Resource Windfalls and Public Goods: Evidence From a Policy Reform*

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Abstract

In this paper, we outline an empirical approach for understanding whether natural resource windfalls have a positive or negative impact on local governments' provision of public goods. The literature on the curse of natural resources suggests that resource windfalls might not necessarily lead to good economic outcomes and that rents might be squandered in corruption and rent seeking. In order to identify the impact of natural resources on local government behavior, we exploit a country-wide fiscal decentralization reform in Indonesia, providing producing provinces a direct share of resource revenues. Our identification strategy is to compare villages along the border of three producing provinces in Sumatra and Kalimantan before and after the legislative change. Detailed descriptive statistics on district government budgets confirm the goodness of the research design. Regression analysis on a wide range of public goods suggests that the revenue windfall had a positive impact on the prevalence of high schools and various other public goods. We find no evidence of a resource curse.

Key words: Natural Resource Curse; Oil; Fiscal Decentralization; Public Goods.

JEL Classification codes: E62,H11,H41,H71,H72,O11,O13,Q32,Q33.

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1 Introduction

Several developing countries around the world are currently enjoying a strong boom in natural resource revenues. Very high world market prices of oil and minerals have resulted in abnormal growth rates in some very poor countries and to an intensive prospecting activity even in countries that were previously not extracting such resources.

At the same time, there is a widespread awareness that resource rents do not necessarily provide a foundation for sustainable economic development. In the very extensive literature on the *curse of natural resources*, it has been shown that countries with substantial natural resource rents often have had a relatively weak economic performance compared to resource-poor countries. Several intermediate channels for this adverse impact have been proposed; Dutch disease effects from currency appreciation, a crowding out of education and innovation, and a higher degree of rent seeking and corruption.[1] In particular, the political economy of the resource curse has received a lot of attention during recent years.[2] However, this mainly theoretical or macro-oriented literature has so far not been able to document many cases of how resource windfalls have actually been used in the public sector. Given this shortcoming, is has been difficult to provide evidence-based policy advice to governments that are concerned about being affected by the resource-curse.

In this paper, we analyze the impact of a country-wide reform from 2001 that decentralized Indonesia's resource revenues (oil and gas) from the federal government to provinces. Our analysis investigates the effect of these windfall gains on local public goods provision in two resource-rich regions; Sumatra and the Indonesian part of Borneo, Kalimantan. The reform allowed resource producing provinces to obtain a percentage of the natural resource revenues collected by the central government. The objective of our study is to determine whether this policy reform actually led to more local public goods such as schools, health clinics, and infrastructure. The main hypothesis is that local public goods should have increased. However, evidence on the resource curse from other countries would rather suggest no impact

[1] See for instance Sachs and Warner (1997), Sachs and Warner (2001), and Gylfason (2001). van der Ploeg (2011) supplies a recent overview of the literature.

[2] See for instance Torvik (2002) and Robinson, Torvik, and Verdier (2006).

or perhaps even a negative impact.

The main contribution of our paper is the research design that we propose for studying the question at hand. Our identification strategy in the empirical analysis is to compare public good outcomes in villages located in producing provinces with neighboring villages across the border in non-producing provinces, before and after the reform. The first category makes up our treatment group (that obtained resource revenues) whereas the second category is our control group (that received no resource revenue). We argue that this design makes our study close to a natural experiment. Our data allows us to study public goods outcomes during the period 2001-2005. We employ a regression discontinuity design with the border between the producing and non-producing provinces as our forcing variable. The descriptive statistics as well as a broad general analysis of the characteristics of the provinces suggest that no key differences exist between treatment and control areas apart from the fact that the treated districts receive resource revenues.

The results are mixed. In general, there are no indications of a decrease in public goods as a result of the reform. In this sense, we find no evidence of a resource curse. Our results suggest that high school facilities tended to improve in treated villages, in particular 3-4 years after the decentralization. We also find evidence that other public goods improve, but they vary across the two study areas. For other public goods like access to clean water, the reform appears to have no impact on either Sumatra or Kalimantan.

Our results are related to a small but growing literature on the impact of resource windfalls within countries. Apart from Indonesia, Brazil has also chosen to decentralize oil revenues to producing areas. Using data on Brazilian municipalities, Monteiro and Ferraz (2009) show that oil revenue appears to have led to an increase in the number of public employees but not to the provision of public goods like health and education. Their main focus is on political economy aspects and their analysis demonstrates that the windfall created a large incumbency advantage in local elections. In their empirical analysis, the authors further analyze how oil revenues affected policy outcomes. The central result in this regard is that whereas oil windfalls increased the number of public employees, they had no significant impact on education or health supply.

Oil windfalls in Brazil is also the topic in Brollo, Nannicini, Perotti, and Tabellini (Forthcoming) and Caselli and Michaels (Forthcoming). Both recognize that municipalities with oil revenues have increased their spending, but like Monteiro and Ferraz (2009), these studies emphasize that the increased spending has not improved public goods as much as one would have expected. Caselli and Michaels (Forthcoming) further show that oil windfalls are associated with illegal activities by mayors, suggesting an increase in corrupt behaviors. Brollo, Nannicini, Perotti, and Tabellini (Forthcoming) use a regression discontinuity design and provide evidence that larger windfalls increase corruption and lower the quality of political candidates on the local level.[3]

Our paper obviously makes a contribution by having a different and, for this purpose, a novel object of study; Indonesia. Our research design is further different since we use a border between a producing and a non-producing province as our forcing variable and exploit the time variation in public goods outcomes. The methodology that we employ is most similar to Dell (2010) who also uses a border as a forcing variable in a historical analysis of the long-run legacy of a colonial institution in Peru.

Our quasi-experimental approach is further related to the large literature on randomized control trials in developing countries (see for instance Duflo, Glennerster, and Kremer (2007)). In recent research, it has often been emphasized that an up-scaling of micro field experiments is a natural direction for future work. The current paper might be seen as an attempt to contribute to this agenda. Furthermore, our approach is related to that of Reinikka and Svensson (2004) who study the extent to which a new grant from the Ugandan government actually reached 250 schools. In a similar spirit, we also combine data on grants from a central government with village level data on actual public good provision.

Our paper is also related to a large literature on the pros and cons of fiscal decentralization. Many of these works use cross-country regressions to assess whether fiscal decentralization is associated with higher economic growth.[4] Other studies use cross-regional variation within

[3] See also Vicente (2010) who compares outcomes in Sao Tome and Principe with Cape Verde as a "control country".

[4] See for instance Davoodi and Zou (1998).

large countries such as United States (Akai and Sakata (2002)) or China (Zhang and Zou (1998)). Our paper is closest to Skoufias, Narayan, Dasgupta, and Kaiser (2011) analysis of the recent reform towards direct elections in districts in Indonesia, showing that the electoral reforms had a positive impact public goods spending. Unlike their study, our treatment is resource windfalls rather than the introduction of direct elections.

The paper is structured as follows: Section 2 gives a brief theoretical background to the political economy of resource windfalls. Section 3 provides information about the context of the study and section 4 discusses the data and identification strategy. The main results are presented in section 5. Section 6 provides the details for the second study area whereas section 6 concludes.

2 The political economy of resource windfalls

From a policy point of view, there are at least four potential strategies that countries can choose regarding resource revenues. The most common strategy when it comes to oil and gas is probably to maintain a close central government control of the extraction process and then keep all the revenue at the center at the full discretion of the incumbent government. This is the path chosen by many African and Middle Eastern countries such as Sudan, Nigeria, and Saudi Arabia. This is also the policy associated with the most blatant failures. As discussed by Sala-i Martin and Subramanian (2003), Nigeria experienced a massive inflow of oil money from the 1970s, yet income per capita in the late 1990s was not higher than at independence. More or less all of the revenue disappeared inside corrupt governments. Several cross-country empirical studies have further indicated that natural resource revenues are associated with more corruption (Leite and Weidmann (1999); Dalgaard and Olsson (2008)).

A second strategy is to keep revenues on central level but to save (or "lock up") the money in a fund that cannot be used freely by incumbent governments. This strategy has been followed by Norway and seems to be appropriate in rich countries that face the risk of Dutch disease through an appreciation of their exchange rates. As argued by Collier (2008), the oil fund-strategy seems less appropriate for poor countries that are seriously constrained by poor infrastructure and low levels of health care and education. In such countries, large scale public investments are often necessary to maintain a sustainable growth process.

A third strategy, which does not seem to have ever been tried in reality, is to redistribute all resource incomes back to the households. Sala-i Martin and Subramanian (2003) suggested such a policy for Nigeria. Although such a policy would of course have great risks and great difficulties (how should such payments be distributed, for instance), the authors contend that it should at least not lead to a worse outcome than the previously followed policy in Nigeria of keeping all revenue at the discretion of the government.

A fourth alternative, which actually has been tried in at least Brazil and Indonesia, is to redistribute a substantial portion of resource revenues to the regional or local level. Local governments would typically at the same time get an increased responsibility for providing public goods. What are the potential benefits and disadvantages of this strategy?

To the extent that the public goods to be provided are truly local, a greater local autonomy over their provision should improve the matching between local preferences and the policy choices made. On the other hand, if there are obvious economies of scale involved or if the public goods are not necessarily only local (like roads that run through several districts), policy decisions should be made at a higher administrative level.

However, even if the public goods are truly local, it is not necessarily the case that a boom in resource revenues will lead to more public goods. The actual outcome will typically depend crucially on the nature of local political institutions.[5] On a macro level, it has been shown that environments with strong private property rights and more accountable governments are more likely to experience economic growth in response to resource booms (Mehlum, Moene, and Torvik (2006)). On the micro level, we have mainly the Brazilian studies to use as a benchmark. Although local governments were democratically elected in the studied municipalities, the main tendency appeared to be that the actual quality or quantity of public goods did not really increase, although spending did increase. Even in democratic settings such as Brazilian municipalities, resource windfalls might thus not lead to better economic outcomes.

[5] The analysis in Reinikka and Svensson (2004) shows for instance how local governments typically captured a substantial share of grants intended for schools in Uganda.

The country that we analyze in this study is Indonesia which experienced similar fiscal decentralization reforms as Brazil and a similar boom in oil revenues. The main research topic is whether resource windfall gains resulted in an increase in local public goods provision. Judging from existing studies, our main hypothesis is that resource windfalls should lead to more public goods, although we recognize that such an effect cannot be taken for granted due to the potentially confounding impact of local political institutions.

3 Context of study

3.1 The 1999 Fiscal Decentralization Reform

The Indonesian administrative structure is composed of different levels: central government, provinces (like US states), districts (US counties), sub-districts and villages. During the 1966-1998 autocratic regime, most of the power was retained by the central government. After the fall of Suharto, the government undertook a massive decentralization process and redistributed a large part of this power to districts. The transfer of authority concerned all fields other than macro-policies[6]: public works, health, education and culture, agriculture, transportation, industry and trade, investment, environment, land, cooperatives, and labor (art 11.2).[7] The reform became law in November 1999 and came into power simultaneously across all Indonesian districts in January 2001.

Laws 22/1999 and 25/1999 regulate the sources of local revenue. They consist of: own income (local taxes and fees, returns from regional-owned enterprises), revenue sharing (local share of taxes, local share of revenues from natural resources) and grants (transfers from the central government). The greatest part of local revenue used to come from transfers from the central government in the pre-decentralization period (called SDO) and continues to be

[6] Macro policies include foreign politics, defense, justice, monetary, fiscal and religious policies.

[7] It is difficult to find additional details on these responsibilities. About education: since 1994 education is mandatory until the 9th grade, therefore districts are particularly responsible for primary and junior-high education. It is not clear how provinces and districts share the responsibility for school building and for hiring and paying teachers. About infrastructures: districts are not directly responsible for electricity provision because that is typically provided by a State-owned enterprise (PLN); they are directly responsible for water provision because that is typically provided by local branches of the water utilities (PDAM). About roads: the central government is directly responsible for highways; provinces are directly responsible for roads crossing more than one district; districts are directly responsible for all the others.

so even after decentralization (DAU and DAK). Among the other sources of income, one was deeply affected by the reform and constitutes the focus of this paper: the redistribution of revenues from natural resources. Natural resources are oil, natural gas, mining, forestry and fishing. While state income from fishing was redistributed equally across all districts, the revenues from all the other resources were redistributed according to location. Table 1 shows the exact shares which went to central and regional governments (art. 6 of Law 25/1999).

Following decentralization, the central government retained a lower percentage of the natural resource tax revenues, while resource-abundant districts retained a greater percentage. Resource-abundant districts (henceforth: producing districts) were not the only beneficiaries of this re-allocation. The fiscal decentralization law states also that non-producing districts within producing provinces are entitled to a share of natural resource tax revenues. This share varies depending on the type of natural resource (see table 1). Although it is relatively high for forestry and mining and low for oil and gas, the latter are a lot more valuable. Therefore, this legislative change not only provides producing districts with a substantial share of the resource revenues, but also redistributes another share to districts located nearby. A noticeable feature of the revenue sharing originating from natural resources is that the law does not specify how the receiving districts should spend these additional revenues, i.e. there are no obligations attached to them.

