects of political pay on the selection and performance of politicians and bureaucrats (Besley, 2005; Dal Bó and Finan, 2018; Besley, 2004). A smaller empirical literature focuses on the effects of changes in compensation of municipal legislators across one or two election terms (Ferraz and Finan, 2009b; Gagliarducci and Nannicini, 2013). Another growing strand of literature studies the effects of career incentives on bureaucrat performance in India (Bertrand et al., 2018). In contrast, the persistent survival of *bengkok* allows me to study the effects of higher rents on rural political economy and development outcomes across three decades of modern Indonesian history. Furthermore, my results suggest that bureaucratic compensation of *village chiefs*, executives situated at the lowest rung of the state administrative ladder, can be as, if not more, important for determining long-run development outcomes.

Relatedly, I provide insight towards an old debate on how (the lack of) incentives affects whether (dis-)honest individuals choose to run for public office. A recent experimental literature shows that the old adage that "you can't get rich in politics unless you're a crook" continues to ring true: In low income countries with high levels of corruption, dishonest university students are more likely to want to enter publice service (Banerjee et al., 2015; Hanna and Wang, 2017). In high income countries with low levels of corruption, however, honest university students are more likely to want to enter (Barfort et al., 2015). I do not measure honesty but my real-world findings bridges the gap between the two, and shows that higher rents within a low income country can potentially shift local political economy into a high income country equilibrium. Higher rents consistently attract more competent politician-bureaucrats who, given better development outcomes, are arguably less dishonest.

Third, this study contributes to a growing economic literature that studies the role of village chiefs in local development (Baldwin, 2013, 2016; Basurto et al., 2017; Michalopoulos and Papaioannou, 2013; Henn, 2019). In a closely related study, Casey et al. (2018) tests the efficacy of three randomized control trials designed to increase own-village development capacity by encouraging

younger, more educated villagers to participate in village development. The authors find that the probability of winning development projects is increasing in the participation of more educated villagers. More educated villagers, however, are typically sidelined by older, less educated traditional chiefs. My findings suggests that, instead of working around traditional chiefs, increases in chief remuneration could be equally effective in improving village development capacity through attracting more highly educated and skilled individuals to run for village office.

Finally, I contribute to a nascent literature on the economic history of Southeast Asia (Dell and Olken, 2017; Dell and Querubin, 2017; Dell et al., 2018; Paik and Vechbanyongratana, 2019). Here, I innovate by designing and collecting data through an original survey. This gives me the unprecedented flexibility to study the inner-workings of village institutions from a bottom-up perspective. Furthermore, lessons from traditional governance in Indonesia have broad external validity for developing countries everywhere: many aspects of traditional governance in Africa are a direct result of colonial experience in Asia (Mamdani, 1997); and many aspects of traditional governance in India are similar to Indonesia given British rule over Java. What distinguishes the Indonesian colonial experience is the granting of rents to chiefs together with the institution of democratic elections; colonial powers in Afria and India did not grant stable rents and typically appointed local leaders to hereditary positions. Hence, my findings suggest that the introduction of both stable within-village rents *and* regular elections could lead to long-lasting, positive effects on economic development.

In the next section, I describe the role of village chiefs in Indonesia, with an emphasis on their role as key intermediaries between the villager and the state. Section 3 provides a brief account of Dutch expansion of *tanah bengkok* and presents the empirical strategy. In Section 4, I introduce my survey data and auxilliary data sources. Section 5 presents results on selection of candidates. Section 6 presents results on downstream chief performance and development outcomes. Section 7 discusses alternative explanations and Section 8 concludes.

2 Background: Village Chiefs and *Tanah Bengkok* in Indonesia

Village elections are a two-century old institution in Java. Introduced by Raffles, Governor General during the British interregnum in the early nineteenth century, the institutionalization of local chief elections distinguishes colonial Java from other colonial settings. Why did the British do this on colonial Java? Historical evidence suggests that village elections were introduced to strengthen

the legitimacy of local chiefs as tax collectors (Bastin, 1954; Bosma, 2013; Holleman, 1981). The designation of local chiefs as tax collectors over regional Javanese lords was also a strategic choice: colonizers were reluctant to grant more power to regional Javanese lords lest they threaten colonial rule.[4]

Introduction of elections and taxation duties was never accompanied by a commensurate increase in remuneration. Chiefs were never formally incorporated into the bureaucratic state but were instead paid in terms of *bengkok* land or a wide variety of levies in money, produce or labor (Husken, 1994) depending on pre-existing institutions and practices. Much of these rewards for local governance arose during the Dutch Cultivation System when chiefs were made responsible for the organization of local land and labor for the forced cultivation of export crops. In particular, given heavy financial costs of paying the salaries of tens of thousands of chiefs, the conversion of rice fields into *tanah bengkok* were sanctioned by the Dutch (Breman, 1983) and the geographical incidence of *tanah bengkok* and differences in land rents continue to follow historical borders. In Section 3, I outline my empirical strategy and how I exploit these cross-border differences.

2.1 Chief Elections: Term Length and Campaign Costs

The persistent practice of electing village chiefs was a direct result of low managerial capacity of the Dutch colonial state (Breman, 2016), and contrasts sharply with other colonial settings where chiefs derived sole legitimacy from colonial authorities (Abraham, 2003).[5] The key difference between chief elections pre and post-Indonesian independence, however, lies in term length. Under colonial rule, chiefs were elected for life. The 1979 Village Law amended this, stipulating that chiefs were to be elected to fixed terms of 6-8 years for a maximum of two terms each.[6]

Ethnographical evidence suggests that the robustness of local elections were highly varied (Antlöv, 1994). A number of sources have documented State interference in the screening of candidates before elections are permitted to take place during the New Order period (1965-1998) (Antlöv et al., 1995). In contrast, villagers today have greater freedom to vote for the candidate of their

[4]The choice of who to designate as local tax collector was made even more difficult due to the fact that the British could not find a clear equivalent to landlords as in the *Zamindari* system instituted in much of British India. See Banerjee and Iyer (2005) for an economic analysis of the legacy of the Zamindari system.

[5]Note that my analysis throughout this study refers to *desa*'s or rural villages where village heads are elected by popular vote and not *kelurahan*'s or urban villages in which village heads are appointed. In contrast, for example, Martinez-Bravo (2014) studies the effects of differences in political leanings between *desa* and *kelurahan* chiefs.

[6]This changed in 2017. Today, chiefs are technically allowed to run for a third time given that they step-down a year before the third election is scheduled to take place.

choice without district interference (LLI3 Study, 2012: 68 – 82). Regardless, village elections are frequently described as festivals of democracy (Husken, 1994): the entire election process takes less than thirty hours during which selection of candidates are announced, speeches held, campaigning starts and ballots are cast and counted in the village hall.

Preparations, however, often begin months before election day, and it is well-known that running for the chief position is one of the most expensive ventures in village society. From my fieldwork, respondents report a mean campaign cost of 22 million Indonesian Rupiah (IDR) ($1,466) and, in particularly fierce contests, campaign costs can reach as high as 400 million IDR ($26,667). Actual, itemized expenditures are highly varied but a large amount is spent on preparing meals, coffee, snacks and cigarettes for an endless stream of visitors. In certain cases, it entails "pocket money" for voters and the sponsoring of local events and festivals both before and after election day. In my study region, respondents report having to sponsor post-election fishing festivals: one candidate reported a purchase of 100kg of *ikan gurame*, a popular local fish, to celebrate his electoral success with voters.

Running for chief is also a highly calculated bet. Many candidates borrow heavily to finance campaign expenditures, and there is a real risk of bankrupty from losing elections. Election losses can lead to financial disaster and the fire-sale of both land and property (Husken, 1994). Similarly, we have encountered numerous occasions where our questions on campaign costs led to hushed whispers about neighbors that lost everything upon losing an election.

2.2 Chief responsibilities and remuneration today

Village chiefs bear a heavy responsibility as both agents of the state and elected representatives of a social community, maintaining responsibilities and allegiances with his fellow villagers (Antlöv, 1994). As agents of the state, chiefs are expected to supervise development projects, maintain regular contacts with higher authorities, and handle issues of security and politics at the village level. As elected representatives, chiefs are expected to collect informal taxes and settle disputes and grievances amongst villagers.

Yet, despite these responsibilities, chiefs are not paid a living wage and the majority of chief remuneration is derived from traditional *bengkok* land rights. Based on my survey data, *bengkok* chiefs earn an average of 34.4 million Indonesian Rupiah (IDR) ($2,293) per year, about 3 times

more than non-*bengkok* chiefs who earn 12.2 million IDR ($813) per year. The bulk of this comes from *bengkok* land with a negligible fraction from intra-village (rice) taxes levied on the population. Regardless, both *bengkok* and non-*bengkok* chief remuneration remains relatively low: The average annual salary of an Indonesian civil servant is 23.4 million IDR ($1,560)[7] and the average annual wage of a day laborer is 1 million IDR ($700) (BPS 2019).

Despite low remuneration, village chiefs play an important role in affecting the level and quality of village development. Chiefs are the only tier of government in constant, direct contact with villagers. Hence, despite their lowly positions at the bottom of a long chain of command,[8] a good chief can bring development to his village through two channels: Top-down lobbying and bottom-up management of development projects.[9]

First, the competence of village chiefs and their connections with upper levels of government play an important role in securing additional public goods (Evers, 2000). This was especially true during the last decades of Suharto-era rule in the 1990s when discretionary project funding replaced structured development grants: the village chief became a central figure in attracting project funding from the central and provincial government (von Benda-Beckmann and von Benda-Beckmann, 2013). The main channel through which this occurred was the informal and formal lobbying of upper-level government agencies.[10] More recently, the importance of lobbying has increased. Following decentralization in 1999, districts have not become more proactive in the disbursement and monitoring of funds to villages. Rather, "access to district resources (continues to) *depend* on village capacity, rather than supporting it" (LLI3 Study, 2012). In short, lobbying and connections of chiefs to supra-village officials remains as, if not more, important than ever in accessing top-down funds.

Second, the ability of chiefs to raise local revenue is an important determinant of final project quality (Martinez-Bravo, 2017). Both in the absence of and in conjunction with supra-village government support, additional informal taxes or community cash contributions (*Swadaya*, *Gotong Royong*) are a well-documented source of funds and labor for village projects (Antlöv et al., 1995; Evers, 2000; Olken and Singhal, 2011; Raffles, 1830). Higher own-village investment can, in turn, lead to

[7] Author's calculation from the 2010 Indonesian Work Force Labor Survey.

[8] Indonesia has four main tiers of government: provinces, districts, subdistricts, and villages.

[9] Part of the discussion in this section is based on Evers (2000) and Martinez-Bravo (2017). See Martinez-Bravo (2017) for a detailed discussion of the mechanisms behind public good provision at the village level.

[10] Evers (2000) writes:"One village head explained it as follows. "It's a matter of dropping in frequently on heads of the important government agencies. If you're lucky, you may show up just when decisions are being made about new projects. In this manner I've managed to obtain a number of projects for my village without ever paying a bribe or having to promise a kickback."

both higher levels and quality of public goods (Evers, 2000).

3 Empirical Strategy

This section presents the historical experiment and empirical strategy illustrating how Dutch expansion of *bengkok* allows me to identify the effects of higher rents. Throughout, I discuss and address main identification concerns.

3.1 Pre-Colonial Roots and Determinants of Adopting *Bengkok*

The practice of *tanah bengkok* is rooted in the agrarian Indo-Javanese kingdom of Mataram – the last native kingdom to rule Java before the expansion of Dutch colonial rule in the early 19th century. Literally translated as "crooked land", *tanah bengkok* refers to cultivation rights over village rice land that was granted to local notables for political loyalty and services. Pre-colonial rule, these rights were typically expanded with the extension of Mataram rule over Java (Maurer, 1994; Moertono, 2009), and the correlation between *bengkok* rights and Mataram rule is still visible in contemporary village census data. Figure 1 plots the size of village-level *bengkok* land in 2000 and the largest *bengkok* land continues to be concentrated in Central and East Java – the historical centre of the Mataram kingdom. This poses a challenge for identification of the causal effect of *bengkok* land rents today: stronger pre-colonial kingdom rule may have an impact on traditional local leadership in these areas that I cannot control for.

A second potential source of bias is pre-existing rice fertility and geographical elevation. *Bengkok* takes the form of village rice land, hence villages with more fertile rice land typically award chiefs with larger swathes of *bengkok* land (Maurer, 1994). Given that rice is a staple food crop in Indonesia, higher rice fertility could lead to better outcomes for reasons that have nothing to do with *bengkok* land. *Bengkok* practices are also inversely related with elevation: higher altitudes are associated with lower rice fertility and hence, smaller *bengkok* land.

3.2 Exogenous Assignment from Dutch Expansion in West Java

I circumvent these concerns by focusing on a region in West Java of present-day Indonesia that was homogenous until the beginning of the ninteenth century when it was split into two Dutch admin-

istrative units assigned with different systems of chief remuneration. This region was placed under Dutch sovereignty in 1700 and, under a strict policy of non-interference, had a shared political, religious and administrative history in terms of a unified legal and taxation system (Hoadley, 1994). Importantly throughout this time, the Dutch had not yet extended their control down to the villages and there was little village administration and no history of *bengkok* throughout this region (Antlöv et al., 1995; Breman, 2016).