Table 1: Allocation of revenues from natural resources (percentages)

Period	< 2001			≥ 2001			
Type	Centre	Province	Districts	Centre	Province	Districts	
		Prod.	Prod.		Prod.	Prod.	Non-prod.
Oil	100.0	0.0	0.0	84.5	3.1	6.2	6.2
Gas	100.0	0.0	0.0	69.5	6.1	12.2	12.2
Mining, rent	65.0	19.0	16.0	20.0	16.0	6.4	0.0
Mining, royalty	30.0	56.0	14.0	20.0	16.0	3.2	32.0
Forestry	55.0	30.0	15.0	20.0	16.0	3.2	32.0

Source: World Bank (1994) and Law 25/1999

3.2 Study areas: Sumatra and Kalimantan

The two areas that we study in this paper are Sumatra and the Indonesian part of Borneo (Kalimantan). There are several oil and gas producing provinces in Indonesia. However, only few of them produce a quantity of oil and gas that qualifies transfers to non-producing districts located in producing provinces greater than 5 percent of their district budget. These provinces are located in Sumatra and Kalimantan. Figures 1-2 show the distribution of oil and gas revenues on province and district level on Sumatra. As the Figures show, the most central province, called Riau, has received substantial new revenues from natural resources after the recent reform and so has the province of South Sumatra. Also the northern province, Aceh, receives large flows of rents. However, this province has for a long time sought independence from Indonesia and has been plagued by civil strife. Aceh is also one of the provinces that was hardest hit by the 2004 tsunami, just like all the provinces with shores along the Sumatran west coast.[8] In order to avoid these confounding effects, our main analysis will exclusively focus on the provinces Riau and South Sumatra as treatment regions and its neighboring districts in North Sumatra in the northwest and Jambi in the south as control regions.

Our main approach is thus to use the areas along the borders of natural resource-rich Riau and South Sumatra to identify the impact of resource-related revenues on public good provision on Sumatra. The dotted lines in Figure 3 specify more exactly the borders that we focus on in this part of the study. In the empirical section, we will use data from villages that are 200-300 km from the border on each side.

Spatial RD designs require all determinants of the outcome of interest to change *smoothly* at the border. One potential threat to this econometric methodology is that the province border was drawn in correspondence of geographic or human cleavages which are themselves correlated with the provision of public goods (see for instance Dell (2010)). Figure 3 shows the geography of our treatment and control areas. The Figure shows that there are no obvious discontinuities along the border in terms of terrain. Jambi, located in between the two treatment areas, has a very similar lowland geography to Riau and South Sumatra,

[8]The big tsunami in december 2004 had its epicenter in the Indian Ocean right west of Aceh. Hence, Aceh and the provinces on the western coast of Sumatra were affected but not the eastern coasts.

whereas North Sumatra has lowland plains close to the border but also mountains in the west. In the empirical section, we discuss further how we exclude mountain villages in order to check robustness.

As Figure 3 shows, Riau is located by the Strait of Malacca and has the Singapore and Kuala Lumpur metropolitan areas as neighbors across the strait. Riau province has currently about 5.5 million inhabitants and has experienced a steady growth of population and of its economy since the 1970s, largely due to natural resource exploitation. South Sumatra's population is about 7.4 million. The capital city, Palembang, hosts about 1.5 million of the province's inhabitants. Jambi's population is about 3 million whereas North Sumatra's is about 12 million, according to the 2010 census. Population density on the island as a whole is just below 100 people per km^2. In the four provinces in our study, population density is fairly evenly distributed apart from coastal North Sumatra which has a higher population density than the other areas. Malay is the main language spoken in Riau and other dialects of the same family are also the main tongue in Jambi and in South Sumatra. In the interior of North Sumatra, languages of a somewhat different family dominate (Ethnologue (2009)).[9]

The current situation in the four provinces has of course been heavily influenced by general historical developments on Sumatra. Sumatra hosted several kingdoms after its initial settlement around 500 BC. One of the most dominant polities was the Buddhist Kingdom of Srivijaya, based in South Sumatra's capital Palembang. This maritime power flourished between 850-1025 AD and was a very important trading hub between east and west. After Srivijaya's decline, most of the population on Sumatra converted to Islam by the year 1300 through the influence of Arab and Indian traders. Aceh became the dominant political unit in the 16th century and resisted the increasing Dutch influence until the Aceh War 1873-1903. Trade was always a central part of the Sumatran economy, in particular during the Dutch East Indies-era when Dutch traders dominated the spice trade. In 1945, Sumatra became part of newly independent Indonesia (Ricklefs (2008)).

Although Sumatra is the main focus of our analysis, we also investigate the impact of resource windfalls among the provinces of Kalimantan, the other major oil-producing region

[9] These language are Batak Mandailing, Batak Angkola, and Batak Toba.

in the country. Kalimantan is made up of the Indonesian parts of Borneo. Before the colonial period, the southern parts of Kalimantan belonged to the Banjar sultanate (1526-1860). The Dutch colonial power increased its presence in the 19th century from their bases on Java but the current Indonesian borders of the Dutch colony were not established until in the early 20th century. Kalimantan was always considered a peripheral part of the colony. Like Sumatra, Kalimantan became part of independent Indonesia in 1945.

Kalimantan province split into three provinces in 1956; West, South, and East. The following year, South Kalimantan split into South and the geographically larger Central Kalimantan in order to give the indigenous Dayak population of Central province greater autonomy from the Muslim populations in South Kalimantan. Kalimantan hosts numerous ethnic groups of which the most important language families are Malayic, Barito, Dayak, and North Borneo.[10] A simplified description, Dayak groups dominate the interior whereas Muslim groups control the lands closer to the coast.

In terms of natural resources, Kalimantan is perhaps the richest region in the country, whereas in terms of general wealth, it is relatively undeveloped (like most of the areas outside Java). In terms of population density and the geographic dispersion of economic activity, Kalimantan is similar to the many African countries currently experiencing a resource boom. Total population in 2010 is estimated to be just below 14 million and population density is only 25 people per km^2, which can be compared with Sumatra's 100 people per km^2 and Java's equivalent Figure of over 1000 per sq. km.

East Kalimantan is the only province where oil is produced whereas no oil is produced in South, Central, and West Kalimantan. Our analysis focuses on the border area between East Kalimantan and the other three provinces, as shown in Figure 4. The widest area that we consider includes villages as far as 100 kilometers from the border. We choose this threshold because the treatment area beyond this point is mainly covered by a producing district which we have excluded from the analysis. We also study outcomes at closer distances from the border.

Figure 4 shows the geographic features of the border area. As is evident from the map, the

[10] Data is from Ethnologue (2009). Kalimantan as a whole has 74 distinct languages.

terrain is not obviously different on either side of the border. On the contrary, the topography is typically quite similar on both sides. In terms of ethnicity, our investigations show that at least the southern and central parts of the border cut right through the traditional lands of ethnic groups within the Barito language family.[11] Although we have not found specific reasons which explain why the province border is shaped as it is, we have found no information suggesting that the border was shaped by major discontinuities in colonial or pre-colonial history.

4 Data and identification strategy

4.1 Data

In this paper we make use of village data and district data. The village data come from various waves of the Indonesian Village Census (PODES), collected by the Indonesian National Institute of Statistics (BPS) every three years. We make use of the 1996, 2000, 2003 and 2006 waves.[12] The village censuses include detailed information on geographic characteristics, dwelling and wealth characteristics for the majority of the households, access to infrastructures, economic activities. The main advantage of using these data is that they cover the entire universe of Indonesian villages. This allows us to avoid problems of sample size in our study area. The second advantage is that we can merge these data with detailed information on the location of these villages.[13]

The second type of data that we use is the budget data collected by the Ministry of Finance. The data include revenue and expenditure data. The revenue components include the data on natural resource related transfers that constitute our explanatory variable of

[11] See maps on Indonesia in Ethnologue (2009).

[12] The village data are collected in preparation of larger household surveys (or censuses). Hence, the year of the PODES does not always correspond to the effective collection period. For example, the PODES 2000 data were collected during the fall 1999, the PODES 2003 during the fall 2002, while the PODES 2006 were collected during the late spring 2005.

[13] Village coordinates are available only at a specific point in time. Merging village coordinates with the village censuses is challenging because the villages have no common identifier across the different waves. Therefore we decide to track villages across waves using their name, the name of the sub-districts and districts in which they are located and detailed documents about how districts, sub-districts and villages split and aggregated over time. We successfully track about 62 percent of the villages in our baseline (1996) data.

interest.

4.2 Identification strategy

The legislative change generates automatically two groups: districts located in producing provinces and districts located in non-producing provinces. Districts belonging to the first group should have experienced a remarkable increase in their revenue driven by the oil and gas transfers. An obvious identification strategy would be to compare the two groups over time, thus applying a Difference-in-Difference (DD) strategy. Since we have the precise geo-referenced location of all the villages in the sample, we push the identification strategy one step further and adopt a spatial Regression Discontinuity (RD) design in which we compare villages facing each other from the opposite sides of the province borders.

In order to unfold the research design in a clear way, we present the identification strategy, the econometric specification and the results for the Sumatra study area. The details and the results for the Kalimantan study area are summarized in Section 6.

We consider a "large" sample including all villages within 300 kilometers from the closest border and a restricted sample including all villages within 200 kilometers from the same borders. The "large" sample includes 5107 villages (2308 treatment villages in 12 districts, 2799 control villages 14 districts), while the "restricted" sample includes 4109 villages (1949 treatment villages in 10 districts, 2160 control villages in 11 districts). Table 2A shows that, before the legislative change, treatment and control villages were broadly similar in terms of geographic, dwellings and infrastructure characteristics even when the sample includes villages relatively far from the border.[14]

Figure 5 shows the district revenue per capita over time.[15] Consistent with the implementation of Law 22/1999, districts experience a sharp increase in revenue in 2001. Figures 6 and 7 show the pattern of district revenue disaggregated by treatment/control group and

[14] Table 2B shows the comparison of treatment and control villages after we excluded villages in producing districts. The few relevant differences seem to be in terms of quality of the main road, village area and prevalence of primary schools.

[15] Since any homogeneous distance from the border cuts through several districts we further weigh the revenue by the number of villages included in the sample. District population and number of villages are obtained from the 1996 PODES data. We describe these data more in detail in the next section.

by source of revenue. The Figures support our research design: treatment areas experience a greater increase in revenue than control areas; this additional increase is driven by transfers related to natural resources.[16] Next, we look at district expenditure. Figure 8 shows that treatment areas increase their expenditure as soon as their revenue increases. This is a similar pattern to what was found in Brazil. In addition, we document strong increase in administrative expenditure (Figure 9), followed by a strong increase in transport and public work expenditure and education (Figure 10).[17]

In order to understand whether the quantity and quality of local public goods actually improve, we need to combine this data with village censuses.

4.3 Econometric specification and falsification experiments

One of the biggest advantages of our dataset is the time dimension. First, it allows to compare villages close to the border before and after the legislative change. Second, joint with our work on tracking villages over time, it allows us to include village fixed effects in the analysis. Third, joint with the availability of two waves of data before the legislative change takes place, it allows us to estimate the impact of the legislative change on treatment villages before the legislative change actually takes place (falsification experiment).

While a typical spatial RD design requires all determinants of the outcome of interest to change smoothly at the boundary (so that villages just outside the boundary are an appropriate control group to villages just inside it), the availability of village characteristics before and after the legislative changes requires us to assume that only *time-varying* determinants of the outcome of interest change smoothly at the boundary.[18] This assumption is significantly

[16] Treatment and control groups still exhibit great differen even if we exclude the producing districts (not reported).

[17] It is not trivial to follow sector expenditure over time because the Ministry of Finance changed the budget structure in 2003. This creates two problems. First, not all districts switched to the new system at the same time. Second, the expenditure categories with the new system do not match well the old categories (i.e., it is very difficult to reconstruct the entire time series using only one reporting system). In our case before 2003 routine expenditure for sectors like education (e..g teachers' wages) fell into the administrative category, while building new schools fell into the education section. Along the same lines, there is a relationship between transportation expenditure in 2001-2002 and public work expenditure 2003-2005, although the details are unclear.

[18] To our knowledge, the only other empirical application combining a spatial RD design with a time dimension is Lemieux and Milligan (2008).

weaker if one was concerned with persistent differences between the two groups.

With the sample of villages so restricted, we estimate the impact of the legislative change on treatment villages using the following econometric specification:

$$c_{idt} = \alpha_{1,i} + \gamma_{1,1999}(T_d * 1999) + \sum_{t \in \{2002,2005\}} \left[\gamma_{1,t} \left(T_d * d_t\right)\right] + d_t + \varepsilon_{idt} \quad (1)$$

where c_{idt} is the outcome in village i, district d at time t, α_i is a village fixed-effect, T_d is a measure of the resource windfall, d_t is the year fixed effect, and ε_{idt} is the error term clustered at the district level.

We will use two different measures of the resource windfall: a simple binary variable indicating whether the district is located within a producing province, and a continuous variable capturing the average per capita oil and gas transfers that the district government received during the current and the two previous periods.[19] Our outcomes of interest measure the amount of public goods that villagers have access to: for education we use binary variables indicating whether the village has a primary school, whether it has a junior-high school and whether it has a senior-high school; for health we use binary variables indicating whether the village has a maternity hospital/house, whether it has a health center and whether the majority of the households have access to piped water; for transportation we use a binary variable indicating whether the majority of the traffic is through land (as opposed to water), whether the main village road is paved and whether the village has a bus terminal; other infrastructures are whether the village has a public phone, whether it has a post office and whether it has a permanent market. The key parameter of interest are $\gamma_{1,2002}$ and $\gamma_{1,2005}$. These two coefficients capture the impact of the resource windfall on public good provision as long as there are no differences between treatment and control villages (other than the resource windfall) that vary over time and are correlated with public good provision (identification assumption). If $\gamma_{1,2005} > 0$ or even $\gamma_{1,2002} > 0$, this means that treatment villages experienced

[19] Including the two transfers preceding the current one in our measure seems appropriate not only because the effect of the resource windfall may take place with one or more lags, but also because districts received not transfers in 2000. Hence, the measure incorporates by construction the fact that the impact in 2002 may be weaker than the impact in 2005.

a greater increase in public goods than the control group after the legislative change. The other parameter of interest is $\gamma_{1,1999}$, which works as a falsification experiment. If $\gamma_{1,1999} = 0$, then treatment villages experienced no variation in public goods relative to the control group before the legislative change. This would be consistent with the identification assumption being valid. On the contrary, a coefficient estimate different from zero would shed some doubt on the validity of the identification assumption.

Specification (1) essentially corresponds to a Difference-in-Difference (DD) specification. Since we have detailed information on the geographic location of each village in the dataset, we can specify further our econometric model using a spatial Regression Discontinuity (RD) design. Like Dell (2010) we have not enough units close to the border to specify a fully flexible local linear regression. Hence, we turn to the following semi-parametric specification:

$$c_{idbt} = \alpha_{2,ib} + \gamma_{2,1999}(T_d * 1999) + \sum_{t \in \{2002,2005\}} \left[\gamma_{2,t}\left(T_d * d_t\right)\right] + \left[f(location_i) * d_t\right] + (\Phi_b * d_t) + \varepsilon_{ibdt} \quad (2)$$

where $f(location_i)$ is a function of the geographic location of the village, Φ_b is binary indicator for the boundary and ε_{ibdt} clustered at the district level. Since econometric theory (and practice) does not provide precise indications on which functional form is superior in a spatial RD design, we use three different specifications: a cubic polynomial of the latitude and the longitude of the village; the distance of the village to the closest border; a cubic polynomial of the distance of the village from the border.[20] The interaction between the segment indicators and the year indicators ($\Phi_b * d_t$) imply that we control for segment-year fixed effects, rather than just for year fixed effects. Controlling for segment-year fixed effects means that the comparison between villages on different sides of the boundaries that identifies our coefficient estimates of interest is restricted to those villages "facing each other", i.e., lying on different sides of the same boundary. This could be important because our study area includes three different boundaries that are located far away from each other. The

[20] In the results we report only the coefficient estimates associated with the cubic polynomial of the distance to the border for the sake of brevity. The results for the other two alternatives are typically very similar and are available upon request.

two coefficients of interest ($\gamma_{2,2002}$ and $\gamma_{2,2005}$) capture the impact of the resource windfall on public good provision as long as there are no differences between treatment and control villages (other than the resource windfall) that vary over time, are correlated with public good provision and vary discontinuously across the border. The identification assumption is weaker than in specification (1) because the inclusion of segment-year fixed effects and the flexible function of village location allows possible differences in local markets not to confound our effect of interest.[21]

Finally, since our sample of districts includes both producing and non-producing districts, and local governments may behave very differently across the two categories, we will also estimate specification (2) controlling for a binary indicator for producing districts interacted with a full set of time dummies. This will ensure that our coefficients of interest (γ_{2002} and γ_{2005}) capture the impact of the resource windfall on local government behavior rather than the direct impact of oil and gas extraction on the local economy.

5 Results

Table 3A shows the impact of the resource windfall on transportation infrastructures, i.e., whether the majority of the traffic runs through land (Columns 1-4), whether the village road is paved (Columns 5-8) and whether the village has a bus terminal (Columns 9-12). Panel A shows the results associated with the binary treatment indicator. The effect of the revenue windfall on the likelihood that most of the traffic runs through land is close to zero in all specifications. The effect of the revenue windfall on road quality seems to be negative before decentralization, positive and relative large immediately afterwards, and positive and small in the medium term.[22] None of the coefficient estimates is consistently significant. Panel B and

[21] Controlling for distance to the border is similar to controlling for distance to the extraction points. We expect oil extraction to influence the markets closeby. However, we also expect such influence to fade away smoothly with distance from the extraction points (Aragon and Rud (Forthcoming)). Treatment villages are, on average, closer to these extraction points than control villages, but any possible direct (time-varying) impact of this difference on public good provision should be captured by the distance to the border.

[22] Specifying the function of geographic location as (linear) distance to the border or a cubic polynomial of latitude and longitude does not affect the results. This holds true for all other results in this section unless otherwise specified.

C show the results associated with per capita oil and gas transfers averaged over the current and the previous two years. The effect of the revenue windfall on road quality is positive and significant throughout all specifications. The magnitude is rather small: an increase in per capita oil and gas revenue of one standard deviation (15 USD) increases the probability of having the road paved by 3 percentage points, i.e., about 5 percent of the pre-decentralization average. In addition, the resource windfall seems to have no effect on the likelihood of having a bus terminal (Columns 5-8).

Table 3B shows the impact of the resource windfall on education infrastructures, i.e., whether the village has a primary school (Columns 1-4), a junior-high school (Columns 5-8) or a senior-high school (Columns 9-12). The revenue windfall seems to have no effect on the likelihood of having a primary school. On the other hand, it seems to have a consistent positive impact on the likelihood of having a junior-high school: being located in a producing province is associated with an increase of 8.3 percentage points of having a junior-high school in 2002 and 9.9 points in 2005, i.e., an increase of (respectively) 26 and 31 percentage points relative to the pre-decentralization average. The coefficient estimates associated with the continuous measure of the revenue windfall (Panel B and C) confirm the direction and significance of the impact. An increase in per capita oil and gas revenues of one standard deviation is associated with an increase of 3 percentage points, i.e., an increase of 9.3 points relative to the pre-decentralization average. On the contrary, the results for senior-high schools are mixed: the coefficient estimates are positive but relatively large only in the second period and not always significant. An increase in per capita oil and gas revenues of one standard deviation is associated with an increase of 1.5 percentage points, i.e. an increase of 8.3 points relative to the pre-decentralization average. Overall, the resource windfall has the strongest impact on junior-high schools. This is consistent with the what we know about education in Indonesia: primary education is almost universal (87 percent of villages have a primary school); junior-high schools are widespread but not nearly as much as primary schools (junior-high schools are present in 32 percent of the villages) notwithstanding the increase in mandatory education to the first nine grades adopted since the early 1990s; senior-high schools are relatively rare (they are present in 16 percent of the villages).

Table 3C shows the impact of the resource windfall on health infrastructures, i.e., whether the village has a maternity house (Columns 1-4), a health center (Columns 5-8), or whether the majority of the households has access to piped water (Columns 9-12). We find no evidence of an increase in health infrastructures following the increase in oil and gas revenues.

Table 3D shows the impact of the resource windfall on whether the village has a public phone (Columns 1-4), a post office (Columns 5-8) or a permanent market (Columns 9-12). The resource windfall does not seem to have led to more communication infrastructures, although the results for the post office are mixed. On the contrary, it seems to have led to better trade infrastructures: being located in a treatment village is associated with an increase of 7.7 percentage points on the likelihood of having a permanent market in 2002 and 7.9 in 2005, i.e., 55 and 57 percent relative to the pre-decentralization average. The coefficient estimates associated with the continuous measure of the revenue windfall (Panel B and C) confirm the direction and significance of the impact. An increase in per capita oil and gas revenues of one standard deviation is associated with an increase of 3 and 1.5 percentage points, i.e., an increase of, respectively, 20 and 10 percentage points relative to the pre-decentralization average.

In order to make sure that the producing districts are not driving the evidence found so far, we re-estimate the previous models controlling for an interaction between a producing indicator and the time dummies. By controlling for the producing districts, our coefficient estimates should capture uniquely the effect of the revenue windfall on local government behavior without any obvious direct impact of oil extraction. Table 4 shows the results for selected outcomes: whether the village has a paved road (Columns 1-4), whether it has a junior-high school (Columns 5-8), whether it has a permanent market (Columns 9-12). The coefficient estimates essentially confirm the previous results: the revenue windfall led to more junior-high schools and more permanent markets, while the evidence for road quality is, again, mixed.

6 Resource windfall and public goods in Kalimantan

As discussed in Section 3, there is only one other area in Indonesia where the oil and gas extraction takes place at a scale so high that it leads to relevant oil and gas transfers to districts located within the same province of the producing district. This area is Kalimantan. Oil and gas extraction takes place almost exclusively in East Kalimantan. Hence, our analysis focuses on the border area between East Kalimantan and the other three provinces (Figure 4). The study area is not as large as for Sumatra. Hence, we expect to have a lower power to detect any change in public good provision following the redistribution of resource revenues. On the other hand, replicating the analysis in a different region of Indonesia may yield interesting insights, for example, in terms of external validity, since Kalimantan and Sumatra differ in many aspects.

The widest area that we consider includes villages as far as 100 kilometers from the border. We choose this threshold because the treatment area beyond this point is mainly covered by a producing district which we want to exclude from the analysis. Along the lines of the analysis for Sumatra, we gradually restrict the study area to villages within 75, 50 and 25 kilometers from the border. Our final sample includes: 1,551 villages for the 100 kilometer sample (275 treatment, 1,276 control); 1,174 villages for the 75 kilometer sample (222 treatment, 952 control); 589 villages for the 50 kilometer sample (158 treatment, 431 control); 187 villages for the 25 kilometer sample (52 treatment, 135 control).[23] Table 5 shows the comparison of treatment and control villages in terms of a wide range of geographic and demographic characteristics, as well as in terms of dwellings and public infrastructures. Treatment and control villages show some differences, but they tend to fade away as we get closer to the border.

Figure 11-16 shows the pattern of revenue, revenue components and expenditure across treatment and control villages over time. The pattern confirms that treatment villages did experience a resource windfall following the implementation of the fiscal decentralization law even stronger than in the Sumatra study area.

[23] For Kalimantan we manage to track over 90 percent of the villages over time. Hence, we are much more confident in the quality of the data throughout the entire analysis than we did for Sumatra.

We turn to the econometric analysis. It is important to keep in mind that a recent econometrics literature (see Cameron and Miller (2011) and references therein) has found that clustering the standard errors with less than 30 clusters can lead to underestimating the true standard errors. The problem can be particularly severe with less than 10 clusters and generally fades away as the number of clusters increases. Based on Monte-Carlo simulations in Cameron, Gelbach, and Miller (2008), the econometric analysis that we carried out for the Sumatra study area should be still valid (since we used 26 and 23 clusters). However, the analysis for the Kalimantan study area will be based on a number of clusters ranging from 15 in the largest sample to 8 in the smallest.

We re-estimate specification (1) and (2) for this study area. Due to data constraints, we estimate only the specifications using the binary treatment measure. Table 6A, Panel A, shows the results for transportation infrastructures: whether the majority of the traffic runs on land (Columns 1-5); whether the main road is paved (Columns 6-10); whether the village has a bus terminal (Columns 11-15). The coefficient estimates of interest are positive, large and significant for whether the majority of the traffic is through land (rather than water): being located in a treatment village is associated with an increase of 15 percentage points in 2002 and 25 points in 2005 of having the majority of the traffic through land, i.e., an increase of 23 and 38 percentage points relative to the pre-decentralization average (about 66 percent). On the other hand, the resource windfall does not seem associated with an increase in quality of the road (whether it is paved or not) and public transport facilities (whether there is a bus terminal in the village).

Panel B shows the results associated with education infrastructures. As for Sumatra, the resource windfall does not seem to be associated with an increase in primary schools (Columns 1-5), while it does seem to be associated with an increase in junior-high schools (Columns 6-10) and senior-high schools (Columns 11-15). The increase in likelihood of having a junior-high school in the village is 2.8 percentage points in 2002 and 9.3 in 2005, i.e., an increase of 18 and 60 percent relative to the pre-decentralization average (15.6 percent). The increase in likelihood of having a senior-high school in the village is 2.2 percentage points in 2002 and 10.6

in 2005, i.e., an increase of 56 and 270 percentage points relative to the pre-decentralization average (3.9 percent).

Table 6B, Panel A, shows the results for health infrastructures. The resource windfall seems to be associated with an increase of 2.8 percentage points in 2002 and 2.6 in 2005, i.e., 700 and 650 percentage points relative to the pre-decentralization average (0.4 percent). However, notice that the pre-decentralization effect is almost half as large as the coefficient estimates of interest, so one must use caution to interpret these estimates as evidence of such a strong effect of the resource windfall of maternity hospitals. Indeed, having a maternity hospital in the village seems to be an event so rare that few observations may be driving the entire result. This is not the case for the second health outcomes: whether the village has a health center. There appear to be few health centers in the study area, but having one is not such a rare event as it was for the maternity hospital (the pre-decentralization average is 8.1 percent). The resource windfall is associated with no effect in 2002 and an increase of 8.6 percentage points in 2005, i.e., 106 percent relative to the pre-decentralization average. There does not seem to be any effect on access to piped water (the coefficient estimate is positive and significant in 2002, but it is not robust across the various specifications).

Panel B shows the results for other infrastructures. The resource windfall is associated with an increase in whether the village has a public phone (Columns 1-5). However, as for the maternity hospital, the coefficient estimates appear unreasonably large and this may be due to the scarcity of this facility in Kalimantan (the pre-decentralization average is 2.3 percent). On the other hand, the resource windfall seems to have increase the presence of post offices (temporary or permanent): the effect is about zero in 2002 but there is an increase of 2.6 in 2005, i.e., an increase of 40 percent relative to the pre-decentralization average (6.5 percent). Finally, the resource windfall does not seem to have a clear effect of trade facilities: the coefficient estimates associated with whether there is a permanent market in the village vary in magnitude and significance across specifications.

Table 7 shows the results for some selected outcomes once we control for the (few) villages located in producing districts. The coefficient estimates are virtually identical to those previously found.

7 Conclusions

In this paper, we study the impact of a fiscal decentralization programme in Indonesia that provided producing provinces with a greater share of resource revenue from oil and gas. Our main research question is whether this change actually led to an increase in the provision of local public goods like health and education. The previous literature on natural resources and economic development suggests several reasons why resource windfalls might actually not contribute to an improved supply of public goods.

In order to make our study as similar to a natural experiment as possible, we restrict our analysis to natural-resource rich regions Sumatra and Kalimantan and to comparing villages close to the border between oil producing and non-producing provinces. Our empirical analysis employs a regression discontinuity design where we use different distances to border as a restriction for inclusion in our treatment and control groups. Our results suggest that high school facilities tended to improve in the treated villages, in particular 3-4 years after decentralization. This finding seems robust across the two study areas. Otherwise the revenue windfall is associated with an increase in trade infrastructures in Sumatra (but not in Kalimantan), while it is associated with an increase in road, health, and communication infrastructures in Kalimantan (but not in Sumatra). We found no evidence of a decrease in public goods. Hence, we find no indications of a curse of natural resources but rather of beneficial or no effects of the resource windfall.