It was only in the early ninteenth century that colonial attempts to enforce and streamline village administration began. In 1808, with little knowledge about the interior of Java, the Dutch divided the region into two parts – Priangan in the East and Cirebon in the West – following salient geographical features of mountains and rivers.

Shortly after, the end of the Belgian War in 1831 led to an urgent need for a new source of revenue (Van Niel, 1972). This led to the imposition of the Dutch Cultivation System (1832-1870) across the entire Java where local villagers were forced to grow export crops under the supervision of local village chiefs. A lack of colonial manpower, however, meant that Dutch authorities had to work within pre-existing local institutions and constraints (Van Niel, 1972). A key institution that the Dutch were aware of were traditional *bengkok* rights for chiefs in central Cirebon but not elsewhere in Cirebon nor Priangan (Figure 3). Hence, in order to facilitate extraction, the Dutch imposed *tanah bengkok* practices everywhere across Cirebon but not in Priangan. Dutch missives and regulations suggest that the differential introduction of *bengkok* land was enforced due to the self-proclaimed importance of respecting existing local customs of *bengkok* that existed in Cirebon but not in Priangan (Raffles, 1830; Fernando, 1982). Notably, this was despite the border between the two regions (henceforth refered to as the Priangan-Cirebon border) being extremely mountainous and unsuitable for the cultivation of wetland rice and, by extension, the practice of *tanah bengkok*.

To see that the historical expansion of tanah bengkok did indeed conform to the Priangan-Cirebon border, Figure 4 illustrates the border in black and green and the extent of tanah bengkok land at the sub-district level using 1867 Dutch archival data.[11] The expansion of *bengkok* appears to

[11]The 1867 Eindresume is a historical land cadastre of 808 villages in Indonesian Java conducted by the Dutch colonial government in 1867 and contains the earliest records of *bengkok* land. The purpose of the survey was to determine the direction of colonial policy due to liberal Dutch opposition against the continued exploitation of natives through the Cultivation system (Eindresume Vol I, 1867 pp 3-6). All land under private estates were excluded. This refers to land sold by the Colonial Government to the European and Chinese. Most of this land was centered on the North Coast of West Java (present-day Cirebon) and Surabaya in East Java (Kano, 1904). Surveyors were advised to select at least 2 villages in each district (roughly equivalent to present-day subdistricts) with a preference for those that were as distinct from each other as possible.

align almost exactly with the extent of the border and, despite imprecision of colonial statistics at that time, there is a marked discontinuity in *bengkok* across the border.

A related concern is that there could have been historical differences in Dutch colonial policy across the Priangan-Cirebon borders. Indeed, historical evidence suggests that crop cultivation systems were different across most of the Priangan-Cirebon border: the Dutch grew coffee in Priangan and sugar throughout Cirebon. To circumvent this, I focus on the southern segment of the Priangan-Cirebon border where historical records suggest that coffee, and not sugar, was grown along the Cirebon borders. Indeed, Figure A.1 clearly shows that no sugar was grown in the south of Cirebon. Why then was *bengkok* introduced in south Cirebon despite the cultivation of coffee? Archival work suggests that this was due to Dutch obsession in preserving contiguous borders. Despite being designated for coffee cultivation, southern Cirebon fell on the north side of the Citanduy river and hence was placed under the administration of Cirebon. This arbitrary division by river led to *bengkok* expansion in south Cirebon just because it happened to lie on the other side of the river.

Given that most of the Priangan-Cirebon border closely followed rivers and mountain ranges, I further limit my sample to two segments of the southern Priangan-Cirebon border where villages are balanced on elevation. Figure 2 plots the two segments of my study border and the contemporary size of *bengkok* across the Priangan-Cirebon borders. Moving across the borders, there is a marked discontinuity in *bengkok* size. There have, however, been increases in *bengkok* in Priangan compared to 1867 (Figure 4). This can been seen in the northwestern corner of Figure 2 where villages in Priangan have substantial amounts of *bengkok* land today. Fieldwork suggests, however, that these increases in *bengkok* came about after Dutch colonial rule. Typically, this adoption of *bengkok* land occurred when a rich villager passed on and pledged his rice land towards payment of village government officials. It could also take place if village elders or officials came together to purchase rice land for the same purpose. In other cases, villages received funds from supra-village government officials to purchase *bengkok* land. In sum, these increases in *bengkok* were relatively less uniform then under Dutch rule. Given positive amounts of *bengkok* land across both sides of the border, this motivates a spatial fuzzy regression discontinuity design.

3.3 Spatial Fuzzy Regression Discontinuity Design

Following Basten and Betz (2013), I estimate a spatial fuzzy regression discontinuity (RD) across the Priangan-Cirebon border. The fuzzy RD design exploits the fact that the incidence of *bengkok* does not jump from zero to one at the border. Instead, the causal effect of *bengkok* is identified by instrumenting the *size* of *bengkok* with the indicator for whether a village belonged to the historical Cirebon region and hence, was assigned *bengkok* in 1830.

In a fuzzy RD estimation framework, I estimate the following specification using ordinary least squares (OLS) and instrumental variables (IV):

$$c_{ivbt} = \alpha + \gamma \,\text{bengkok}_v + f(\text{geographic location}_v) + \phi_b + \text{Soeharto}_t + X_v\,\beta + \epsilon_{ivbt}, \tag{1}$$

where c_{ivtbt} is the outcome variable of interest for candidate i in village v at time t located along segment b of the Priangan-Cirebon administrative boundary. In the OLS specification, bengkok_v is the size of *bengkok* land in village v and in the IV specification, this is instrumented by Cirebon_v an indicator equal to 1 if village v is located in Cirebon Residency and equal to 0 otherwise. $f(\text{geographic location}_{vd})$ is an RD polynomial which controls for smooth functions of geographic location. ϕ_b is a set of boundary segment fixed effects that denote each of the north and south segments of the study boundary and Soeharto_t is an indicator that equals one if the village election took place during the Soeharto dictatorship. X_v is a vector of time-invariant covariates for village v. In my baseline specification, I control for predetermined geographical characteristics of elevation and slope shown to be important determinants of *bengkok* and results are robust to excluding these controls.

The main coefficient of interest is γ: the effect of higher land rents from an increase in 1 hectare of *bengkok* land. Under the assumption that Dutch Cirebon rule only affects outcomes via its effect on *bengkok*, the IV estimate of γ identifies the causal effect of *bengkok* land on downstream outcomes. Notably, under a Local Average Treatment Effect (LATE) framework the IV estimates isolates the effects of marginal *bengkok* land endowed under the Dutch. Given low population density at that time, it is plausible that this land would have been more productive than the marginal *bengkok* land endowed in later periods. This is important for understanding differences between OLS and IV results presented later.

For outcomes on chief performance and development, I estimate village and individual-level

outcomes analogous to equation (1) with two differences. For village-level outcomes, I include (survey-)year indicators and individual level controls for individual-level outcomes. Since village-level unobservables are likely to be spatially correlated, I report standard errors corrected for arbitrary spatial correlation and allow for spatial dependence of an unknown form (Conley, 1999). I use a cut-off window of 30kms and, in the Online Appendix, I further show that these results are largely robust to alternative cut-off windows and the clustering of standard errors at the village-level.

In terms of bandwidth selection, I limit my analysis to observations within 30 km, 20 km and 10km of the Priangan-Cirebon border. This leaves me with 193 sample villages within a 30km bandwidth. I calculated the optimal Imbens-Kalyanaram bandwidth for my main outcomes with distance to the border as the running variable. The optimal bandwidth was generally between 5 and 10 km depending on the outcome.

For villages in Cirebon to be an appropriate counterfactual for those in Priangan, all relevant factors besides treatment have to vary smoothly at the Cirebon-Priangan Residency boundary before the introduction of Dutch *tanah bengkok* in Cirebon, i.e. before 1830. An important covariate is pre-treatment economic prosperity. This is important given that, if the Dutch simply introduced *bengkok* in areas that had higher pre-existing prosperity, differences in post-treatment outcomes could simply be a reflection of this and not differences in *bengkok*. To test this, I use 1819 Dutch population records collected from Dutch colonial archives in Indonesia. Unfortunately, these population records are aggregated and reported only for the largest village located within each sub-district, a larger administrative unit. Hence, to construct measures consistent with present-day administrative boundaries, I match 1819 village names to contemporary village locations. I then divide population by the size of sub-districts and, in this way calculate measures of population density for 24 contemporary sub-districts. The reported mean in Table 1 shows that in 1819 the entire Priangan-Cirebon border region was sparsely populated with an average population density of 0.24 persons per ha.[12] Estimates imply that, if anything, the Cirebon region where *bengkok* was imposed was less sparsely populated before Dutch intervention.

In Table 2, Panel A, I test for jumps in important geographic characteristics of elevation, slope and ruggedness. The first three columns shows that elevation is statistically identical across the Cirebon-Priangan residency boundary except within the 10km bandwidth where Cirebon villages

[12] Average population density today in the Priangan-Cirebon region is around 10 persons per ha.

are of slightly higher elevation. This is consistent with historical evidence discussed above: the introduction of *bengkok* was done in a haphazard manner that ignored actual geographical suitability for *bengkok*. Regardless, I control for elevation in all my regressions and results are robust to the exclusion of elevation as a control. Next, I look at differences in slope and terrain ruggedness. All differences remain small and statistically insignificant except for ruggedness for villages within 30km where Priangan villages are marginally more rugged.

In Panel B, I further test for differences in crop suitability in terms of percentage soil with poor drainage and proxies for rice and coffee fertility using FAO-GAEZ potential yield data. Rice is a staple food crop and, as discussed, rice fertility is a strong determinant of *bengkok* incidence and size outside of my study region. I further test for differences in coffee fertility as a proxy for Dutch extraction given that coffee was the main cash crop grown in my study region. Again, across variables and specifications, there are no large differences except on potential yield for wet rice that is, on average, 3 kilograms lower in *Cirebon* villages. Relative to a mean of 2154 kilograms, however, this is not a meaningful difference.

In sum, I find balance on important predetermined geographical characteristics and crop suitability, suggesting that villages on either side of my study border are comparable.

4 Data

To examine the effects of higher land rents on political selection and economic development, I collect original survey data and combine this with various rounds of the Indonesian Village and Population Census data. Here, I provide details on core regressors and outcomes. I introduce other outcomes of interest as they arise.

4.1 Original Survey Data

Between January - May 2019, I design and conduct an original survey of village chiefs to record the oral and written history of village establishment, chief characteristics, and chief and village income for all post-1979 elections in 193 villages within 30km of the southern Priangan-Cirebon border. As discussed above, 1979 marked the implementation of the 1979 Village Law which introduced regular chief elections. The final dataset comprises detailed biographical information on all chief

candidates who ever ran for village office including education, occupation, land ownership, chief ancestry, vote shares, campaigning costs, term length, and completion.

In particular, data on education and occupational characteristics comprises 931 chiefs and the entire candidate pool of 2,297 candidates from 1979 - 2014. I also collect qualitative data on how *tanah bengkok* functions in each village: the size of *bengkok* awarded to chiefs, mode of cultivation, the reason behind the choice of system, the number of leasors or sharecroppers and actual harvest income. Finally, I collect quantitative data on (in-)formal tax collection, development projects and qualitative information on how chiefs obtain funds for projects. My dataset substantially improves upon existing data with detailed information on characteristics of each election-term period and information on the entire candidate pool. Existing data on chief elections is limited to education and age of chiefs starting from the 1986 Indonesian village census and number of years a chief has been in office in the 1992, 2000 and 2003 census rounds.

Prior to implementation, I conduct in-depth qualitative fieldwork and pre-testing of questionnaires, entirely in the Indonesian language, jointly with AKATIGA foundation, an Indonesian NGO with extensive experience in rural poverty studies. This was done to determine how best to elicit responses to sensitive questions. I work with qualified locals as enumerators (fluent in local dialect and skilled in social issues) who reside in each survey village, and in interviews, all enumerators tried to simulate a "conversation about village oral history". We target 5 respondents per village and, to the best of our ability, interview all past and present village chiefs, currently alive, with quantitative, historical recall questionnaires embeded in qualitative interviews. If a chief was no longer alive or unable to communicate, we interviewed village elders or officials who were alive during that chief's rule and familiar with his rule. In this manner, 33.5% of sample respondents are past or present village chiefs.

There are two main survey issues – recall bias and whether an individual's response to questions varies systematically with local socio-political conditions. While it is impossible to rule out both effects, I do my best to control for them during survey implementation. First, we collect village administrative and archival records from village offices and village elders. We then cross-check survey responses with these records and the village census for all variables common across datasets. Second, survey responses were consistent across all 5 respondents. Third, almost all respondents seemed very willing to talk about corruption and electoral costs. Any hesitation seemed idiosyn-

cratic and unrelated to local socio-political conditions. This is possibly because of the historical framing of our study and our conduct of conversational interviews within private residences.

4.2 Measuring Village Development and Chief Performance

To examine the *bengkok* system's impact on contemporary development outcomes and chief performance, I use various rounds of the Indonesian Village Census and the 100% count 2010 Indonesian Population Census and georeference outcomes to the village-level. Crucially, the 100% count population census provides information on education and health outcomes in all my sample villages. This is important because the geographical concentration of my sample limits usage of other survey modules with more detailed measures of education and health.

My main measures of chief performance are village revenue and public goods provision. To measure these, I merge eleven different waves of the triennial Indonesian Village Census (*Potensi Desa*) collected between the years 1983 and 2014.[13] Conducted by the Central Bureau of Statistics, Indonesia, the village census covers the entire country and comprises a large number of measures of public goods provided in the village, such as infrastructure, health and educational facilities.[14]. Across waves, the village census has a different focus (agriculture, economy, or population) and several variables are not reported consistently across years. Hence, I focus on public good outcomes that are reported consistently across different waves of the survey.

5 Results

This section presents my main empirical results in two stages. First, I present first-stage results, linking historical Dutch intervention to *bengkok* prevalence today. Second, I present my main results on economic development and chief performance. I defer discussion of mechanisms to Sections 6 and 7, where I layout evidence consistent with historically positive political selection and rule out alternative explanations.

[13] In particular, these waves correspond to the years 1983, 1986, 1990, 1993, 1996, 2000, 2003, 2005, 2008, 2011 and 2014.

[14] As discussed in Martinez-Bravo (2016), survey enumerators collect answers from members of the village administration and are expected to check these answers against village administrative records and through physical, on the ground, surveys. Since measures of public goods such as the number of schools and health facilities are easily verifiable, this survey provides an accurate representation of public goods in all villages.

5.1 First Stage

Table 3 and Figure 5 presents first stage results of the average size of *bengkok* land under chief control. I report estimates as follows: Across columns in Table 3, I demonstrate robustness of results to bandwidth choice by presenting results for observations within three bandwidths of 30km, 20km and 10km. Following Gelman and Imbens (2017), I use a linear polynomial in latitude and longitude of each village as my baseline specification in Panel A and report robustness to the use of a cubic polynomial in distance to the border and cubic polynomial in latitude and longitude in Panel B and C. Given the small N nature of my study, however, a cubic polynomial in latitude and longitude results in substantially noiser results but reassuringly, coefficient magnitudes remain largely the same.

Across columns in Table 3, Panel A, Cirebon villages have 1.36 to 1.48 more hectares of *bengkok* land. The use of a cubic polynomial in distance and latitude, longitude leads to slightly larger point estimates in Panels B and C. As expected, a cubic polynomial in latitude and longitude leads to noisier estimates of the jump in *bengkok* at the border but reassuringly, magnitudes remain stable across all three polynomial specifications.

The jump in discontinuity of *bengkok* across the border can be seen graphically in Figure 5 which plots the actual data alongside predicted values. Given the use of a two-dimensional RD polynomial in latitude and longitude, these are three-dimensional analogues to standard two-dimensional RD plots. Each subfigure plots each villages longitude on the x-axis, latitude on the y-axis, and the actual data or outcome using an evenly-spaced monochromatic color scale. In the typical RD, the predicted value plot is a two-dimensional curve, whereas here it is a three-dimensional surface, with the third dimension indicated by the color gradient. Darker shades indicate higher values of the outcome variable. Here in Figure 5 the left subfigure plots the actual size of *bengkok* land and the right subfigure plots the predicted values of *bengkok* land. Figure 5 shows clearly that the predicted size of *bengkok* changes discontinuously at the border. Taken together, these results testify to the strong persistence of differences in *bengkok* practices since their introduction almost 200 years ago in 1830 and suggests that IV estimates using a linear polynomial in latitude and longitude do not suffer from a weak instruments problem.

5.2 Main Outcomes

In this section, I estimate the effects of *bengkok* land rents on chief performance and contemporary development outcomes. I find that higher *bengkok* rents lead to the collection of both higher external and internal village revenue, and the construction of more public goods in terms of contemporary infrastructure facilities and historical village schools. Remarkably, positive effects from public goods accrue to the entire village. *Bengkok* villages continue to be better developed today across measures of economic activity, health, and education. For all outcomes, I continue to present results for observations within three bandwidths of 30km, 20km and 10km across columns but present results only for my baseline specification of a linear RD polynomial in latitude and longitude of each village. I present key robustness checks along the way, including to alternative RD polynomials, but defer mechanisms and further robustness checks to Section 6 and 7.

5.3 Public goods provision

Table 5 examines the effects of higher land rents on public goods provision from 1983 to 2011.[15] Following Martinez-Bravo (2017), I construct standardized z-score measures of three types of public goods provision per capita – infrastructure, health and education. To isolate the effects of chief effort, I examine public goods that are more susceptible to village governance (Lewis, 2016; Martinez-Bravo, 2017). Hence, I construct a z-score for infrastructure by taking standardized, per capita averages of three indicators for whether the main village road is passable by a 4-wheel vehicle, whether the village has access to safe garbage disposal, and whether the village has safe drinking water as measured by access to tap water or a water pump. I construct a z-score for health public goods by taking standardized, per capita averages of the sum of health posts, supplementary health posts and trained doctors in each village. I construct a z-score for education public goods by taking standardized, per capita averages of the number of kindergartens, primary schools and junior secondary schools. I omit anything above the junior secondary level as the construction and management of these schools are almost always under the control of external government offices.

Higher land rents from *bengkok* lead to positive effects on infrastructure public goods but no differences in health public goods. There is also a negative effect on education public goods. Columns

[15] Given that public goods measures are not consistently reported across village census years, I use measures from 1983, 1986, 1993, 2003, and 2011 which reports consistent measures of infrastructure, health, and education.

(1) to (3) examine effects on infrastructure public goods and implies that a 1 hectare increase in *bengkok* land rents leads to 0.14 to 0.22 s.d. higher infrastructure public goods. As a benchmark, Martinez-Bravo (2017) finds that each additional year of *district* exposure to Soeharto-era mayors is associated with a decrease of 0.047 s.d. in education public goods per capita. Next, columns (4) to (6) examine effects on health public goods and find small and insignificant differences in health public goods. In the remaining columns of (7) to (9), higher *bengkok* land rents leads to 0.08 to 0.14 standard deviations less educational public goods.

Why do *bengkok* villages today have fewer educational public goods despite earlier discussion on positive historical selection of chiefs and local village schools? This is because contemporary educational public goods measures do not distinguish between schools constructed by top-down government intervention and those constructed through local chief efforts. In Indonesia, large-scale central government school construction efforts, or INPRES, between 1973 and 1978 sought to equalize primary schooling access, with the number of government schools constructed inversely related to existing pupil enrolment (Duflo, 2001). This suggests that lower educational public goods provision in *bengkok* villages today are almost surely a result of higher villager education and more local village schools constructed before top-down government intervention.[16]

To investigate this, I use the 1983 village census to reconstruct the number of central government INPRES schools and non-INPRES village schools. For comparison with results in Table 5, I construct a standardized z-score average of INPRES and non-INPRES schools. Indeed, in Table 6, columns (1) - (3) reveal that less INPRES schools were constructed in *bengkok* villages and columns (4) - (6) implies that more non-INPRES village schools were constructed. I.e. Results on fewer contemporary educational public goods in Table 5 are driven by the construction of fewer top-down INPRES schools. Fewer top-down INPRES schools were constructed in *bengkok* villages because there were a larger number of existing own village schools.

Large positive results on village schools are important for two reasons. First, in the absence of school construction by Dutch colonial authorities and the pre-INPRES Indonesian state, the presence of village schools are strongly suggestive of greater village school construction efforts led by

[16]Similarly, Dell and Olken (2017) finds evidence of higher historical villager education in villages forced to cultivate sugar under the Dutch Cultivation System. There, however, the channel is through greater construction of village schools on larger plots of village-owned land induced by redistribution of village land for forced sugar cultivation. This possibly took place to a lesser extent in my study region given that coffee, and not sugar was the main export crop grown in the Priangan-Cirebon area. Coffee was typically grown outside of villages in the highlands. In contrast, sugar is typically grown inside villages directly alongside rice fields.

village chiefs. Typically involving the pooling of contributions from land-owners or market taxes (Aritonang, 1994; Djajadiningrat, 1940), greater school construction efforts are indicative of the ability of village chiefs to win the trust of villagers and build consensus between different stakeholders. Second, in the absence of top-down intervention, greater village school construction is a pure outcome of bottom-up village capacity and rules out differential top-down provision as an alternative explanation. Together, this is suggestive of *bengkok* land rents exerting a historically positive effect on political selection of chiefs who were more effective at historical school construction. I investigate this possibility in Section 6.1. when discussing mechanisms.

5.4 Village Transfers

To construct public goods, chiefs can lobby for external revenue from government sources or raise internal revenue through informal taxation of villagers. In Table 7, I investigate the extent to which chiefs are able to leverage both channels using all four rounds of village census data in 1996, 2003, 2008, and 2011 that report the amount of revenue received by villages in the previous fiscal year. To account for possibly meaningful content of zeroes, I apply an inverse hyperbolic sine transformation to the amount of external and internal village revenue received by villages.

In Table 7, coefficients across columns (1) - (3) imply that an increase in 1 hectare of *bengkok* is associated with 0.15 to 0.19 higher external village revenue. Crucially, however, the ability to obtain higher external revenue does not come at the expense of internal revenue. Columns (4) to (6) show that there is a similar positive effect of *bengkok* land rents on internal revenue. Taken together, these results suggest that chiefs are more effective at raising funds from both top-down and bottom-up sources.

Positive effects on bottom-up funding are informative: fieldwork suggests that chiefs who have the trust and support of villagers are typically more successful at raising informal revenue for the construction of public goods. In turn, public goods constructed from a greater proportion of internal village revenue might be of higher quality if villagers are more invested in the maintenance of these facilities (Evers, 2000).

Despite greater infrastructure and historical educational public goods provision, it is unclear if increases in public goods provided by chiefs necessarily translates into improvements in overall development outcomes. Much of the development literature highlights how benefits from public

goods often remain concentrated among political elites (Hoffman et al., 2017). Hence, in the next section, I investigate the effects of higher rents on contemporary development outcomes.

5.5 Contemporary development

Do increases in public goods translate into better economic development? I investigate the effect of land rents on measures of contemporary development in terms of nighttime light intensity, the percentage of deceased children, and years of education. The effects of nighttime light intensity are estimated at the village-level, and the latter two at the individual-level controlling for cohort fixed effects and gender.

Nighttime light intensity is from the National Oceanic and Atmospheric Administration (see Henderson et al. (2012), for details) and is increasingly used to proxy for income in studies exploiting highly localized identifying variation (e.g., Michalopoulos and Papaioannou (2013)). I use all available years of nighttime light intensity from 1992 to 2011 as my main measure of overall economic development at the village level. I apply an inverse hyperbolic transformation to account for zeros. The percentage of deceased children and years of education is constructed from the 2010 Indonesian population census. Percentage of deceased children is a proxy for child mortality where, for each women who ever gave birth to a child, I use the difference between the number of children ever born and the number of children still alive to construct the percentage of deceased children. To obtain a better proxy for recent village health conditions, I restrict the sample to all women of recent child-bearing age at the time of enumeration. I.e. All women aged between 20 to 35 years or born between 1975-1990. I complement this by constructing years of education of all individuals aged 20 to 35.

I present estimates on village-level economic development in Table 4. In Panel A, I begin with estimates of nighttime light intensity. The estimates in Panel A implies that *bengkok* villages have higher economic activity as proxied by nighttime light intensity. This is consistent with positive effects on infrastructure in columns (1) - (3) of Table 5. It it also consistent with a sizeable literature that shows how greater road construction is associated with greater market access and economic prosperity (Gollin and Rogerson, 2014). Together with positive results on village revenue, chiefs compensated by higher land rents might be more effective at gathering funds or lobbying for the construction of village roads. In turn, this has positive downstream effects for the entire village.

Panel B shows that *bengkok* villages have 0.6 percentage points fewer deceased children relative to a mean of 2.4 percentage points in spite of no effects on health infrastructure in columns (4) to (6) of Table 5. This can be reconciled by the fact that childbirth and important medical care continues to take place outside villages. Within-village health posts are rarely staffed by adequately trained personnel and women have to be transported to hospitals in towns or cities with adequate medical equipment. In transportation of women to towns or cities, roads are likely to play a greater role and lower proportion of deceased children possibly reflects better within-village infrastructure as shown in columns (1) - (3) of Table 5.

Finally, panel C reports estimates for contemporary years of education of all *villagers* born between 1975-1990. Across columns, villagers have 0.17 to 0.23 more years of education relative to a mean of 6.5. These small but positive effects on education stand in contrast to negative effects on educational public goods in columns (7) - (9) in Table 5, but are consistent with better ability of chiefs to raise internal funds from villagers in Table 7. As discussed in Section 2.2., schools constructed from a greater proportion of internal revenue might provide villagers with a higher quality of education compared to schools constructed entirely from top-down, external funding. Positive effects on contemporary education of villagers are also consistent with intergenerational spillovers from higher education of earlier villager birth cohorts (Figure 6, discussed later in Section 6.1.).

Key Robustness Checks In Appendix Table A.2 - A.7, I show that results on contemporary development outcomes in Table 4 are robust to a range of alternative RD polynomial specifications and the inclusion of a range of controls. For controls, I run equation (1) including predetermined village-level agricultural controls (rice potential yield and coffee potential yield), geographic controls (ruggedness, drainage), and measures of ease of access to upper levels of external government (distance to sub-district and district capital). Controlling for measures of access to upper levels of external government is particularly important given possible concerns that villages might receive more funds simply because they are located geographically closer to administrative centres of external government.