We believe the Indonesian fiscal decentralization program might provide poor, resource-abundant countries with an interesting policy experiment that has not previously been widely tested throughout the world. There are however numerous issues that remain to be studied within our Indonesian context. For instance, it would be useful to reach a stronger understanding of the political economy at local level. Why do an increase in resource rents lead to an increase in certain public goods and not in others? In future work, we also hope to obtain better measures of public good *quality*. For instance, it would be interesting to analyze whether the improved facilities for high schools are also associated with an improved pupil attendance or stronger test scores. This is left for future work.

References

Akai, N., and M. Sakata (2002): "Fiscal decentralization contributes to economic growth: evidence from state-level cross-section data for the United States," *Journal of Urban Economics*, 52(1), 93–108.

Aragon, F. M., and J. P. Rud (Forthcoming): "Natural Resources and Local Communities: Evidence from a Peruvian Gold Mine," *American Economic Journal: Economic Policy*.

Brollo, F., T. Nannicini, R. Perotti, and G. Tabellini (Forthcoming): "The Political Resource Curse," *American Economic Review*.

Cameron, A. C., J. B. Gelbach, and D. L. Miller (2008): "Bootstrap-Based Improvements for Inference with Clustered Errors," *Review of Economics and Statistics*, 90(3), 414–427.

Cameron, C. A., and D. L. Miller (2011): "Robust Inference with Clustered Data," in *Handbook of Empirical Economics and Finance*, ed. by A. U. Giles, and D. E., pp. pp.1–28. CRC Press.

Caselli, F., and G. Michaels (Forthcoming): "Do Oil Windfalls Improve Living Standards? Evidence from Brazil," *American Economic Journal: Applied Economics*.

Collier, P. (2008): *The Bottom Billion: Why the Poorest Countries are Failing and What Can Be Done About It*. Oxford University Press, New York.

Dalgaard, C.-J., and O. Olsson (2008): "Windfall Gains, Political Economy and Economic Development," *Journal of African Economies*, 17(suppl 1), 72–109.

Davoodi, H., and H.-f. Zou (1998): "Fiscal Decentralization and Economic Growth: A Cross-Country Study," *Journal of Urban Economics*, 43(2), 244–257.

DELL, M. (2010): "The Persistent Effects of Peru's Mining Mita," *Econometrica*, 78(6), 1863–1903.

DUFLO, E., R. GLENNERSTER, AND M. KREMER (2007): "Chapter 61 Using Randomization in Development Economics Research: A Toolkit," in *Handbook of Development Economics*, ed. by T. P. Schultz, and A. S. John, vol. Volume 4, pp. 3895–3962. Elsevier.

ETHNOLOGUE (2009): "Ethnologue: Languages of the World," Lewis, M. Paul.

GYLFASON, T. (2001): "Natural resources, education, and economic development," *European Economic Review*, 45(4âĂŞ6), 847–859.

LEITE, C. A., AND J. WEIDMANN (1999): "Does Mother Nature Corrupt? Natural Resources, Corruption, and Economic Growth," .

LEMIEUX, T., AND K. MILLIGAN (2008): "Incentive effects of social assistance: A regression discontinuity approach," *Journal of Econometrics*, 142(2), 807–828.

MEHLUM, H., K. MOENE, AND R. TORVIK (2006): "Institutions and the Resource Curse*," *The Economic Journal*, 116(508), 1–20.

MONTEIRO, J., AND C. FERRAZ (2009): "Resource Booms and Voracious Politicians: The Effects of Oil Shocks on Patronage, Rent-Seeking, and Elections," .

REINIKKA, R., AND J. SVENSSON (2004): "Local Capture: Evidence from a Central Government Transfer Program in Uganda," *The Quarterly Journal of Economics*, 119(2), 679–705.

RICKLEFS, M. C. (2008): *History of Modern Indonesia Since c. 1200: Fourth Edition*.

ROBINSON, J. A., R. TORVIK, AND T. VERDIER (2006): "Political foundations of the resource curse," *Journal of Development Economics*, 79(2), 447–468.

SACHS, J. D., AND A. M. WARNER (1997): "Natural Resource Abundance and Economic Growth," .

——— (2001): "The curse of natural resources," *European Economic Review*, 45(4âĂŞ6), 827–838.

Sala-i Martin, X., and A. Subramanian (2003): "Addressing the Natural Resource Curse: An Illustration from Nigeria," .

Skoufias, E., A. Narayan, B. Dasgupta, and K. Kaiser (2011): "Electoral accountability, fiscal decentralization and service delivery in Indonesia," .

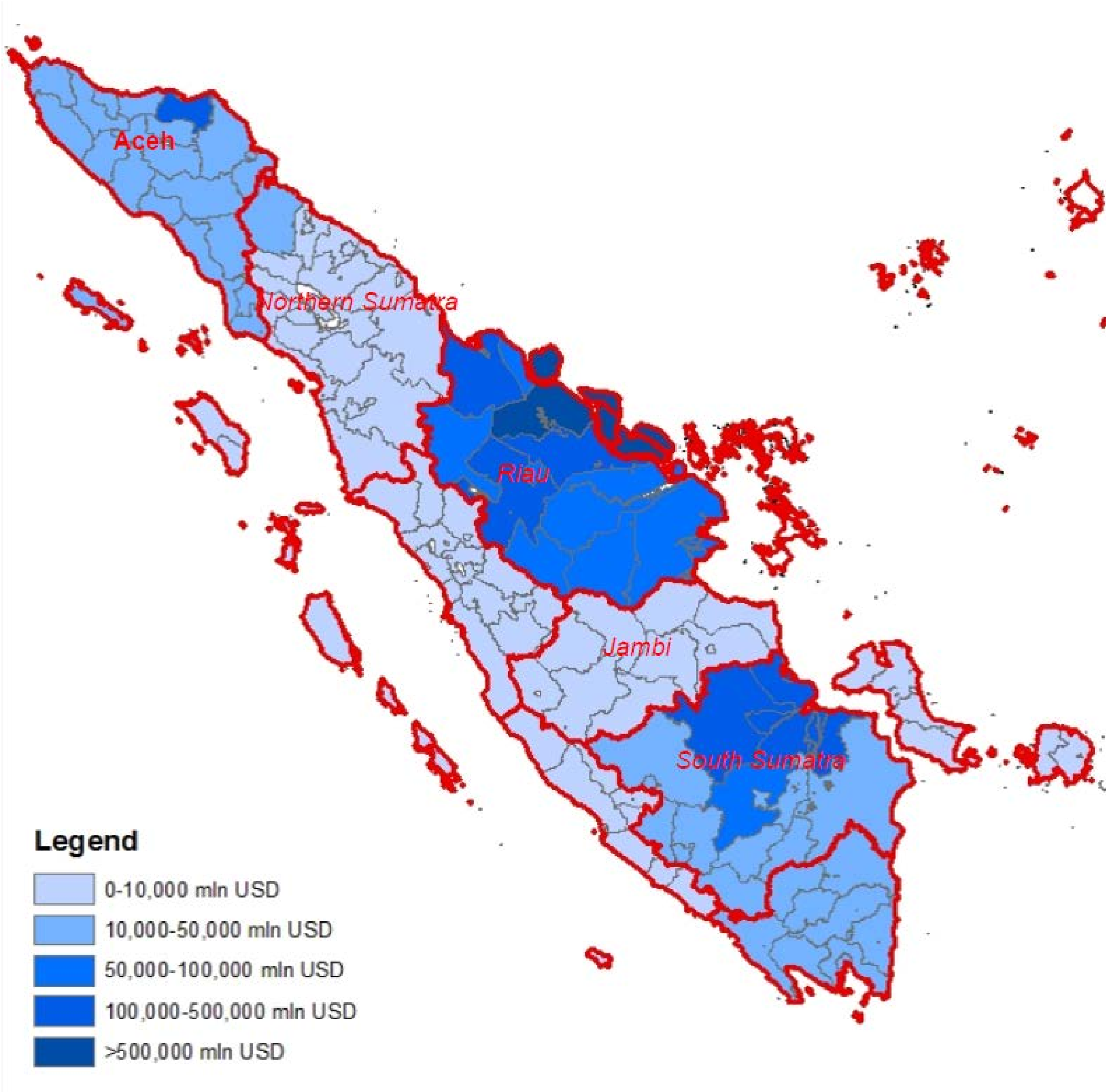
Torvik, R. (2002): "Natural resources, rent seeking and welfare," *Journal of Development Economics*, 67(2), 455–470.

van der Ploeg, F. (2011): "Natural Resources: Curse or Blessing?," *Journal of Economic Literature*, 49(2), 366–420.

Vicente, P. C. (2010): "Does oil corrupt? Evidence from a natural experiment in West Africa," *Journal of Development Economics*, 92(1), 28–38.

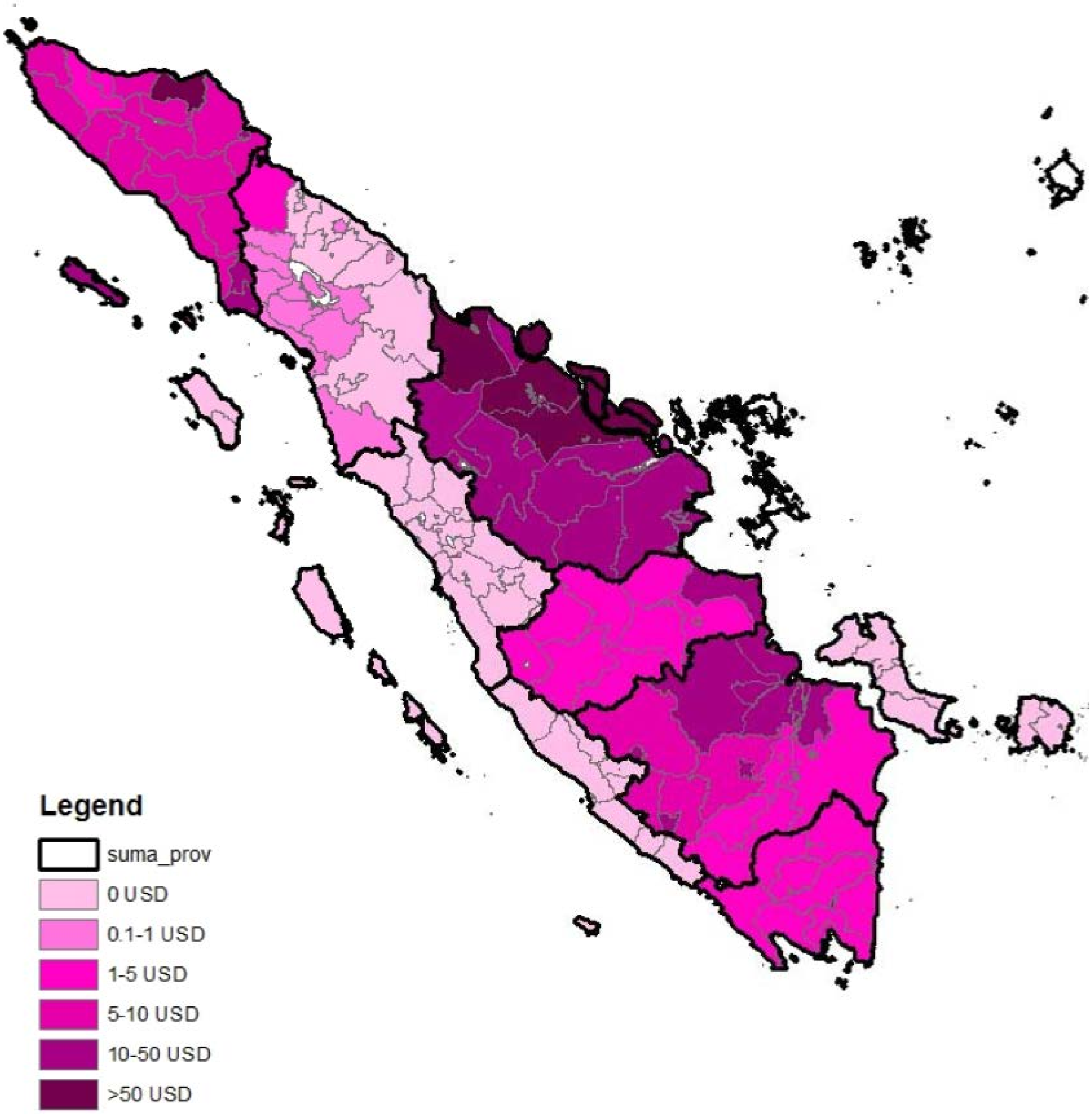
Zhang, T., and H.-f. Zou (1998): "Fiscal decentralization, public spending, and economic growth in China," *Journal of Public Economics*, 67(2), 221–240.

Figure 1: Magnitude of oil and gas transfers in absolute terms in 2002 on Sumatra



Note: The thick lines show province borders whereas the thin lines show district borders. The names of the four provinces included in the study are in italics.