Appendix Table A.2, A.3, and A.4 reports robustness of main results to alternative RD specifications. For comparison, the top row of each table reports estimates from the baseline specification. First, I vary the degree of the polynomial in the running variable (latitude and longitude) in equa-

tion (1). My main results are largely robust to alternative polynomials (quadratic, and cubic). As discussed, the use of a cubic polynomial results in substantially noisier estimates, but reassuringly coefficient magnitudes remain largely similar. Second, I vary the running variable and, instead of a polynomial in latitude and longitude, use a cubic polynomial in distance to the colonial border. The RD specification remains positive and significant.

Appendix Table A.5, A.6, and A.7 reports results from equation (1) with sequential addition of agricultural, geographic and distance to external government controls in each panel. Again, for comparison the top row reports results from my baseline specification in Table 4. Reassuringly, my findings are robust to the inclusion of these controls.

Overall, my results suggest that persistently higher land rents from *bengkok* continue to cause better chief performance today, as measured by village revenue and public goods construction. The benefits of positive chief performance accrue to the entire village. Villages where chiefs receive higher *bengkok* land rents remain richer and more developed even today. In the next section, I disentangle mechanisms and present results consistent with higher *bengkok* land rents improving performance by persistently attracting higher quality chiefs. I do not find any evidence for stronger re-election incentives.

6 Mechanisms

Why do higher land rents lead to better chief performance? This section examines and disentangles two mechanisms commonly discussed in the empirical literature on political pay and performance (Ferraz and Finan, 2009b; Gagliarducci and Nannicini, 2013): because higher land rents attract better quality chiefs *(political selection)*, or because, seeking re-election, higher rents incentivizes chiefs to put in greater effort *(re-election incentives)*.

Given the persistence of *bengkok* land rents over nearly two centuries, I investigate both historical and modern-day mechanisms. Overall, I find evidence consistent with persistently positive political selection starting from as early as the 1920s. I do not find any evidence for stronger re-election incentives both historically and today. This provides further evidence for the importance of political selection over re-election incentives and is consistent with evidence from Gagliarducci and Nannicini (2013). There, the authors study the effects of higher wages on the performance of Italian mayors, and using term limits to disentangle selection from incentives, do not find a role for

re-election incentives in driving better mayoral performance.

6.1 Historically Positive Political Selection

Prior to 1979, chiefs were elected for life. Hence, in the absence of re-election incentives, any positive outcomes of chief effort that I observe prior to 1979 is almost surely a result of positive political selection. Given that I do not have direct measures of chief quality, I test for historical political selection by turning to two measures of historical educational provision: historical village school construction and villager education. Educational provision is an important indicator of chief effort given the complete absence of top-down school provision up till the late 1970s (Aritonang, 1994; Djajadiningrat, 1940). The late 1970s marked the beginning of INPRES, a massive school construction program in Indonesia which largely equalized primary school access and was funded entirely through central government transfers (Duflo, 2001).

I begin in Table 6 by looking at the presence of schools in 1983, one of the earliest dates for which village level data on different types of schools are reported in the Indonesian village census. The data breaks down primary schools into those constructed through top-down, INPRES goverment transfers and those constructed through bottom-up, village chief efforts. Columns (1) - (3) focuses on INPRES schools and show that *bengkok* villages received if anything fewer INPRES schools. This is almost surely an indicator of greater villager education before the 1970s given that INPRES schools were targeted based on pre-existing availability of primary education (Duflo, 2001). Indeed, columns (4) - (6) focuses on non-INPRES schools and report that an increase in 1 hectare of *bengkok* land is associated with 0.15 to 0.4 standard deviations higher village schools constructed.

I dig deeper into effects on historical villager education by using the 100% count sample of the 2000 Population Census to estimate cohort-level regressions. Following Dell and Olken (2017), I estimate equation (1) beginning with the cohort born between 1920 and 1930, and ending with the cohort born between 1975 and 1980, the youngest cohort to have completed formal education by 2000. Figure 6 plots cohort-level coefficient estimates from equation (1). Impacts on years of education are large and positive across all cohorts. In particular, cohorts born in 1920 who completed their education in the complete absence of top-down school provision by the Dutch, have 1.2 more years of education relative to a mean of 3.6 years. These effects decrease somewhat across time but are still present in the most recent cohorts.

Taken together, positive impacts on historical school construction and villager education are indicative of the *timing* of effects of higher *bengkok* land rents. In the absence of re-election incentives, higher *bengkok* land rents attracted higher quality chiefs who were better able to lead historical school construction efforts. Positive effects of school construction efforts extend to entire villager cohorts who continue to be more educated even today. In the next section, I investigate the extent to which selection vis-a-vis re-election incentives continue to play a role in driving positive chief performance today.

6.2 Modern-Day Political Selection on Education and Occupation vs Re-Election Incentives

Using original survey data, this section disentangles political selection from re-election incentives. I show that higher land rents attract higher quality candidates, as measured by education and previous occupation, but these effects disappear once I account for average villager education. Together with evidence of historically positive political selection, these results suggest that strong positive political selection in the past cumulatively raised the average education of the entire village population such that *bengkok* candidates today, despite being more educated and drawn from better occupations compared to their non-*bengkok* counterparts, are not more highly educated or elite compared to the average *bengkok* villager.

I then turn to re-election incentives. After 1979, chiefs today are no longer elected for life but to fixed terms of 6-8 years each. I do not find, however, any evidence that higher *bengkok* rents lead to stronger re-election incentives. *Bengkok* chiefs are if anything less likely to re-run for elections. Instead, I find evidence for selection along a different margin: *bengkok* rents attract chiefs who are less orientated towards the interests of elites and more towards that of their fellow villagers.

Candidate Quality: Education & Previous Occupation Table 8 estimates the effect of *bengkok* land rents on the education of village chief *candidates*. Across columns (1) - (3), a 1 hectare increase in *bengkok* land leads to an increase in the average years of education of the candidate pool by 0.15 to 0.35 years relative to a mean of 11 years. Given the average duration of high school education in Indonesia is 12 years, this suggests that *bengkok* candidates are marginally more likely to be high school graduates.

Table 9 examines effects on occupational selection. Specifically, I look at three main categories of previous occupation constructed from the survey question, "What was the previous occupation of each chief (candidate)?". In this manner, I classify candidates who prior to running for elections held a high wage occupation, was a civil servant, or held a low wage occupation.[17] Accordingly, results in Table 9 are presented as follows: In columns (1) - (3) the dependent variable is an indicator for whether the candidate held a high skilled occupation, in columns (4) - (6) the dependent variable is an indicator for whether a candidate was an ex-civil servant and finally, in columns (7)-(9) the dependent variable is an indicator for whether a candidate held a low skilled occupation pre-election.

Before we move to results in Table 9, it is useful to understand how formal compensation from the village chief position compares with compensation from the closest outside options. The average annual remuneration of a *bengkok* chief in my sample with 2.8ha of *bengkok* land rights is 34.4 million Indonesian Rupiah (IDR) ($2,293), roughly three times more than a non-*bengkok* chief who earns 12.2 million IDR ($813). In comparison, the average annual salary of an Indonesian civil servant is 23.4 million IDR ($1,560)[18] and the annual wages of a day laborer is 1 million IDR ($700) (BPS 2019). Overall, annual compensation of an average *bengkok* chief in my sample is substantially higher than that of a civil servant, but compensation of an average non-*bengkok* chief is equivalent to that of a day wage laborer.

Higher land rents attract a larger share of ex-civil servants. Across columns in Table 9, an increase in 1 hectare of *bengkok* land leads to a 1.9pp to 3.6pp increase in the share of chief candidates from a civil service background. Notably, there are no differences in the share of chief candidates from high or low wage occupations. Taken together, these results suggest that candidates are being selected exactly from the middle-end of the skill-wage distribution. This is exactly what we would expect given prevailing wage differentials outlined above.

In Table 10, I report effects of *bengkok* land rents on education of village chiefs. I.e. Only election winners. Estimates are positive but fall short of statistical significance across columns except for column (1). These ambiguous effects of higher land rents on the quality of elected politicians compared to positive effects on the entire candidate pool, are consistent with political economy

[17] Note that these three occupational categories are not mutually exclusive owing to the difficulty of classifying occupations. For example, a large portion of my sample consists of traders (*pedagang*) who might plausibly be classified as medium or low wage. I do not classify these occupations and they remain outside of my analysis.

[18] Author's calculation from the 2010 Indonesian Work Force Labor Survey.

models such as Dal Bó and Finan (2018). It also suggests that elected chiefs might be selected based on other traits, a possibility that I explore in Section 6.3.

Are candidates more selected compared to the average villager? Table 11 estimates analagous candidate-level equations by subtracting average villager education from the education of candidates. I measure villager education at the village-level from the 100% count 2010 Indonesian population census and define average villager education as the education of all villagers aged 25 to 70 years old at the time of census enumeration. Before we look at estimation results, the mean of the dependent variable is informative. Chief candidates have, on average, 4 more years of education compared to the average villager. Given that the average villager has 6 years of primary education (Table 4, Panel C), this implies that candidates on both sides of the border are highly selected with 10 years of education (junior high school). Remarkably, in a very different context, Thompson et al. (2019) finds that candidates who ran for Congress in the 1940s have 4.38 more years of education compared to members of the public.

Across columns (1) to (3), however, Table 11 implies that, despite overall positive selection of candidates compared to the *average villager*, higher land rents have no effect on differences in education between candidates and the average villager today. Together with earlier positive results on historical selection, the absence of modern-day selection is not surprising. Persistently higher land rents from *bengkok* caused *historically* positive selection of chiefs. Historically selected chiefs were so effective at constructing schools and providing education for villagers such that both villagers and candidates today are more highly educated. As a result, we no longer observe positive selection today. This is also consistent with improvements in outside options over time. Given the lack of increases in chief remuneration, interest in the village chief position could have decreased with increasing urbanization and opening up of the Indonesian economy since the 1980s (Antlöv, 1994).

Re-Election Incentives Since 1979, chiefs are no longer elected for life but are subject to recurring elections every 6-8 years. Given the possibility of re-election, Table 12 examines to what extent better chief performance is a result of higher *bengkok* land rents inducing chiefs to put in greater effort in a bid to get re-elected. Columns (1) to (3) presents results for the effect of land rents on the probability that an incumbent chief chose to re-run for office. Effects are small and statistically insignificant

and if anything are somewhat negative. In fact, across all villages, only 18% of all incumbent chiefs choose to re-run for office. This is extremely low compared to other contexts.[19] Columns (4) to (6) estimate effects on the probability that an incumbent chief is re-elected conditional on re-running. Re-election rates are somewhat higher for *bengkok* chiefs and all chiefs, on average, have a 46% chance of re-election conditonal on re-running.

Though somewhat puzzling, the lack of re-election incentives despite high re-election rates are consistent with findings from qualitative fieldwork. Respondents frequently cite long term lengths and the insufficiency of chief compensation as a primary reason for their reluctance to re-run for office. First-hand accounts from fieldwork illustrate the disparity between compensation and duties: "As village officials, we serve villagers round-the-clock. Back then, when we didn't have streetlights, I frequently had to walk in darkness to the village office to write letters for villagers." In another account, a son of an ex-village chief recalled how their family frequently ate cassava without any rice and, before his death, his father banned all members of his family (*diharamkan*) from running for the village chief position on account of the low compensation and hardship that the family faced during his term of office.

Together, these results suggest that higher *bengkok* land rents cause positive chief performance through historically positive effects on selection and not stronger re-election incentives. Historically positive effects on selection were so strong that we no longer see contemporary positive political selection on education nor occupation. Persistently positive effects of higher land rents despite the absence of re-election incentives are particularly interesting: they undermine the importance of elections as a disciplining tool (Gagliarducci and Nannicini, 2013), and suggest that the use of elections as a selection mechanism in the presence of higher political pay might be sufficient to ensure good performance of politicians.

Given persistently positive development outcomes and the lack of modern-day selection on education, occupation, and re-election incentives, I turn to another margin of selection suggested as important by the stable, within-village nature of *bengkok* rice land and qualitative ethnographic fieldwork: the orientation of chiefs away from elite interests.

[19] On average, 66% of Italian mayors rerun for a second term and 78% are re-elected (Gagliarducci and Nannicini, 2013). In Brazil, 75% of municipal legislators re-ran for a second term and 40% were re-elected (Ferraz and Finan, 2009b).

6.3 Modern-Day Selection on Orientation Towards Elite Interests

As a proxy for orientation towards elite interests, I examine the probability that villages vote for Golkar, the party of Soeharto, the longest-standing ruler of Indonesia, in the 1999 legislative elections. The 1999 elections is notable for being the first democratically held elections after the end of Soeharto's rule in 1998. Hence, given well-documented evidence that chiefs were made to turn out the vote for Golkar during the Soeharto era, and persistence of party machinery that helped Golkar carry the vote in 1999, voting against Golkar is a plausible indicator of chief independence of elite interests both during and after Soeharto's rule.