Figure 2: Magnitude of per capita oil and gas transfers in 2002 on Sumatra

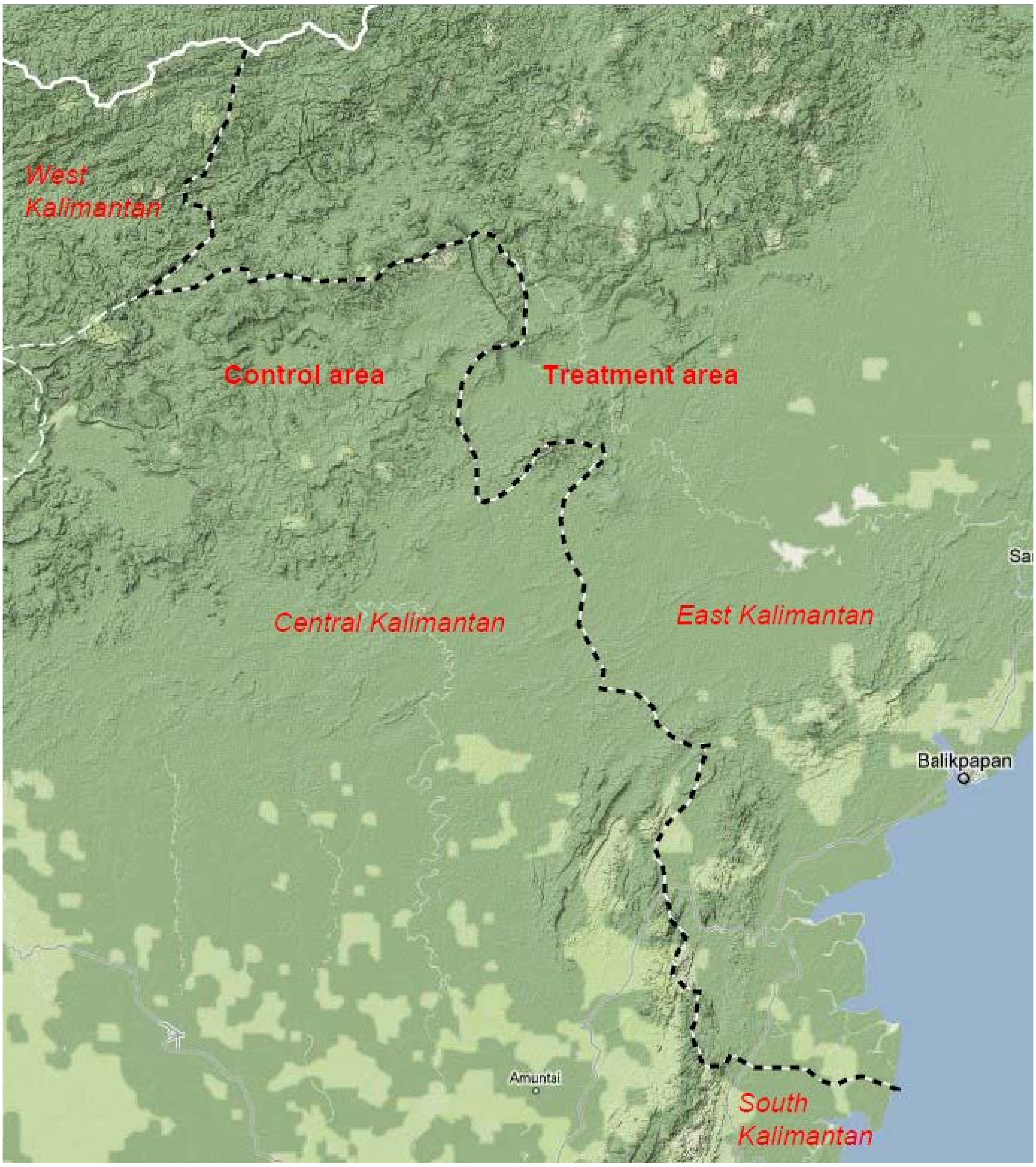


Note: The thick lines show province borders whereas the thin lines show district borders.

Figure 3: Borders between treatment (Riau, South Sumatra) and control areas (Northern Sumatra and Jambi) on Sumatra

Note: The three dotted lines show the borders exploited in the empirical study between treatment and control areas. The northeastern dotted line is between Riau (treatment) and North Sumatra (control), the central line between Riau (treatment) and Jambi (control), and the southernmost line is between South Sumatra (treatment) and Jambi (control). The black lines show the borders to provinces not included in the study.

Figure 4: Border between treatment (East Kalimantan) and control areas (West, Central, and South Kalimantan)



Note: The dotted lines show the borders exploited in the empirical study between the treatment area East Kalimantan and the control areas West, Central, and South Kalimantan.

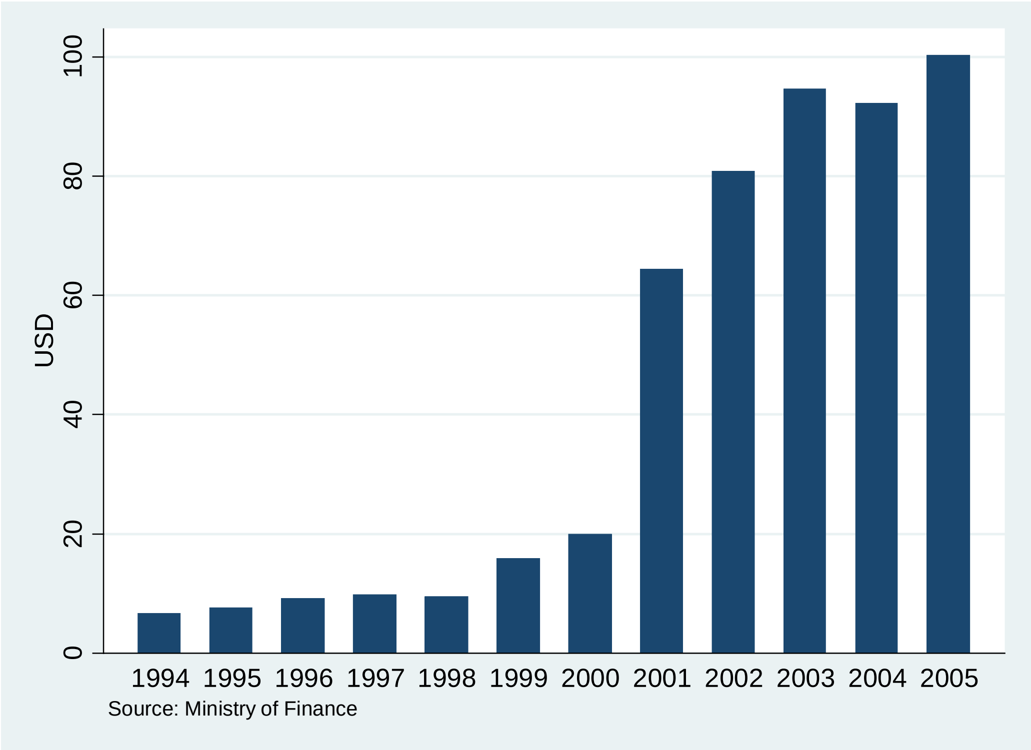


Figure 5: Evolution of per capita district revenue over time (Sumatra).

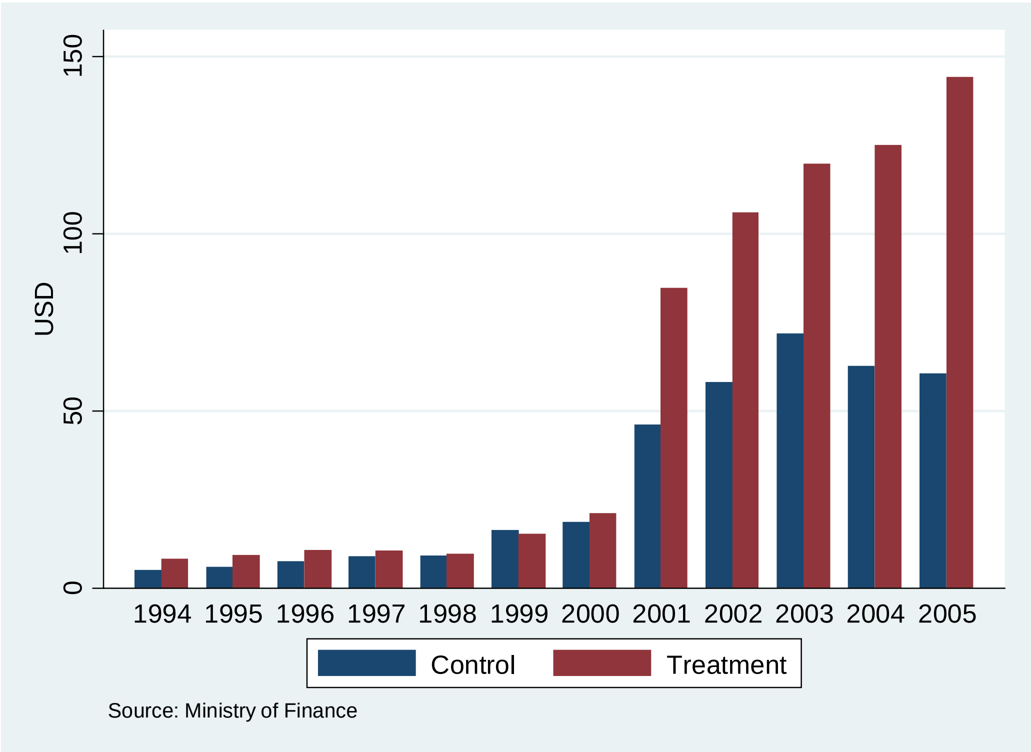


Figure 6: Per capita district revenue in treatment and control areas (Sumatra).

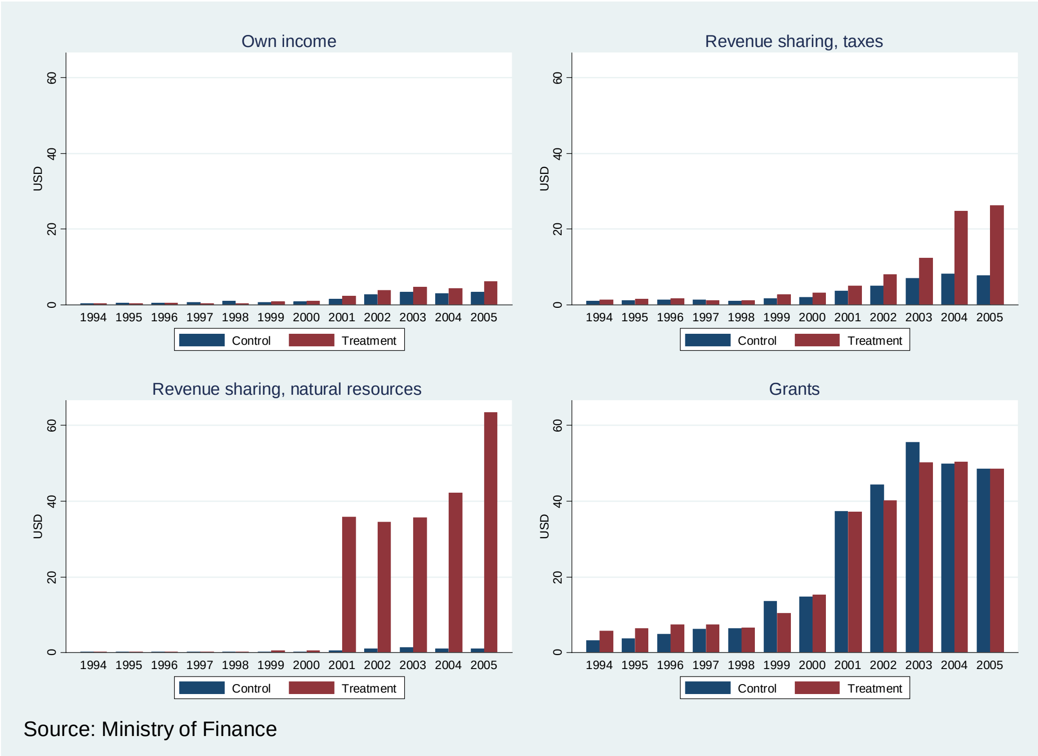


Figure 7: Per capita district revenue components in treatment and control areas (Sumatra) .

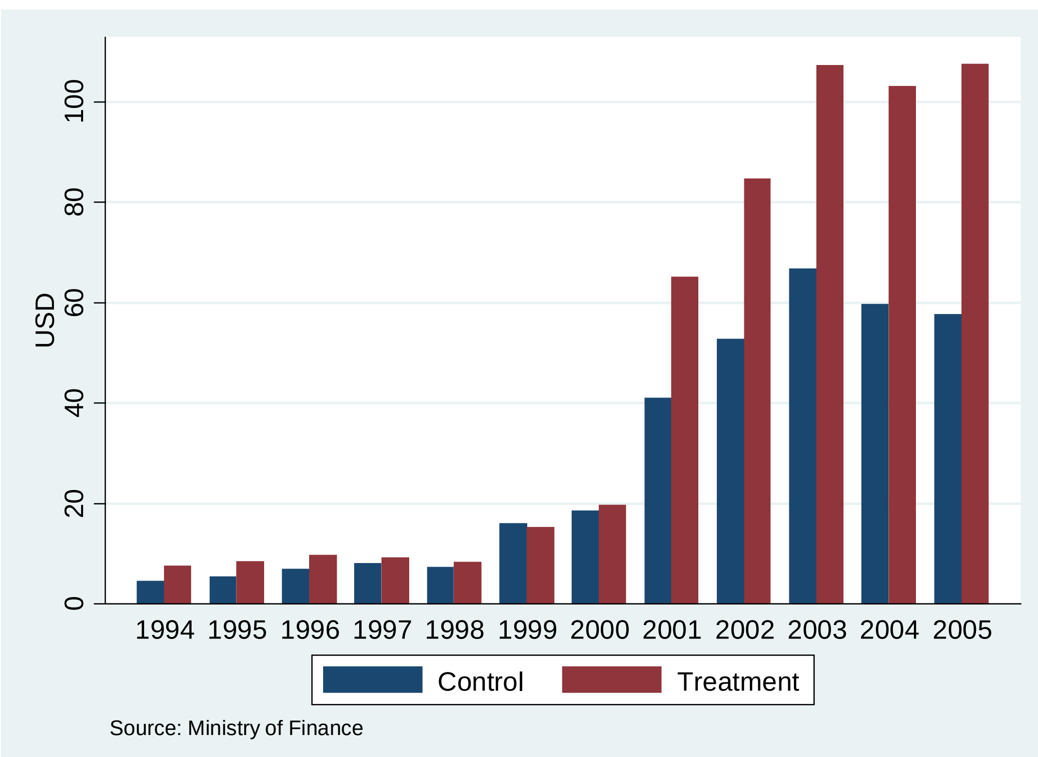


Figure 8: Per capita district expenditure in treatment and control areas (Sumatra).

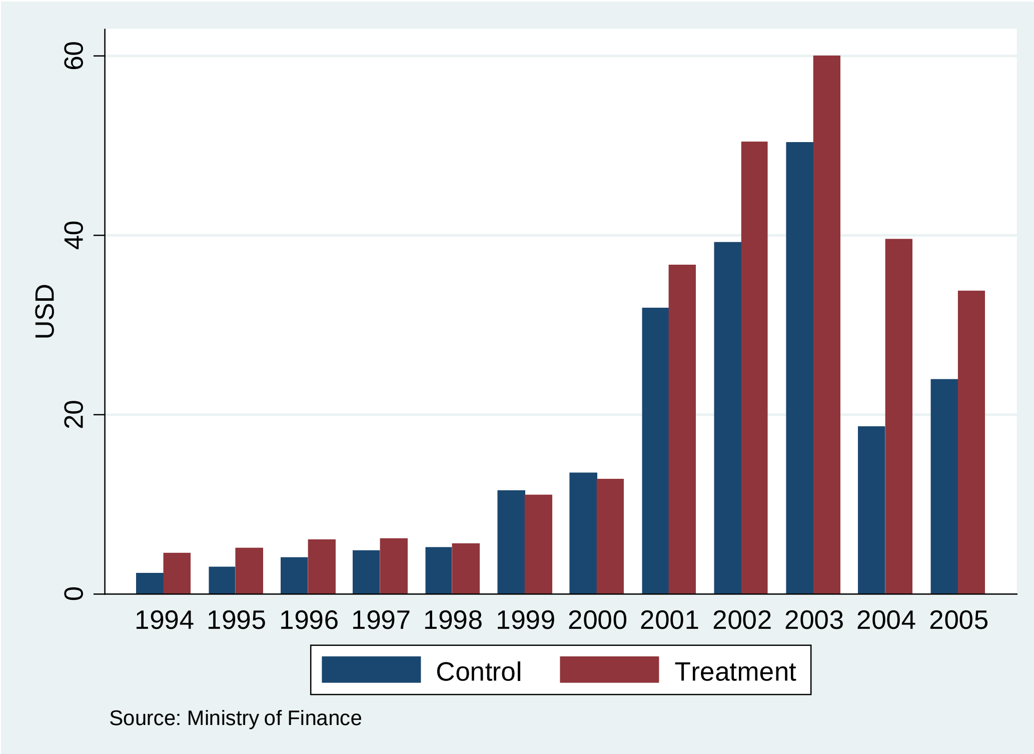


Figure 9: Per capita district administrative expenditure in treatment and control areas (Sumatra).

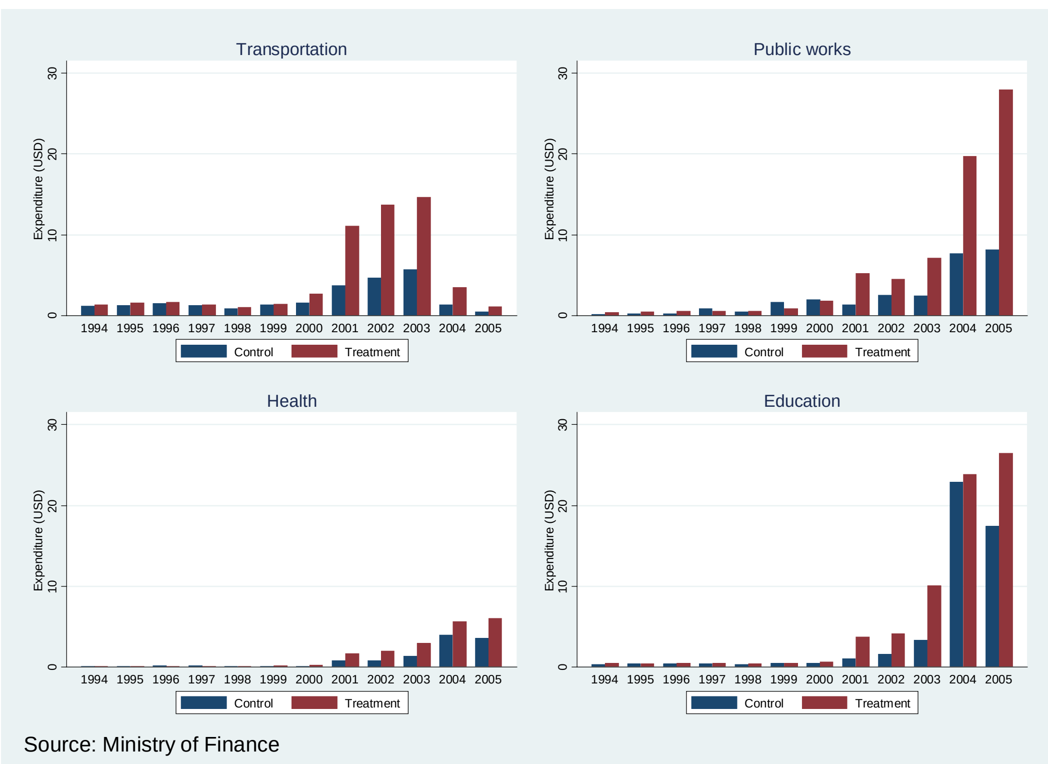


Figure 10: Per capita district expenditure, other primary components (Sumatra).

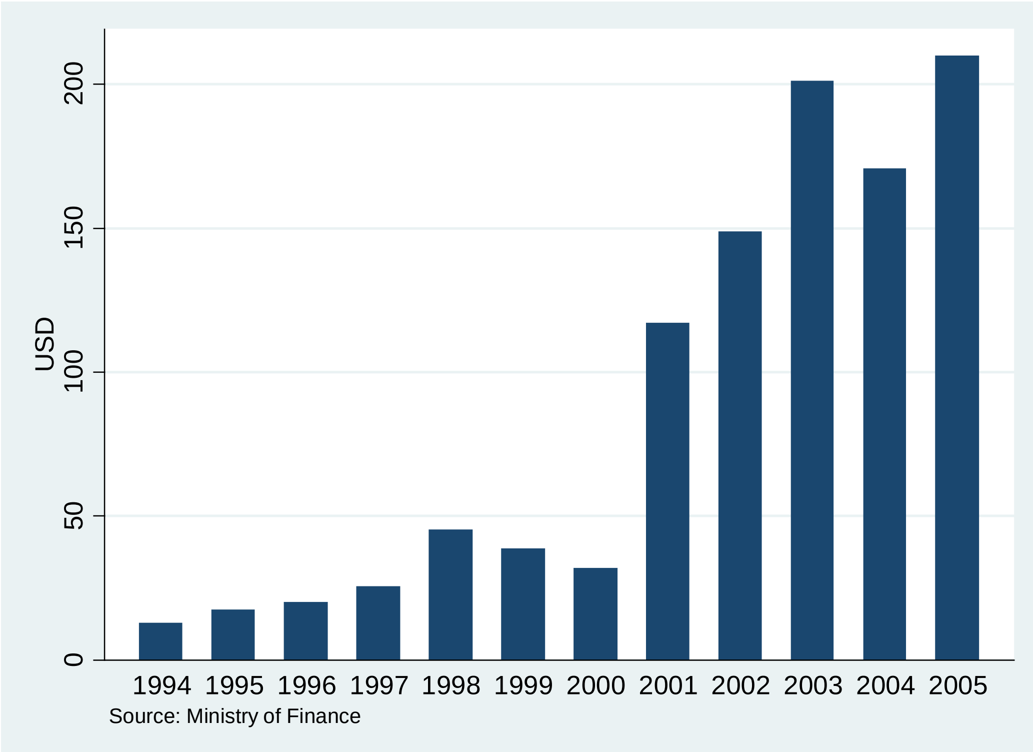


Figure 11: Evolution of per capita district revenue over time (Kalimantan).

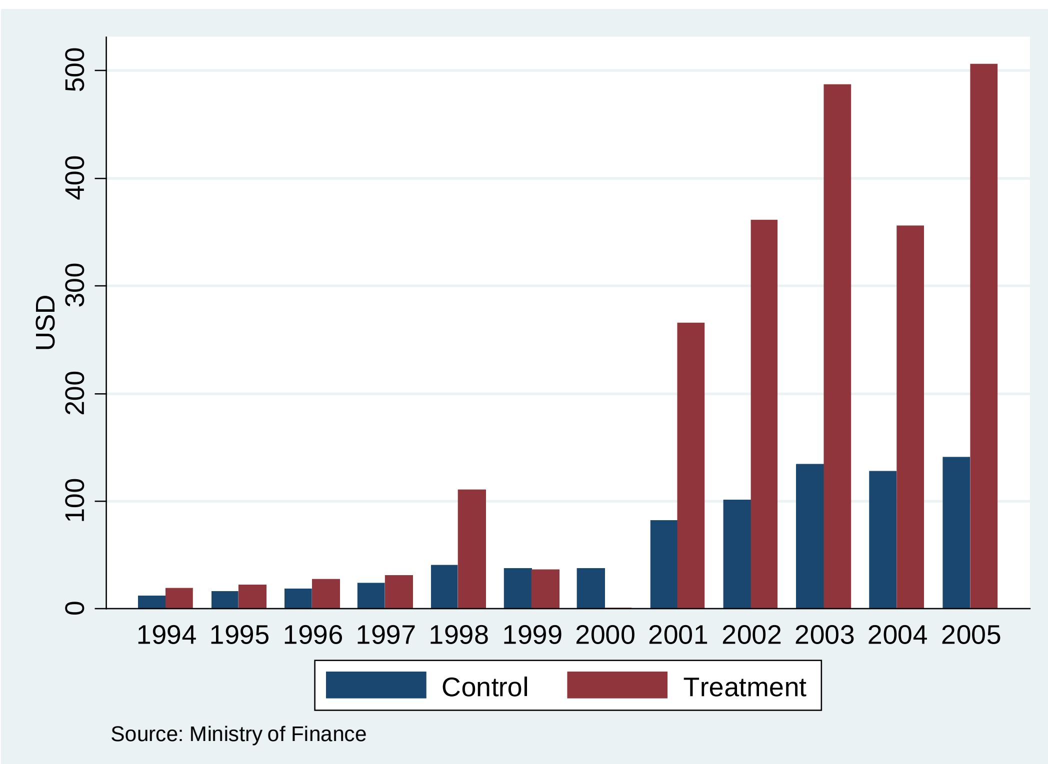


Figure 12: Per capita district revenue in treatment and control areas (Kalimantan).

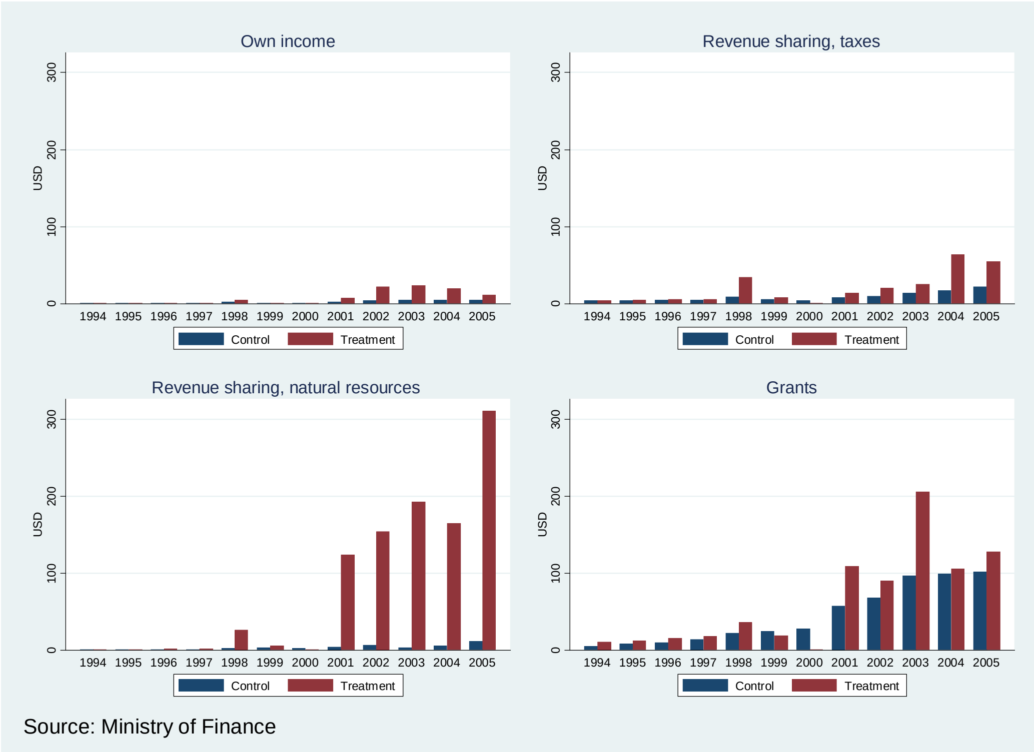


Figure 13: Per capita district revenue components in treatment and control areas (Kalimantan) .