In the absence of individual-level vote counts, I construct an indicator that equals 1 if Golkar obtained first place in the 2000 village census. Across columns (1) - (3), Table 13 implies that an increase in 1 hectare of *bengkok* leads to a 10.5 to 18.4p.p. decline in the probability that Golkar obtained first place in a village. Together with evidence that land rents from *bengkok* led to consistently positive development outcomes, voting against the authoritarian party suggests that the stable, within-village nature of *bengkok* rents attracted chiefs who are less oriented towards supra-village government and village elite interests. In turn, these chiefs were more likely to act in the best interests of the village both during and after authoritarian rule. This is consistent with Olson (1993) theory of "stationary bandits": a stake in local village land attracted chiefs who are more oriented towards village interests.

7 Alternative Explanations

I have argued that the main driver of positive development outcomes is selection arising from higher *bengkok* land rents. This section provides additional evidence to support this interpretation by considering and ruling out several leading alternative explanations.

7.1 Moonlighting

One possibility is that stable compensation from *bengkok* land rents simply freed up time for chiefs to perform their duties. Better performance of *bengkok* chiefs is a result of having more time to, for example, lobby for funds and public goods. Non-*bengkok* chiefs perform worse in office because of the need to moonlight or supplement insufficient chief compensation through working a second

job. I investigate this possibility in Table A.1 by estimating the effect of *bengkok* land rents on the probability that a chief reported having held a second job while in office.[20] It is important to note, however, that these are self-reported measures and might be biased if chiefs who receive lower compensation are less willing to report having held a second job while in office. Hence, I also report estimates for the probability that a chief refused to answer when asked whether he had a second job.

Indeed, 23% of chief respondents refused to answer this question. Columns (1) - (3) of Table A.1, however, show that chiefs who receive lower compensation are not more likely to refuse to answer. In addition, columns (4) - (6) show that an additional hectare of *bengkok* land is, in fact, associated with a 10p.p. increase in the probability that a chief had a second job while in office. This suggests that *bengkok* chiefs are not performing better because land rents from *bengkok* frees up their time for political office. Instead, these results are in line with the plausibly positive selection of chiefs of higher ability as evidenced by enterprises that were too lucrative to give up in spite of being elected as chief. Conversely, non-*bengkok* chiefs, being of lower ability, are less likely to have had lucrative enterprises or jobs worth holding onto once they are elected to office.

7.2 Intermediate Colonial Extraction and Infrastructure Policy

Dutch rule over most parts of Java lasted from 1830 - 1945 and during this time the Dutch enforced forced cultivation of crops from 1830 - 1870. After the abolition of forced cultivation in 1870, the latter half of Dutch colonial rule was characterized by a more liberal, "ethical policy". Throughout both periods, however, Dutch administrative units were largely under the control of the Dutch central government and lacked individual autonomy to decide on policy for their own regions. Nevertheless, given that the expansion of *bengkok* rights stemmed from motives of colonial extraction, differed across a historical colonial border, and evidence that Dutch investments in infrastructure elsewhere in Java continue to have effects on development today (Dell and Olken, 2017), I examine differences in colonial extraction and infrastructure across my study border and show that my results are robust to accounting for these differences.

The Dutch collected extensive data during the colonial era but most of these are only available at an aggregated level. To obtain measures of extraction and infrastructure at the village-level, I turn

[20]This question covers all 339 past or present chiefs who were still alive at the time of our survey and whom we interviewed. We did not ask about second job status of other chiefs given time constraints.

to 1853 and 1945 Dutch maps (Appendix Figure A.2). which I digitize and overlay over modern-day village boundaries. 1853 maps show coffee cultivation and road infrastructure. Forced coffee cultivation was abolished in 1870 and hence, 1945 maps no longer show cofffee cultivation. Instead, 1945 maps show road and rail infrastructure. For 1853 maps, I calculate the percentage of village land that was covered by village settlements, the percentage of village land covered by coffee plots, and road density at the modern-day village polygon level. For 1945 maps, I calculate road and rail density at the modern-day village polygon level.

Table A.8, Panel A presents results for 1853 measures while Panel B presents results for 1945 measures. Across measures, the percentage of village land settled is higher within 10km (column (3)) and both coffee cultivation and road density is significantly higher across all three bandwidths. Given the lack of village autonomy at this time, these results suggest that, at the height of forced cultivation in 1853, there was greater Dutch extraction in Cirebon compared to Priangan, and this was accompanied by the construction of more roads for the transportation of coffee produce.

The pattern of higher infrastructure largely reverses by 1945. In Panel B, both road and rail density in 1945 is negative all throughout Cirebon except within 10km of the border where road density remains higher. The reversal of infrastructure provision suggests that, with the end of forced cultivation, central Dutch colonial policy largely equalized and reversed any advantages in infrastructure stemming from colonial extraction across my study borders. Given the uneven differences in extraction and infrastructure across time and space, however, I formally test for the robustness of my key findings by including these measures as controls.

Appendix Table A.9, A.10, and A.11 reports results from equation (1) controlling for differences in colonial administrative policy. Again, for comparison the top row reports results from my baseline specification in Table 4. Reassuringly, my findings are robust to the inclusion of these controls. Overall, there is little evidence that differences in colonial administrative policy are responsible for the differences in contemporary development that we observe today. This provides further support for the mechanisms highlighted in Section 6: higher *bengkok* land rents attracted better quality leaders who exhibit better performance in office.

7.3 Differential Top-Down Provision of Public Goods

The historical colonial border continues to live on as a modern-day district administrative border. Hence, another concern is that differences across my study borders could be driven simply by differences in top-down provision of public goods or funds disbursed by external district governments. Qualitative fieldwork, however, suggests that there were no differences in the extent to which district governments disbursed public goods to my sample villages. Respondents commonly cite the need for village chiefs to visit external village government offices to ask or lobby for funds and public goods, without which, there would not be any village development. This is reflected in my survey data where 75% of all development projects constructed by chiefs were reported to have been obtained through chief lobbying efforts.

To the best of my knowledge, there is no pre-existing data source that tracks the amount of funds or public goods disbursed by district governments to individual villages. As a proxy, I instead investigate the possibility of differential top-down provision using detailed modern-day intercity and local roads data in Table A.12. Intercity and local roads are a key public good whose provision and maintenance typically fall under the direct purview of provincial (*intercity*) or district governments (*local roads*). Hence, the presence of intercity and local roads is a plausible proxy for top-down provision of public goods. Notably, the provision of these roads are entirely separate from village roads provided through bottom-up village chief efforts as explored in Table 4, and are much less susceptible to the influence of village governments. Furthermore, intercity and local roads are main thoroughfares that typically connect rural villagers to neighboring towns and urban centres. Hence, any differences in provision might plausibly have direct effects on modern-day development outcomes.

Columns (1) - (3) and (4) - (6) shows that there are no statistically significant differences in intercity nor local roads provision across my study borders today. In fact if anything, *bengkok* villages have less intercity roads. These results demonstrate that any pre-existing differences in colonial infrastructure policy have been ameloriated by the modern Indonesian state, and despite being under the jurisdiction of different district governments, there is no evidence of differential top-down provision of public goods today.

8 Conclusion

In conclusion, I provide novel micro-level empirical evidence for the efficacy of paying chiefs higher land rents based on rights to a stable, within-village income generating asset. In contrast to the large literature that emphasizes the extractive nature of traditional local governance, I document a rare case where the strengthening of local chief authority did not lead to worse outcomes. This is striking given that the award of *bengkok* land took place during one of the most extractive colonial enterprises in history.

Using original survey data, I show that the key to positive economic development here was the use of higher rents to office in the context of robust local elections. This led to historically positive selection of local leaders. These leaders constructed more village schools in the distant past and this has persistently positive effects on long-run development with both villagers and candidates today being more educated. The within-village nature of *bengkok* land is likely to be important. Similar to Olson (1993)'s theory on stationary bandits, the provision of higher rents through control over a within-village income-generating asset appears to have strengthened the chief position and attracted chiefs who are less beholden to supra-village elite interests (lower probability of voting for Golkar). In turn, these chiefs were more likely to invest in village development.

Last, my findings have direct implications for development policy. In Indonesia, under the 2014 Village Law Fund (*Undang-Undang Dana Desa 2014*), villages today receive direct transfers of US$70,000 to village bank accounts for development purposes, broadly construed. My findings suggest that recent, concommitant increases in and the provision of a stable compensation for village chiefs are a step in the right direction. My research also highlights benefits that might accrue if attempts to raise the salary of village chiefs in India and Africa succeed (Times of India, 2012; Daily Monitor, 2016) and provides conditions under which such measures might be effective.

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Figure 1: Bengkok Land in each village, 2000 (ha)

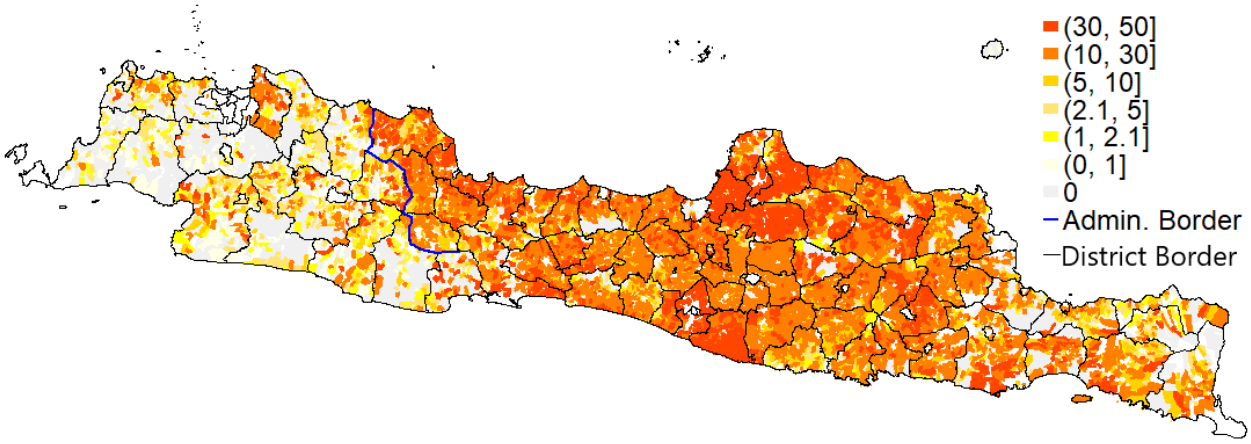


Figure 1: This map plots the size of *tanah bengkok* land, at the village-level, across the entire island of Java, Indonesia. The Priangan-Cirebon border is highlighted in dark blue. In particular, I study villages along the southern Priangan-Cirebon border where villages have similar historical crop cultivation patterns. I zoom in on this portion of the map in Figure 2 below

Figure 2: Bengkok Land in each village, 2000 (ha)

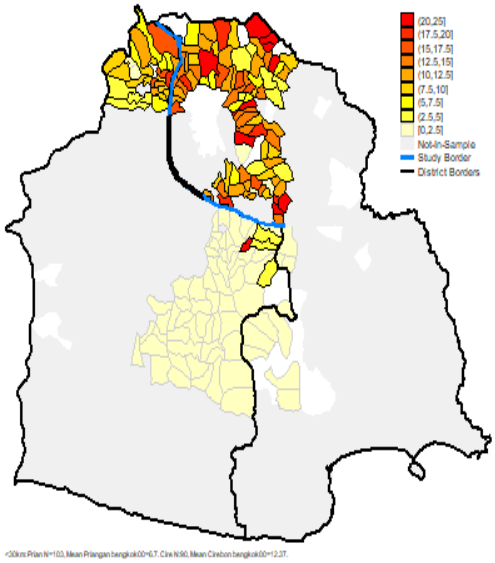


Figure 2: This map plots the size of *tanah bengkok* land, at the village-level, across my study borders. Given the mountainous geography of this region, I restrict my study sample to villages across two segments of this border where there are no discontinuities in elevation. Hence, in grey, are villages not included in my study. In white, are mountains where no village settlement exists. Urbanized towns and cities are omitted given that settlements in these areas are organized under a different system and chiefs are not awarded *bengkok* land.