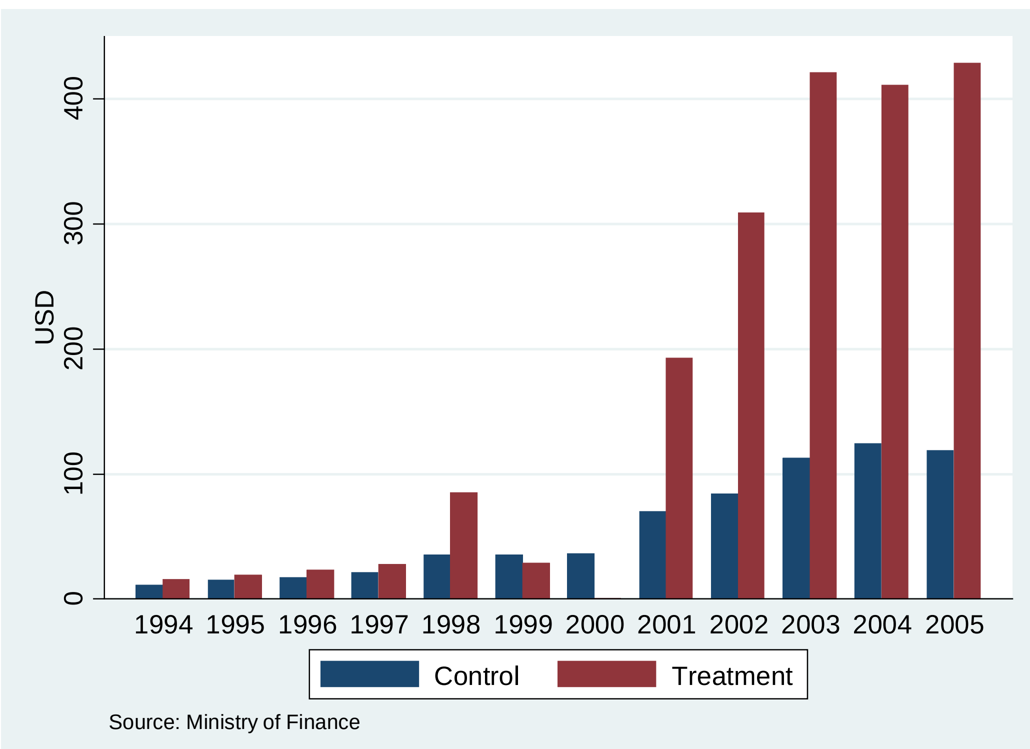


Figure 14: Per capita district expenditure in treatment and control areas (Kalimantan).

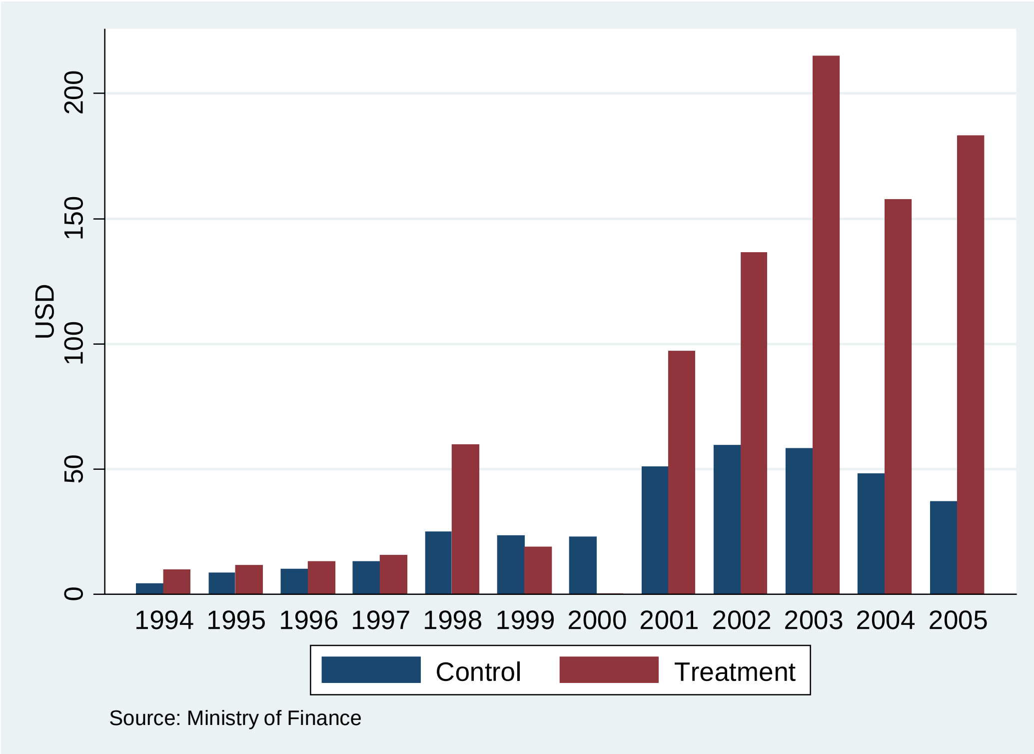


Figure 15: Per capita district administrative expenditure in treatment and control areas (Kalimantan).

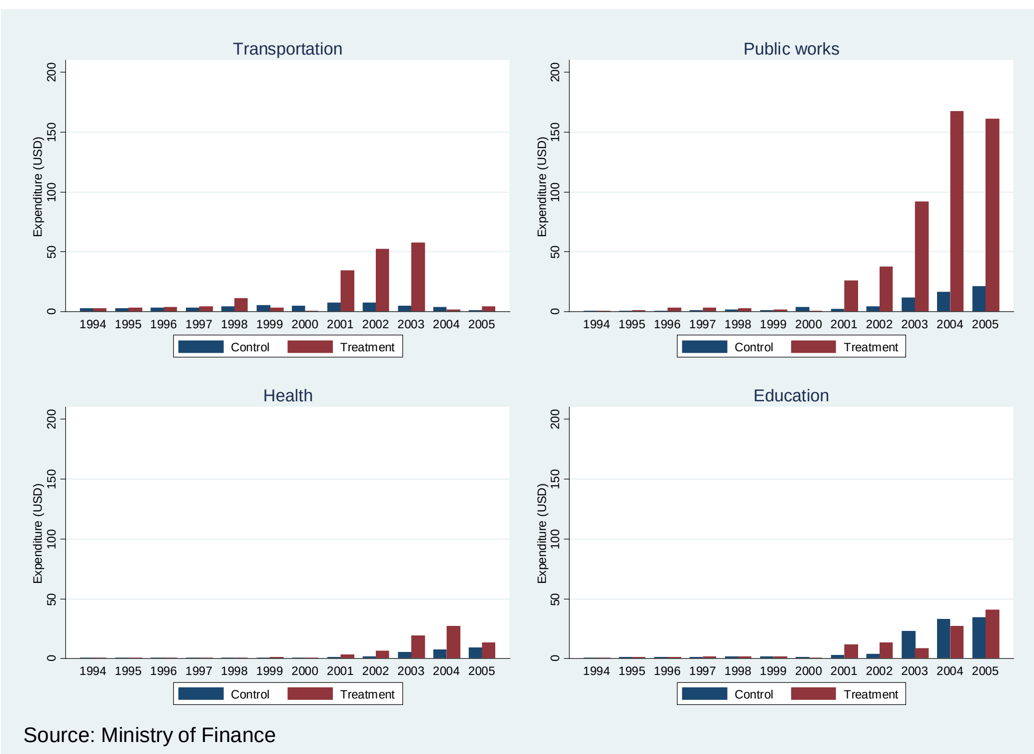


Figure 16: Per capita district expenditure, other primary components (Kalimantan).

TABLE 2A
DESCRIPTIVE STATISTICS: SUMATRA AREA

Sample	<300 kilometers			<200 kilometers		
Treatment	Oil-rich	Oil-scarce	Difference	Oil-rich	Oil-scarce	Difference
Statistic	mean	mean	t-stat	mean	mean	t-stat
Village located on the coast	0.065	0.043	(0.493)	0.062	0.035	(0.646)
Village located in a valley	0.026	0.078	(-1.414)	0.025	0.094	(-1.693) *
Village located in a hilly area	0.099	0.129	(-0.552)	0.071	0.131	(-1.075)
Village located in a plane	0.814	0.75	(0.838)	0.847	0.739	(1.288)
Urban village	0.097	0.176	(-1.003)	0.108	0.119	(-0.158)
Official urban village	0.118	0.154	(-0.459)	0.135	0.116	(0.291)
Population	3109.682	3089.259	(0.020)	2793.325	2447.605	(0.378)
Number of households	559.724	587.714	(-0.153)	572.789	449.206	(0.723)
Number of households in agriculture	303.38	267.816	(0.513)	291.142	260.004	(0.375)
Electricity in the village	0.863	0.892	(-0.611)	0.879	0.87	(0.157)
Share of households with electricity	0.331	0.533	(-2.576) ***	0.355	0.491	(-1.614)
Public phone in the village	0.092	0.135	(-0.633)	0.1	0.081	(0.335)
Number of households with phone[1]	0.019	0.022	(-0.287)	0.021	0.014	(0.638)
Main road is lighted	0.237	0.467	(-2.021) **	0.259	0.371	(-1.063)
Majority uses LPG/Kerosene for cooking	0.114	0.194	(-1.019)	0.124	0.121	(0.053)
Majority litters in bin, then delivered	0.123	0.134	(-0.166)	0.138	0.104	(0.612)
Majority households has private toilet	0.348	0.468	(-0.799)	0.34	0.392	(-0.317)
Majority households has public toilet	0.601	0.437	(1.499)	0.61	0.492	(0.995)
Streaming sewage system in village	0.588	0.679	(-1.167)	0.57	0.653	(-0.900)
Share of permanent dwellings	0.149	0.188	(-0.779)	0.148	0.154	(-0.127)
Slum in village	0.128	0.063	(1.951) *	0.138	0.051	(2.404) **
Share of households living in slum	0.02	0.007	(2.596) ***	0.022	0.006	(3.106) ***
Primary school in the village	0.915	0.815	(1.078)	0.91	0.795	(1.026)
Junior-high school in the village	0.286	0.335	(-0.591)	0.29	0.288	(0.017)
Senior-high school in the village	0.127	0.18	(-0.979)	0.128	0.137	(-0.188)
Number of primary schools in the village[1]	2.404	2.838	(-0.584)	2.416	2.655	(-0.273)
Number of junior-high schools in the village[1]	0.446	0.597	(-0.832)	0.456	0.462	(-0.036)
Number of senior-high schools in the village[1]	0.211	0.352	(-1.169)	0.21	0.248	(-0.410)
Hospital in the village	0.017	0.044	(-1.283)	0.019	0.027	(-0.561)
Maternity house in the village	0.045	0.125	(-1.457)	0.049	0.069	(-0.520)
Health center in the village	0.097	0.111	(-0.395)	0.1	0.095	(0.140)
Doctor in the village	0.145	0.177	(-0.475)	0.154	0.12	(0.651)
Midwife in the village	0.411	0.409	(0.026)	0.409	0.356	(0.682)
Majority has access to piped water	0.088	0.145	(-1.002)	0.089	0.123	(-0.601)
Main road is paved	0.604	0.503	(1.418)	0.63	0.459	(2.291) **
Majority traffic through land	0.883	0.972	(-2.064) **	0.872	0.968	(-1.958) *
Bus terminal in the village	0.033	0.035	(-0.111)	0.036	0.023	(1.208)
Post office in village	0.073	0.075	(-0.084)	0.074	0.067	(0.275)
Land area (ha)	43567.841	16166.957	(2.588) ***	44470.253	19744.98	(1.967) **
Ratio population/land (ha)	0.862	2.076	(-1.143)	0.974	0.892	(0.131)
Permanent market in village	0.121	0.109	(0.330)	0.121	0.098	(0.582)
Temporary market in village	0.14	0.104	(1.217)	0.134	0.092	(1.362)
Community safety post	0.877	0.703	(1.373)	0.865	0.66	(1.381)
Police house in village	0.1	0.067	(0.922)	0.107	0.059	(1.196)
Village head finished junior-high	0.714	0.806	(-1.390)	0.713	0.772	(-0.837)
Village head finished high school	0.427	0.458	(-0.409)	0.445	0.417	(0.356)
Number of villages	*2308*	*2799*		*1949*	*2160*	
Number of districts	*12*	*14*		*12*	*11*	

Note: the "Difference" columns report the difference-in-mean test between oil-rich and oil-scarce villages, where standard errors have been clustered at the district level using district borders as in 1990