Figure 3: Bengkok Land in Priangan-Cirebon, Pre-1830

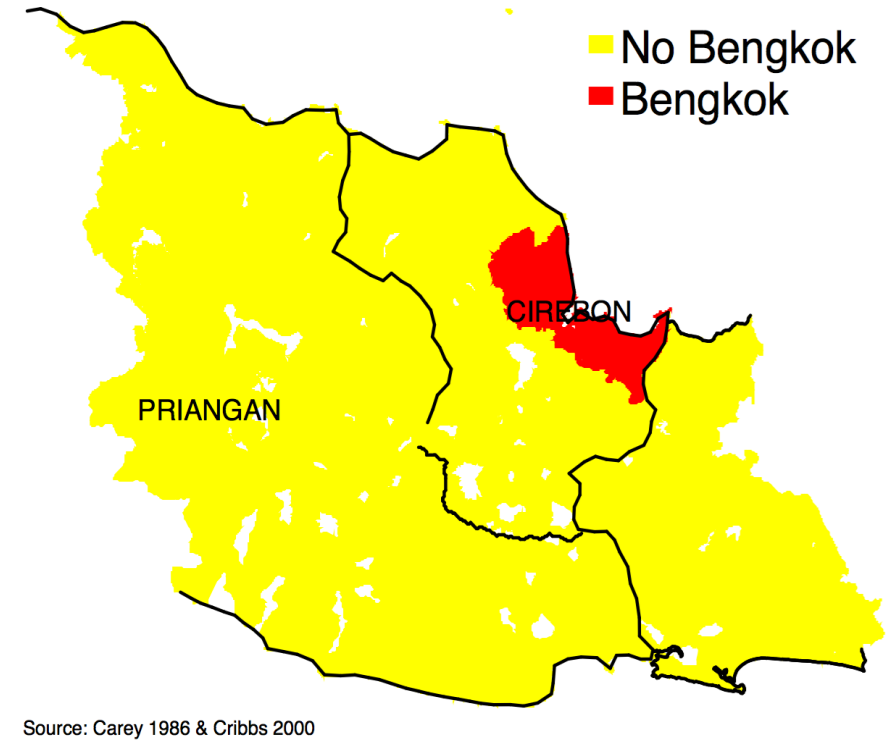


Figure 3: This map plots the geographical spread of *bengkok* before Dutch expansion in 1830. The institution was only known in central Cirebon pre-1830.

Figure 4: Average Bengkok Land in each Village, Sub-District Level 1867 (ha)

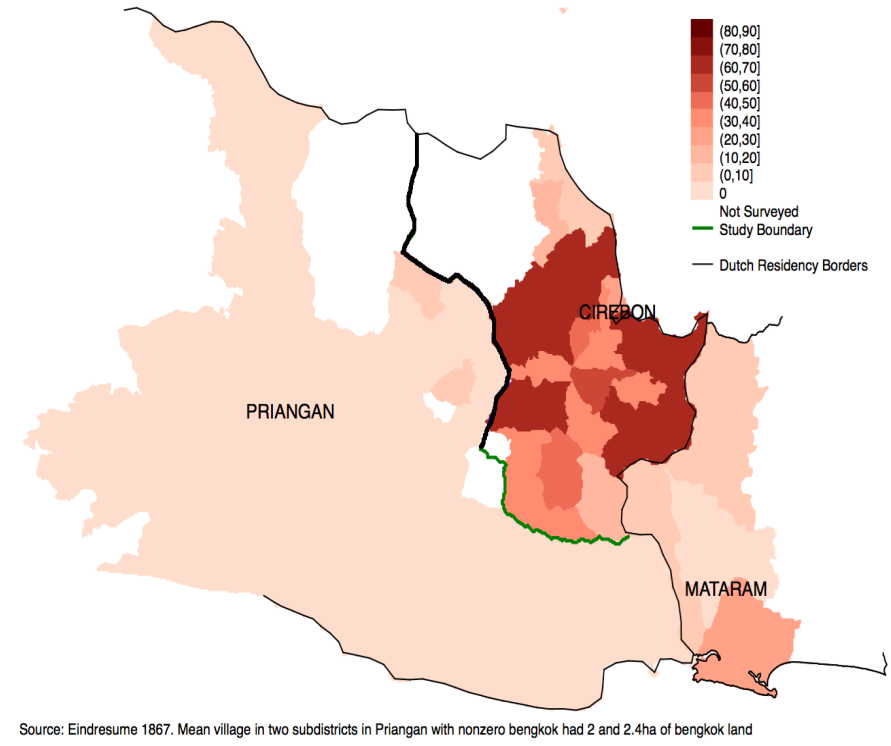
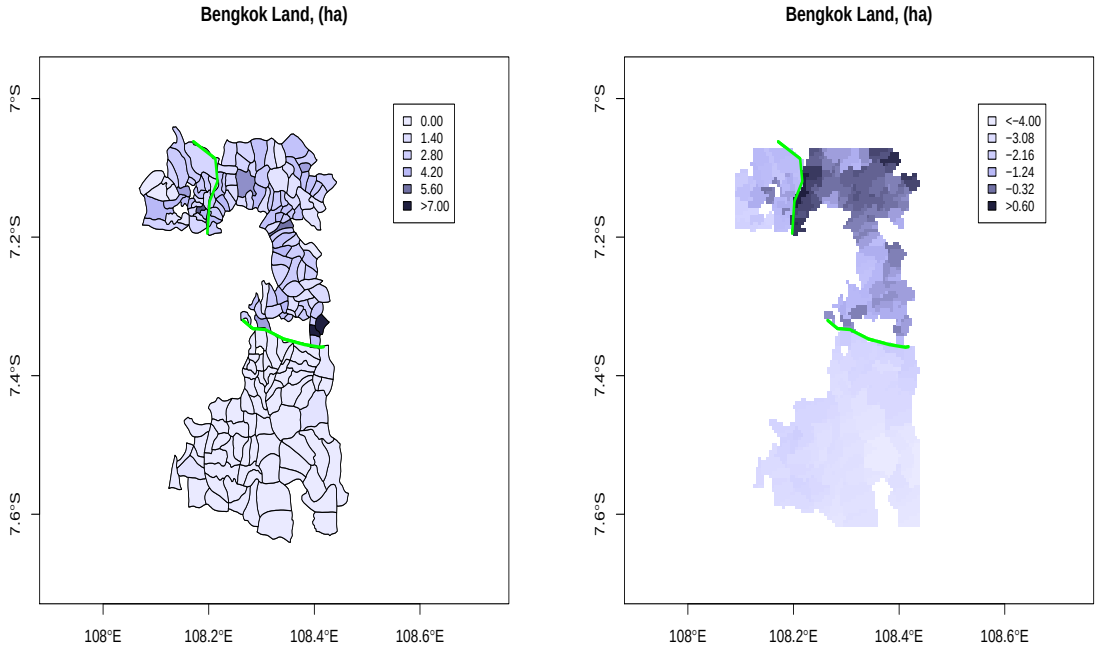


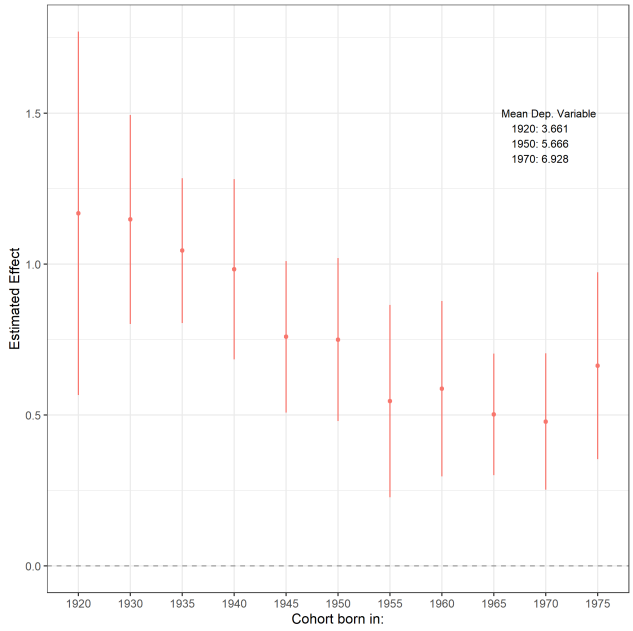
Figure 4: This map plots the size of *tanah bengkok* land, at the subdistrict-level, across my study borders from 1867 Dutch archival data.

Figure 5: First-Stage RD Graph



Longitude is on the x-axis, latitude is on the y-axis, and the data value is shown using an evenly-spaced monochromatic color scale. Figures on the left show actual data values plotted at the village-level. Figures on the right show predicted values, for a finely spaced grid of longitude-latitude coordinates, from a regression of the size of *bengkok* land on an indicator for being on the Cirebon side of the border using equation (1).

Figure 6: Cohort-Level Differences in Years of Education of Villagers Across the *Bengkok* Boundary



Source: Census 2000 data. Regressions estimated at the individual-level and pooled at 5 year cohort-levels. First cohort pooled at 10-year level (1920-1930) for power. Bars plot 95% confidence intervals.

Table 1: Balance on Pre-Treatment Population Density, 1819

	1819 Population Density		
sample within:	30 km	20 km	10 km
	(1)	(2)	(3)
cirebon border	−0.139	−0.178*	−0.177**
	(0.132)	(0.084)	(0.067)
Observations	24	20	17
Mean Dep. Var	0.24	0.25	0.26

Note: Unit of observation is at the sub-district level measured in terms of persons per hectare. Source: 1819 Dutch archival records. Regressions include border fixed effects. In successive columns, I limit the sample to include only villages located less than 30km, 20km, and 10km from the historical Cirebon-Priangan Residency boundary. Conley standard errors for difference in means between Cirebon and Priangan villages are in brackets (assuming a cut-off window of 30km).

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

Table 2: Pre-Determined Geographic Characteristics

	Panel A: Geographic Characteristics								
	Elevation			Slope			Ruggedness		
sample within:	30 km	20 km	10 km	30 km	20 km	10 km	30 km	20 km	10 km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
cirebon border	−25.252	10.451	41.253***	1.511	0.567	−0.864	0.046*	0.004	−0.012
	(43.610)	(26.721)	(15.658)	(3.647)	(3.279)	(2.282)	(0.028)	(0.030)	(0.018)
Observations	193	164	103	193	164	103	193	164	103
Mean Dep. Var	459.38	480.41	443.03	24.76	24.94	27.15	0.18	0.16	0.14
	Panel B: Drainage & Potential Crop Yield								
	Drainage			*Wet Rice Potential Yield*			*Coffee Potential Yield*		
sample within:	30 km	20 km	10 km	30 km	20 km	10 km	30 km	20 km	10 km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
cirebon border	0.042	0.019	−0.004	3.845	0.798	−3.131***	−0.441	0.261	−2.448
	(0.036)	(0.035)	(0.003)	(3.270)	(2.787)	(1.190)	(1.384)	(1.292)	(1.568)
Observations	164	137	81	193	164	103	193	164	103
Mean Dep. Var	0.73	0.84	0.94	2152.87	2155.18	2154.88	623.71	623.43	619.53

Note: Unit of observation is village-level. I include border fixed effects. Geospatial measures of elevation, slope and drainage are calculated using data at 30 arc second (1km) resolution (SRTM (2000)). Meaures of potential agricultural yield are calculated using FAO-GAEZ data. All measures calculated at 2000 village border polygons. The unit of measure for elevation is meters; slope is degrees; drainage is percentage of land covered by soils with poor or excessive drainage; wet rice and coffee potential yield in tons per hectare. In successive columns, I limit the sample to include only villages located less than 30km, 20km, and 10km from the historical Cirebon-Priangan Residency boundary. Conley standard errors for difference in means between Cirebon and Priangan villages are in brackets (assuming a cut-off window of 30km).

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

Table 3: First Stage: Jumps in Size of *Bengkok* Across Historical Border, Border RD

Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
	Panel A: Linear Polynomial in Latitude and Longitude		
cirebon border	1.362***	1.437***	1.487**
	(0.478)	(0.526)	(0.596)
	Panel B: Cubic Polynomial in Distance		
cirebon border	1.644***	1.669***	1.669***
	(0.388)	(0.400)	(0.461)
	Panel C: Cubic Polynomial in Latitude and Longitude		
cirebon border	1.589*	1.602*	1.465
	(0.923)	(0.961)	(1.289)
Observations	191	162	101
Mean Dep. Var	1.64	1.87	2.01

Note: Unit of observation is at the village level. Outcome in column (1) - (3) is the average size of *bengkok* land awarded to the elected chief as reported in our survey data. Controls: Village-level mean elevation, slope and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table 4: Contemporary Development Outcomes: Fuzzy RD

Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
	Panel A: Nighttime Light Intensity, IHS		
bengkok	0.114*	0.165***	0.208***
	(0.060)	(0.046)	(0.054)
Observations	3820	3240	2020
Mean Dep. Var	2.18	2.32	2.49
First Stage F Statistic	13.0	14.0	9.5
	Panel B: % Children Died		
bengkok	−0.63***	−0.58***	−0.47***
	(0.002)	(0.002)	(0.002)
Observations	21709	17947	11027
Mean Dep. Var	2.4	2.4	2.2
First Stage F Statistic	14.9	13.2	9.4
	Panel C: Years of Education, Villagers		
bengkok	0.208**	0.177***	0.233***
	(0.090)	(0.050)	(0.065)
Observations	204189	173744	113862
Mean Dep. Var	6.50	6.55	6.67
First Stage F Statistic	12.8	11.6	7.8

Note: Panel A: Unit of observation is at village-year level. Outcome in columns (1) - (3) is nighttime light intensity, inverse hyperbolic sine transformed. Controls: Village-level mean elevation, slope, year and border segment fixed effects. Panel B: Unit of observation is at individual level. Outcome is constructed from the number of dead children as a proportion of total children ever born reported by each women who was recorded as having ever given birth in the 2010 Indonesian Population Census. To better approximate current-day health conditions, I restrict the sample to all women born between 1975-1990. These are women who would have been 20-35 years of age at the time of enumeration of the 2010 census and of prime child bearing age. Controls: Village-level mean elevation, slope, 5-year cohort and border segment fixed effects. Panel C: Unit of observation is at individual level. Outcome is the number of years of education as reported in the 2010 Indonesian Population Census. For comparability with health outcomes in Table 3, I restrict the sample to all individuals born between 1975-1990. Controls: Identical to Panel B. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used

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

Table 5: Contemporary Public Goods Provision: Fuzzy RD

	Infrastructure Z-Score Per Capita			Health Z-Score Per Capita			Education Z-Score Per Capita		
Sample Within:	30 km (1)	20 km (2)	10 km (3)	30 km (4)	20 km (5)	10 km (6)	30 km (7)	20 km (8)	10 km (9)
	Instrumental Variables								
bengkok	0.229***	0.188***	0.141**	0.032	0.027	−0.021	−0.083***	−0.143***	−0.113**
	(0.064)	(0.056)	(0.056)	(0.050)	(0.073)	(0.081)	(0.030)	(0.034)	(0.052)
Observations	945	802	499	946	803	499	946	803	499
Mean Dep. Var	0.00	0.00	0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00
First Stage F Statistic	12.9	13.9	9.0	12.9	13.9	9.0	12.9	13.9	9.0

Note: Source: Village Census (PODES) data. Pooled regressions at tri-annual podes level for all available village census years between 1983 to 2014. All Z-scores calculated using per-capita measures. Infrastructure z-score includes 3 indicator variables which equal 1 if the village has a road passable by 4wd vehicle, if the village has safe garbage disposal, or if the village has safe water. Health: number of health posts *posyandu*, supplementary health posts and number of doctors. Schools: Kindergartens, (non-)religious primary and junior high schools Controls: Village-level mean elevation & slope, survey-year and border segment fixed effects

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

Table 6: Historical Public Goods Provision, Fuzzy RD

	Z-Score Schools, 1983					
	INPRES			Non-INPRES		
Sample Within:	30 km (1)	20 km (2)	10 km (3)	30 km (4)	20 km (5)	10 km (6)
	Instrumental Variables					
bengkok	−0.167	−0.135	0.052	0.406***	0.226***	0.153**
	(0.105)	(0.089)	(0.077)	(0.145)	(0.064)	(0.075)
Observations	188	160	100	188	160	100
Mean Dep. Var	0.00	-0.00	0.00	0.00	-0.00	-0.00
First Stage F Statistic	11.7	12.2	7.4	11.7	12.2	7.4

Note: Source: 1983 Village Census (PODES) data. Unit of observation is at the village level. Outcome in columns (1) - (3) is the standardized per capita z-score of number of INPRES schools in the village. Outcome in columns (4) - (6) is the standardized per capita z-score of number of non-INPRES village schools. Smaller N is due to difficulty in merging historical village census data with modern-day villages. Controls: Village-level mean elevation, slope and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table 7: Village Revenue: Fuzzy RD

	Village Revenue, IHS					
	Supra-Village			Intra-Village		
Sample Within:	30 km	20 km	10 km	30 km	20 km	10 km
	(1)	(2)	(3)	(4)	(5)	(6)
	Instrumental Variables					
bengkok	0.191***	0.142***	0.155***	0.341***	0.277***	0.219***
	(0.037)	(0.040)	(0.045)	(0.086)	(0.060)	(0.053)
Observations	764	648	404	764	648	404
Mean Dep. Var	11.34	11.35	11.39	11.84	11.85	11.89
First Stage F Statistic	12.7	13.6	9.1	12.7	13.6	9.1

Note: Unit of observation is at the village level. All variables are inverse hyperbolic sine-transformed. Outcome in column (1) - (3) is the amount of funds that a village reports having received from Central, Provincial and District governments. Outcome in column (4) - (6) is the amount of funds that a village reports having received from internal village sources such as village own taxes. Source: Village census 1996, 2003, 2008 and 2011. Controls: Village-level mean elevation, slope, survey-year and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table 8: Candidate Quality: Education (1979-2014), Fuzzy RD

	Years of Education		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
	Instrumental Variables		
bengkok	0.356***	0.241***	0.155*
	(0.068)	(0.063)	(0.089)
Observations	2136	1769	1103
Mean Dep. Var	10.89	10.95	11.06
First Stage F Statistic	22.70	20.30	11.05

Note: Unit of observation is at the village chief candidate level. Outcome in column (1) - (3) is the number of years of education received by a village chief candidate that ran for office between 1979 - 2014, from survey data. Controls: Village-level mean elevation, slope, indicator if election took place before 1999 and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table 9: Candidate Quality: Occupation (1979-2014), Fuzzy RD

Sample Within:	High Wages			(Ex-)Civil Servants			Low Wages		
	30 km (1)	20 km (2)	10 km (3)	30 km (4)	20 km (5)	10 km (6)	30 km (7)	20 km (8)	10 km (9)
	Instrumental Variables								
bengkok	0.001	0.010	0.011	0.036***	0.017**	0.019**	0.013	0.007	0.013
	(0.008)	(0.008)	(0.008)	(0.012)	(0.007)	(0.008)	(0.013)	(0.014)	(0.009)
Observations	2204	1821	1137	2204	1821	1137	2204	1821	1137
Mean Dep. Var	0.11	0.11	0.12	0.21	0.22	0.21	0.23	0.23	0.23
First Stage F Statistic	22.5	21.2	11.9	22.5	21.2	11.9	22.5	21.2	11.9

Note: Unit of observation is at the village chief candidate level. All outcomes are coded from previous occupations of all chief candidates that ever ran for office between 1979 - 2014 from survey data. Outcome in column (1) - (3) is an indicator for whether the candidate held a high wage occupation which includes occupations like businessman, rice paddy huller and equivalent. Column (4) - (6) is an indicator for whether the candidate was previously a career bureaucrat (*PNS*) Column (7) - (9) is an indicator for whether the candidate held a low wage occupation such as day-wage (farm) laborers. Controls: Village-level mean elevation, slope, indicator for whether election took place before or after 1999 democratization and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table 10: Chief Characteristics: Education, Fuzzy RD

Sample Within:	Years of Education, Chiefs (1979-2014)		
	30 km (1)	20 km (2)	10 km (3)
	Instrumental Variables		
bengkok	0.318***	0.143	0.057
	(0.111)	(0.154)	(0.191)
Observations	873	735	456
Mean Dep. Var	11.07	11.14	11.21
First Stage F Statistic	22.2	22.9	13.9

Note: Unit of observation is at the village chief level. Outcome in column (1) - (3) is the years of education received by each village chief that ran for office between 1979 - 2014 from survey data. Controls: Village-level mean elevation, slope, indicator if election took place before 1999 and border fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table 11: Candidate Characteristics: Differencing out Average Village Education, Fuzzy RD

Sample Within:	Differences in Years of Education		
	30 km	20 km	10 km
	(1)	(2)	(3)
	Instrumental Variables		
bengkok	0.073	−0.015	−0.061
	(0.094)	(0.090)	(0.104)
Observations	2136	1769	1103
Mean Dep. Var	3.98	4.01	3.98
First Stage F Statistic	22.7	20.3	11.1

Note: Unit of observation is at the village chief candidate level. Outcome in column (1) - (3) is the years of education received for each village chief candidate that ran for office between 1979 - 2014 from survey data substracted by average years of education in the candidate's village for individuals aged 25-70 from Census 2010 data. Controls: Village-level mean elevation, slope, indicator if election took place before 1999 and border fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table 12: Re-Election Incentives: Fuzzy RD

Sample Within:	=1 if Incumbent					
	Re-Ran For Office			Was Re-Elected		
	30 km	20 km	10 km	30 km	20 km	10 km
	(1)	(2)	(3)	(4)	(5)	(6)
	Instrumental Variables					
bengkok	−0.024*	−0.002	−0.006	0.061**	0.067**	−0.028
	(0.012)	(0.019)	(0.014)	(0.025)	(0.033)	(0.027)
Observations	906	763	471	170	150	84
Mean Dep. Var	0.18	0.19	0.17	0.46	0.47	0.44
First Stage F Statistic	20.7	22.0	13.4	45.1	39.5	23.1

Note: Unit of observation is at the village chief level. Outcome in column (1) - (3) is an indicator variable that equals 1 if an incumbent chief re-ran for office in the next immediate election term. Outcome in column (4) - (6) is an indicator variable that equals 1 if an incumbent chief re-ran and won in the next immediate election term. Source: Original survey data. Controls: Village-level mean elevation, slope, an indicator for whether the election took place before 1999 and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table 13: Orientation towards Elite Interests: Voting for Golkar in 1999, Fuzzy RD

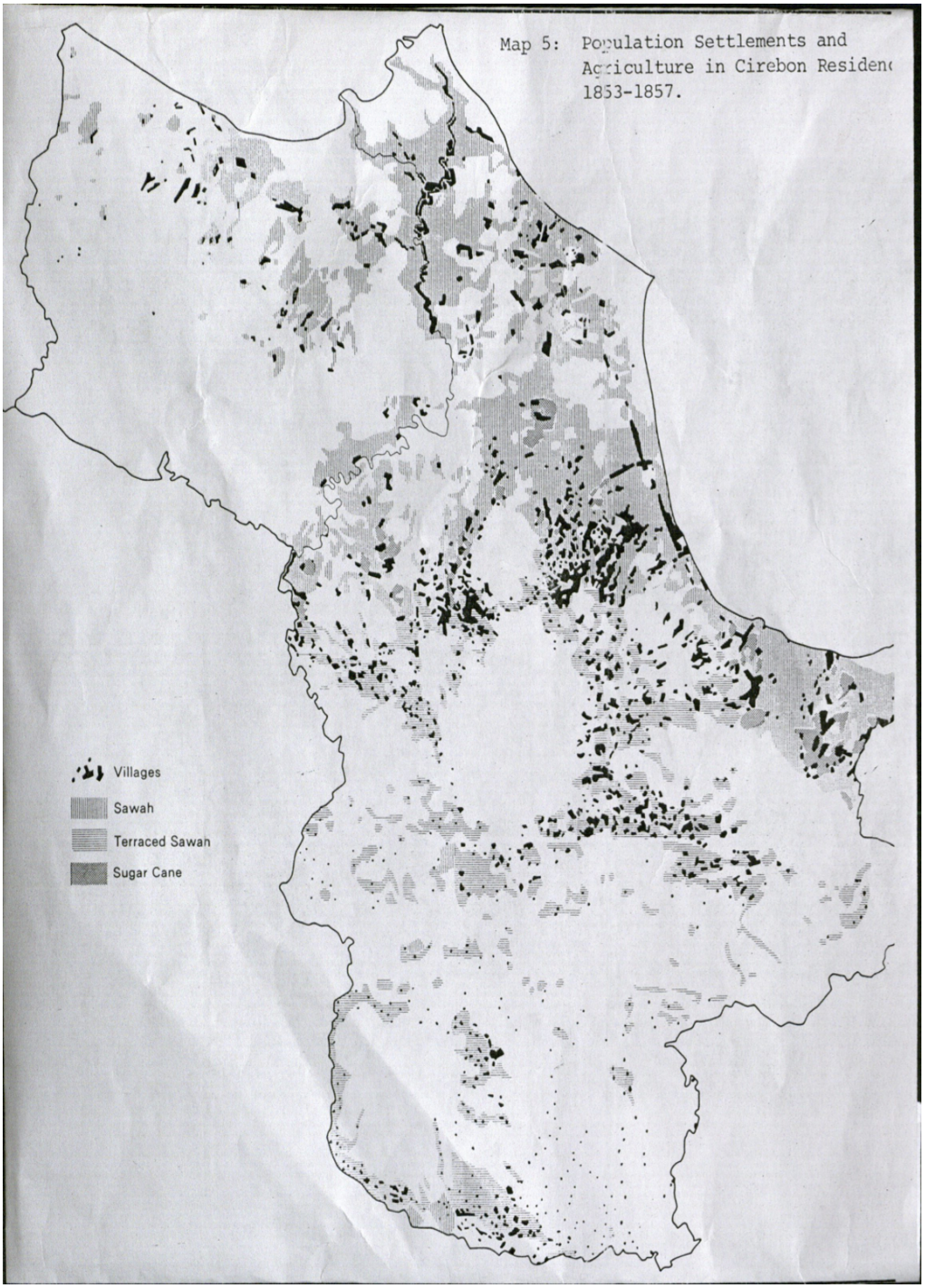
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
	Instrumental Variables		
bengkok	−0.184***	−0.146**	−0.105**
	(0.052)	(0.057)	(0.053)
Observations	191	162	101
Mean Dep. Var	0.32	0.29	0.30
First Stage F Statistic	12.2	13.0	8.4

Note: Unit of observation is at the village level. Outcome in column (1) - (3) is an indicator that equals 1 if Golkar received the most number of votes in 1999, the first elections after the end of Soeharto's rule in 1998. Source: 2000 village census data. Controls: Village-level mean elevation, slope and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Appendix: Additional Figures and Tables

Figure A.1: Map of Agricultural Cultivation in Cirebon Residency, 1853



This map shows, shaded in dark grey, that there was no sugar cultivation along my study border in the south of Cirebon. The only pockets of sugar cane cultivation lay along the middle portion of the Priangan-Cirebon border and in Central Cirebon, away from my study border. Source: Fernando (1982).

Figure A.2: 1853 Dutch Maps

These maps were created by Dutch cartographers simultaneously with a village-level land use survey at a scale of 1:2 500 (1cm to 25m). Reproduction was allowed only after those in charge of statistical survey declared that land use was displayed correctly.

Table A.1: Moonlighting, Whether Chief Had Second Job While in Office: Fuzzy RD

	=1 if Missing Response			=1 if Chief Had Second Job		
Sample Within:	30 km	20 km	10 km	30 km	20 km	10 km
	(1)	(2)	(3)	(4)	(5)	(6)
bengkok	0.034	0.016	0.036	0.103**	0.097**	0.115
	(0.041)	(0.041)	(0.040)	(0.044)	(0.046)	(0.084)
Observations	339	281	185	264	218	144
Mean Dep. Var	0.23	0.23	0.22	0.54	0.55	0.49
First Stage F Statistic	10.0	8.8	4.0	7.9	7.4	3.7

Note: Unit of observation is at the village chief level. Outcome in columns (1) - (3) is an indicator variable that equals 1 if a chief reported having had a second job during his term of office. Sample in columns (1) - (3) includes all past and present village chiefs who had a non-missing response and is smaller because of non-responses. Outcome in columns (4) - (6) is an indicator variable that equals 1 if a chief did not respond to the question of whether he had a second job while in office. Source: Original survey data. Controls: Village-level mean elevation, slope, an indicator for whether the election took place before 1999 and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.2: Contemporary Development, Light Intensity: Robustness to Alt. RD Polynomials

	Nighttime Light Intensity, IHS		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
Baseline	0.114*	0.165***	0.208***
	(0.060)	(0.046)	(0.054)
Quad. in Lat. Lon.	0.094***	0.087***	0.082***
	(0.016)	(0.020)	(0.024)
Cubic in Lat. Lon.	0.126***	0.144***	0.102***
	(0.023)	(0.023)	(0.026)
Cubic in Distance	0.205***	0.196***	0.128***
	(0.040)	(0.033)	(0.027)
Observations	3820	3240	2020
Mean Dep. Var	2.18	2.32	2.49

Note: This table reports estimates from variants of equation (1) using outcomes of nighttime light intensity as in Panel A of Table 4. Unit of observation is at the village level and baseline specification includes baseline controls of elevation, slope and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.3: Contemporary Development, % Children Died: Robustness to Alt. RD Polynomials

	% Children Died		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
Baseline	−0.625***	−0.583***	−0.474***
	(0.211)	(0.210)	(0.158)
Quad. in Lat. Lon.	−0.443***	−0.467***	−0.341*
	(0.141)	(0.167)	(0.195)
Cubic in Lat. Lon.	−0.489**	−0.393***	−0.321*
	(0.226)	(0.134)	(0.168)
Cubic in Distance	−0.480***	−0.450***	−0.376***
	(0.082)	(0.064)	(0.042)
Observations	21709	17947	11027
Mean Dep. Var	2.43	2.41	2.23

Note: This table reports estimates from variants of equation (1) using outcomes of number of dead children as proportion of total children ever born as in Panel B of Table 4. Unit of observation is at the individual level and baseline specification includes baseline controls of village-level elevation, slope, 5-year cohort, and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.4: Contemporary Development, Years of Education, Villagers: Robustness to Alt. RD Polynomials

	Years of Education, Villagers		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
Baseline	0.208**	0.177***	0.233***
	(0.090)	(0.050)	(0.065)
Quad. in Lat. Lon.	0.153***	0.173***	0.169*
	(0.040)	(0.057)	(0.090)
Cubic in Lat. Lon.	0.154***	0.192***	0.191*
	(0.048)	(0.067)	(0.099)
Cubic in Distance	0.230***	0.239***	0.168***
	(0.040)	(0.040)	(0.029)
Observations	204189	173744	113862
Mean Dep. Var	6.50	6.55	6.67

Note: This table reports estimates from variants of equation (1) using outcomes of the number of years of education of each villager as reported in the 2010 Indonesian Population Census as in Panel C of Table 4. Unit of observation is at the individual level and baseline specification includes baseline controls of village-level elevation, slope, 5-year cohort, and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.5: Contemporary Development, Light Intensity: Robustness to Additional Controls

	Nighttime Light Intensity, IHS		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
Baseline	0.114*	0.165***	0.208***
	(0.060)	(0.046)	(0.054)
Controls: Agriculture	0.103*	0.156***	0.215***
	(0.054)	(0.032)	(0.064)
Controls: Geography	0.100	0.090***	0.123***
	(0.071)	(0.034)	(0.020)
Controls: Government	0.089*	0.129**	0.213***
	(0.050)	(0.052)	(0.060)
Observations	3820	3240	2020
Mean Dep. Var	2.18	2.32	2.49

Note: This table reports estimates from variants of equation (1) using outcomes of nighttime light intensity as in Panel A of Table 4. Unit of observation is at the village level and baseline specification includes baseline controls of elevation, slope and border segment fixed effects. Agricultural controls include rice potential yield and coffee potential yield. Geographical controls include, in addition to elevation and slope in the baseline, ruggedness and drainage. Government controls are proxies for ease of government access and includes distance to sub-district and district capital. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.6: Contemporary Development, % Children Died: Robustness to Additional Controls

	% Children Died		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
Baseline	−0.625***	−0.583***	−0.474***
	(0.211)	(0.210)	(0.158)
Controls: Agriculture	−0.642***	−0.575***	−0.378***
	(0.171)	(0.149)	(0.095)
Controls: Geography	−0.620*	−0.504*	−0.286**
	(0.361)	(0.258)	(0.142)
Controls: Government	−0.647***	−0.695***	−0.720**
	(0.226)	(0.268)	(0.317)
Observations	21709	17947	11027
Mean Dep. Var	2.43	2.41	2.23

Note: This table reports estimates from variants of equation (1) using outcomes of number of dead children as proportion of total children ever born as in Panel B of Table 4. Unit of observation is at the individual level and baseline specification includes baseline controls of elevation, slope, 5-year cohort, and border segment fixed effects. Agricultural controls include rice potential yield and coffee potential yield. Geographical controls include, in addition to elevation and slope in the baseline, ruggedness and drainage. Government controls are proxies for ease of government access and includes distance to sub-district and district capital. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.7: Contemporary Development, Years of Education, Villagers: Robustness to Additional Controls

	Years of Education, Villagers		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
Baseline	0.208**	0.177***	0.233***
	(0.090)	(0.050)	(0.065)
Controls: Agriculture	0.226**	0.176***	0.202***
	(0.088)	(0.033)	(0.048)
Controls: Geography	0.185	0.087	0.162**
	(0.150)	(0.058)	(0.065)
Controls: Government	0.215**	0.158***	0.267**
	(0.092)	(0.059)	(0.109)
Observations	204189	173744	113862
Mean Dep. Var	6.50	6.55	6.67

Note: This table reports estimates from variants of equation (1) using outcomes of the number of years of education of each villager as reported in the 2010 Indonesian Population Census as in Panel C of Table 4. Unit of observation is at the individual level and baseline specification includes baseline controls of elevation, slope, 5-year cohort, and border segment fixed effects. Agricultural controls include rice potential yield and coffee potential yield. Geographical controls include, in addition to elevation and slope in the baseline, ruggedness and drainage. Government controls are proxies for ease of government access and includes distance to sub-district and district capital. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.8: Colonial Administrative Policy

	Panel A: 1853 Maps								
	% Village Land Settled			% Village Land Grew Coffee			1853 Road Density		
sample within:	30 km	20 km	10 km	30 km	20 km	10 km	30 km	20 km	10 km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
bengkok	0.998	2.583	4.973**	3.456**	4.201**	5.049***	0.732**	0.790**	1.237***
	(2.108)	(2.415)	(1.979)	(1.611)	(1.790)	(1.192)	(0.317)	(0.398)	(0.432)
Observations	193	164	103	193	164	103	193	164	103
Mean Dep. Var	6.11	7.09	9.58	2.05	2.33	2.69	1.52	1.78	2.13
	Panel B: 1945 Maps								
	1945 Road Density			1945 Rail Density					
sample within:	30 km	20 km	10 km	30 km	20 km	10 km			
	(1)	(2)	(3)	(4)	(5)	(6)			
bengkok	−1.431*	0.160	1.817***	−0.716***	−0.619***	−0.310			
	(0.761)	(0.763)	(0.528)	(0.253)	(0.229)	(0.240)			
Observations	193	164	103	193	164	103			
Mean Dep. Var	4.27	4.64	5.44	0.32	0.38	0.56			

Note: Unit of observation is village-level. I include border fixed effects. All measures calculated from 1853 Dutch maps overlaid over 2000 village border polygons. The unit of measure for road and rail density is meters per hectare. In successive columns, I limit the sample to include only villages located less than 30km, 20km, and 10km from the historical Cirebon-Priangan Residency boundary. Conley standard errors for difference in means between Cirebon and Priangan villages are in brackets (assuming a cut-off window of 30km).

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

Table A.9: Contemporary Development, Light Intensity: Robustness to Differences in Colonial Administration

	Nighttime Light Intensity, IHS		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
Baseline	0.114*	0.165***	0.208***
	(0.060)	(0.046)	(0.054)
% Land Settled 1853	0.116*	0.157***	0.191***
	(0.065)	(0.053)	(0.062)
% Grew Coffee 1853	0.126**	0.172***	0.219***
	(0.064)	(0.050)	(0.058)
1853 Road Density	0.111*	0.161***	0.197***
	(0.059)	(0.044)	(0.054)
1945 Road Density	0.134**	0.165***	0.195***
	(0.056)	(0.042)	(0.059)
1945 Rail Density	0.122*	0.168***	0.208***
	(0.067)	(0.052)	(0.052)
Observations	3820	3240	2020
Mean Dep. Var	2.18	2.32	2.49

Note: This table reports estimates from variants of equation (1) using outcomes of nighttime light intensity as in Panel A of Table 4. Unit of observation is at the village level and baseline specification includes baseline controls of elevation, slope and border segment fixed effects. Each additional row includes the control variables as stated in the row header. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.10: Contemporary Development, % Children Died: Robustness to Differences in Colonial Administration

	% Children Died		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
Baseline	−0.625***	−0.583***	−0.474***
	(0.211)	(0.210)	(0.158)
% Land Settled 1853	−0.620***	−0.584***	−0.463**
	(0.197)	(0.217)	(0.197)
% Grew Coffee 1853	−0.647***	−0.609***	−0.501***
	(0.234)	(0.234)	(0.172)
1853 Road Density	−0.632***	−0.587***	−0.489***
	(0.222)	(0.224)	(0.186)
1945 Road Density	−0.634***	−0.584***	−0.480***
	(0.212)	(0.201)	(0.158)
1945 Rail Density	−0.573***	−0.550***	−0.481***
	(0.188)	(0.193)	(0.168)
Observations	21709	17947	11027
Mean Dep. Var	2.43	2.41	2.23

Note: This table reports estimates from variants of equation (1) using outcomes of number of dead children as proportion of total children ever born as in Panel B of Table 4. Unit of observation is at the individual level and baseline specification includes baseline controls of elevation, slope, 5-year cohort, and border segment fixed effects. Each additional row includes the control variables as stated in the row header. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.11: Contemporary Development, Years of Education, Villagers: Robustness to Differences in Colonial Administration

	Years of Education, Villagers		
Sample Within:	30 km	20 km	10 km
	(1)	(2)	(3)
Baseline	0.208**	0.177***	0.233***
	(0.090)	(0.050)	(0.065)
% Land Settled	0.208**	0.167***	0.216***
	(0.095)	(0.056)	(0.072)
% Grew Coffee	0.191**	0.156***	0.209***
	(0.084)	(0.043)	(0.060)
1853 Road Density	0.207**	0.173***	0.228***
	(0.093)	(0.050)	(0.068)
1945 Road Density	0.222***	0.177***	0.220***
	(0.085)	(0.047)	(0.068)
1945 Rail Density	0.204**	0.176***	0.235***
	(0.084)	(0.049)	(0.067)
Observations	204189	173744	113862
Mean Dep. Var	6.50	6.55	6.67

Note: This table reports estimates from variants of equation (1) using outcomes of the number of years of education of each villager as reported in the 2010 Indonesian Population Census as in Panel C of Table 4. Unit of observation is at the individual level and baseline specification includes baseline controls of elevation, slope, 5-year cohort, and border segment fixed effects. Each additional row includes the control variables as stated in the row header. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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

Table A.12: Top-Down Provision of Roads Across the RD Border

	2017 Roads					
	Intercity			Local		
Sample Within:	30 km	20 km	10 km	30 km	20 km	10 km
	(1)	(2)	(3)	(4)	(5)	(6)
cirebon border	−0.534	−0.536	−0.032	0.433	−0.182	0.017
	(0.602)	(0.681)	(0.651)	(3.247)	(2.920)	(2.889)
Observations	193	164	103	193	164	103
Mean Dep. Var	2.48	2.66	2.67	18.24	19.27	20.52

Note: Unit of observation is at the village level. Outcome in column (1) - (3) is intercity road density in 2017. Outcome in column (4) - (6) is local road density in 2017. Road density is calculated by dividing total road length (metres) within each village polygon by the size of each village polygon (hectares). Source: IRMS Indonesian Data. Controls: Village-level mean elevation, slope, and border segment fixed effects. Conley standard errors allowing for spatial autocorrelation within cutoff of 30km is used.

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