TABLE 2B

DESCRIPTIVE STATISTICS EXCLUDING PRODUCING DISTRICTS: SUMATRA AREA

Sample	<300 kilometers				<200 kilometers			
Treatment	Oil-rich	Oil-scarce	Difference		Oil-rich	Oil-scarce	Difference	
Statistic	mean	mean	t-stat		mean	mean	t-stat	
Village located on the coast	0.033	0.031	(0.080)		0.039	0.029	(0.342)	
Village located in a valley	0.027	0.081	(-1.339)		0.026	0.097	(-1.701)	*
Village located in a hilly area	0.122	0.132	(-0.160)		0.088	0.135	(-0.815)	
Village located in a plane	0.822	0.756	(0.796)		0.852	0.739	(1.317)	
Urban village	0.106	0.19	(-0.915)		0.12	0.122	(-0.024)	
Official urban village	0.123	0.166	(-0.459)		0.145	0.118	(0.352)	
Population	3106.973	3045.089	(0.053)		2679.367	2419.133	(0.259)	
Number of households	542.235	572.193	(-0.147)		553.303	440.103	(0.596)	
Number of households in agriculture	285.767	244.298	(0.579)		266.586	249.06	(0.206)	
Electricity in the village	0.856	0.89	(-0.651)		0.878	0.875	(0.054)	
Share of households with electricity	0.337	0.538	(-2.291)	**	0.366	0.501	(-1.476)	
Public phone in the village	0.103	0.143	(-0.496)		0.113	0.084	(0.443)	
Number of households with phone[1]	0.021	0.023	(-0.135)		0.024	0.015	(0.746)	
Main road is lighted	0.274	0.45	(-1.445)		0.309	0.377	(-0.605)	
Majority uses LPG/Kerosene for cooking	0.125	0.199	(-0.819)		0.138	0.12	(0.250)	
Majority litters in bin, then delivered	0.132	0.139	(-0.100)		0.149	0.105	(0.684)	
Majority households has private toilet	0.356	0.457	(-0.615)		0.342	0.392	(-0.293)	
Majority households has public toilet	0.592	0.44	(1.265)		0.608	0.488	(0.943)	
Streaming sewage system in village	0.59	0.67	(-0.911)		0.574	0.651	(-0.721)	
Share of permanent dwellings	0.147	0.194	(-0.825)		0.143	0.158	(-0.290)	
Slum in village	0.128	0.059	(1.821)	*	0.139	0.049	(2.235)	**
Share of households living in slum	0.018	0.007	(2.269)	**	0.02	0.005	(2.696)	***
Primary school in the village	0.9	0.799	(1.029)		0.893	0.789	(0.896)	
Junior-high school in the village	0.263	0.328	(-0.738)		0.266	0.286	(-0.219)	
Senior-high school in the village	0.122	0.178	(-0.944)		0.122	0.136	(-0.273)	
Number of primary schools in the village[1]	2.31	2.766	(-0.562)		2.313	2.609	(-0.320)	
Number of junior-high schools in the village[1]	0.418	0.59	(-0.856)		0.428	0.462	(-0.188)	
Number of senior-high schools in the village[1]	0.208	0.353	(-1.071)		0.206	0.25	(-0.430)	
Hospital in the village	0.018	0.046	(-1.219)		0.02	0.028	(-0.507)	
Maternity house in the village	0.051	0.132	(-1.292)		0.057	0.071	(-0.317)	
Health center in the village	0.094	0.102	(-0.241)		0.098	0.091	(0.182)	
Doctor in the village	0.149	0.179	(-0.387)		0.159	0.118	(0.680)	
Midwife in the village	0.445	0.407	(0.437)		0.446	0.358	(1.032)	
Majority has access to piped water	0.101	0.15	(-0.736)		0.104	0.125	(-0.336)	
Main road is paved	0.625	0.509	(1.429)		0.66	0.464	(2.378)	**
Majority traffic through land	0.911	0.981	(-1.657)	*	0.897	0.977	(-1.605)	
Bus terminal in the village	0.03	0.033	(-0.235)		0.033	0.024	(0.778)	
Post office in village	0.075	0.073	(0.065)		0.077	0.066	(0.407)	
Land area (ha)	34759.007	15471.433	(2.196)	**	34550.818	17741.619	(1.565)	
Ratio population/land (ha)	0.998	1.708	(-0.674)		1.157	0.916	(0.307)	
Permanent market in village	0.121	0.109	(0.298)		0.119	0.094	(0.587)	
Temporary market in village	0.14	0.099	(1.280)		0.13	0.092	(1.121)	
Community safety post	0.893	0.676	(1.629)		0.88	0.65	(1.520)	
Police house in village	0.088	0.064	(0.639)		0.096	0.053	(0.990)	
Village head finished junior-high	0.717	0.801	(-1.166)		0.709	0.772	(-0.841)	
Village head finished high school	0.428	0.46	(-0.378)		0.448	0.417	(0.362)	
Number of villages	*1825*	*2547*			*1497*	*2097*		
Number of districts	*11*	*13*			*11*	*11*		

Note: the "Difference" columns report the difference-in-mean test between oil-rich and oil-scarce villages, where standard errors have been clustered at the district level using district borders as in 1990

TABLE 3A

IMPACT OF RESOURCE TRANSFERS ON TRANSPORT INFRASTRUCTURES: SUMATRA AREA

	Majority traffic through land				Access to paved road				Access to bus terminal			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PANEL A: BINARY TREATMENT												
TREATMENT × 2005	0.057*	0.057	0.001	0.011	0.027	0.031	0.024	0.031	-0.001	-0.002	-0.016*	-0.016*
	(0.030)	(0.034)	(0.041)	(0.040)	(0.026)	(0.025)	(0.046)	(0.045)	(0.009)	(0.007)	(0.008)	(0.009)
TREATMENT × 2002	0.025**	0.024*	0.012	0.016	0.027	0.019	0.057	0.064	-0.010	0.001	-0.004	-0.002
	(0.011)	(0.013)	(0.021)	(0.021)	(0.028)	(0.031)	(0.057)	(0.052)	(0.011)	(0.007)	(0.018)	(0.019)
TREATMENT × 1999	0.020*	0.021*	0.021	0.027*	-0.033	-0.067	-0.057*	-0.048*	-0.005	-0.003	-0.017	-0.017
	(0.010)	(0.012)	(0.014)	(0.015)	(0.048)	(0.051)	(0.033)	(0.025)	(0.006)	(0.006)	(0.011)	(0.012)
R-squared	0.030	0.033	0.054	0.057	0.004	0.006	0.008	0.008	0.001	0.000	0.001	0.002
PANEL B: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS	0.001***	0.001**	0.000	0.000	0.001***	0.002***	0.002***	0.002***	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.033	0.032	0.054	0.057	0.004	0.005	0.009	0.010	0.001	0.000	0.001	0.001
PANEL C: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS × 2005	0.002***	0.001**	0.000	0.001	0.001**	0.001***	0.001***	0.001***	-0.000	-0.000**	-0.000*	-0.000*
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PER CAPITA OIL-GAS × 2002	0.001**	0.001***	0.000***	0.000***	0.003***	0.003***	0.004***	0.004***	0.000	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.035	0.033	0.054	0.057	0.006	0.007	0.011	0.012	0.001	0.002	0.002	0.003
Village FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE or Segment-year FE	year	year	segment	segment	year	year	segment	segment	year	year	segment	segment
Sample	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km
Geographical controls				cubic				cubic				cubic
Observations	20,423	16,431	16,431	16,431	19,410	15,511	15,511	15,511	20,423	16,431	16,431	16,431
Number of vv	5,107	4,109	4,109	4,109	5,025	4,033	4,033	4,033	5,107	4,109	4,109	4,109
Number of clusters	26	23	23	23	26	23	23	23	26	23	23	23

Note: robust standard errors in parentheses clustered at the district level as in 1993. *** p<0.01, ** p<0.05, * p<0.1. All specifications exclude mountainous areas, i.e., parts of North Sumatra and Jambi. Columns (1)-(3), (5)-(7), (9)-(11) show the coefficient estimates associated with specification (1), i.e., the Difference-in-Difference strategy. Columns (4), (8) and (12) show the coefficient estimates associated with specification (2), i.e., the spatial Regression Discontinuity strategy.

TABLE 3B

IMPACT OF RESOURCE TRANSFERS ON EDUCATION INFRASTRUCTURES: SUMATRA AREA

	Primary school in village				Junior high school				Senior high school			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PANEL A: BINARY TREATMENT												
TREATMENT × 2005	0.010	0.014*	0.012	0.013	0.062**	0.069***	0.090**	0.099**	0.032*	0.037*	0.039	0.045
	(0.007)	(0.008)	(0.010)	(0.009)	(0.023)	(0.024)	(0.043)	(0.039)	(0.017)	(0.020)	(0.041)	(0.041)
TREATMENT × 2002	0.008	0.013**	0.002	0.004	0.049**	0.058***	0.079**	0.083**	0.015	0.018	0.007	0.014
	(0.006)	(0.006)	(0.007)	(0.007)	(0.019)	(0.020)	(0.031)	(0.030)	(0.013)	(0.015)	(0.019)	(0.019)
TREATMENT × 1999	0.006	0.011*	0.008	0.010	0.022	0.023	0.018	0.022	0.010	0.006	-0.007	-0.002
	(0.006)	(0.006)	(0.011)	(0.011)	(0.016)	(0.018)	(0.024)	(0.022)	(0.008)	(0.010)	(0.015)	(0.014)
R-squared	0.001	0.001	0.002	0.002	0.016	0.017	0.019	0.020	0.015	0.017	0.019	0.020
PANEL B: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS	-0.000	-0.000	0.000	0.000	0.002***	0.002***	0.002***	0.002***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.001	0.001	0.002	0.002	0.020	0.020	0.021	0.021	0.016	0.019	0.020	0.021
PANEL C: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS × 2005	0.000	0.000	0.000	0.000	0.002***	0.002***	0.002***	0.002***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PER CAPITA OIL-GAS × 2002	-0.000**	-0.000*	-0.000***	-0.000***	0.002***	0.002***	0.002***	0.002***	0.001***	0.001***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.001	0.001	0.002	0.002	0.020	0.020	0.021	0.021	0.016	0.019	0.021	0.022
Village FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE or Segment-year FE	year	year	segment	segment	year	year	segment	segment	year	year	segment	segment
Sample	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km
Geographical controls				cubic				cubic				cubic
Observations	20,423	16,431	16,431	16,431	20,423	16,431	16,431	16,431	20,423	16,431	16,431	16,431
Number of vv	5,107	4,109	4,109	4,109	5,107	4,109	4,109	4,109	5,107	4,109	4,109	4,109
Number of clusters	26	23	23	23	26	23	23	23	26	23	23	23

Note: robust standard errors in parentheses clustered at the district level as in 1993. *** p<0.01, ** p<0.05, * p<0.1. All specifications exclude mountainous areas, i.e., parts of North Sumatra and Jambi. Columns (1)-(3), (5)-(7), (9)-(11) show the coefficient estimates associated with specification (1), i.e., the Difference-in-Difference strategy. Columns (4), (8) and (12) show the coefficient estimates associated with specification (2), i.e., the spatial Regression Discontinuity strategy.

TABLE 3C

IMPACT OF RESOURCE TRANSFERS ON HEALTH INFRASTRUCTURES: SUMATRA AREA

	Maternity hospital				Health center				Access to clean water			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PANEL A: BINARY TREATMENT												
TREATMENT × 2005	0.031	0.018	0.026	0.029	0.014*	0.013	0.016	0.017	-0.017	-0.008	-0.003	0.002
	(0.021)	(0.020)	(0.027)	(0.026)	(0.007)	(0.009)	(0.016)	(0.016)	(0.014)	(0.013)	(0.016)	(0.015)
TREATMENT × 2002	0.023	0.012	0.008	0.010	0.007	0.004	0.013	0.009	-0.031**	-0.020*	-0.031	-0.027
	(0.016)	(0.016)	(0.023)	(0.022)	(0.008)	(0.009)	(0.014)	(0.015)	(0.013)	(0.011)	(0.020)	(0.018)
TREATMENT × 1999	0.020*	0.016	0.024*	0.023	-0.003	0.001	0.005	0.005	0.010	0.011	0.000	0.003
	(0.011)	(0.012)	(0.013)	(0.014)	(0.006)	(0.007)	(0.009)	(0.010)	(0.011)	(0.010)	(0.013)	(0.012)
R-squared	0.002	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.003	0.002	0.004	0.004
PANEL B: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS	0.001***	0.001***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.002	0.002	0.002	0.003	0.002	0.003	0.004	0.004	0.000	0.001	0.003	0.003
PANEL C: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS × 2005	0.001**	0.001**	0.000**	0.000***	0.000***	0.000***	0.000***	0.000***	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PER CAPITA OIL-GAS × 2002	0.001***	0.000***	0.000**	0.000**	0.000***	0.000**	0.000***	0.000***	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.002	0.002	0.002	0.003	0.002	0.003	0.004	0.004	0.000	0.001	0.003	0.003
Village FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE or Segment-year FE	year	year	segment	segment	year	year	segment	segment	year	year	segment	segment
Sample	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km
Geographical controls				cubic				cubic				cubic
Observations	20,423	16,431	16,431	16,431	20,423	16,431	16,431	16,431	20,423	16,431	16,431	16,431
Number of vv	5,107	4,109	4,109	4,109	5,107	4,109	4,109	4,109	5,107	4,109	4,109	4,109
Number of clusters	26	23	23	23	26	23	23	23	26	23	23	23

Note: robust standard errors in parentheses clustered at the district level as in 1993. *** p<0.01, ** p<0.05, * p<0.1. All specifications exclude mountainous areas, i.e., parts of North Sumatra and Jambi. Columns (1)-(3), (5)-(7), (9)-(11) show the coefficient estimates associated with specification (1), i.e., the Difference-in-Difference strategy. Columns (4), (8) and (12) show the coefficient estimates associated with specification (2), i.e., the spatial Regression Discontinuity strategy.

TABLE 3D

IMPACT OF RESOURCE TRANSFERS ON OTHER INFRASTRUCTURES: SUMATRA AREA

	Public phone in village				Post office in village				Permanent market in village			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PANEL A: BINARY TREATMENT												
TREATMENT × 2005	-0.061	-0.044	-0.012	-0.031	0.004	0.006	0.018	0.020	0.022	0.037*	0.075***	0.079***
	(0.058)	(0.063)	(0.046)	(0.041)	(0.008)	(0.009)	(0.012)	(0.013)	(0.022)	(0.021)	(0.019)	(0.020)
TREATMENT × 2002	-0.017	0.003	0.040	0.033	0.008	0.009	0.020	0.023*	0.036	0.053**	0.070**	0.077**
	(0.041)	(0.046)	(0.040)	(0.039)	(0.006)	(0.006)	(0.012)	(0.012)	(0.022)	(0.022)	(0.031)	(0.032)
TREATMENT × 1999	-0.013	-0.017	0.001	0.001	0.004	0.005	0.010	0.012	0.003	0.012	0.019	0.024
	(0.011)	(0.013)	(0.012)	(0.011)	(0.006)	(0.007)	(0.007)	(0.008)	(0.017)	(0.015)	(0.015)	(0.015)
R-squared	0.156	0.146	0.148	0.152	0.001	0.001	0.002	0.003	0.008	0.011	0.014	0.015
PANEL B: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS	0.000	0.000	0.000	0.000	0.000***	0.000**	0.000***	0.000***	0.001***	0.001***	0.001***	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.154	0.145	0.147	0.151	0.001	0.002	0.002	0.003	0.010	0.013	0.014	0.015
PANEL C: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS × 2005	-0.000	-0.000	-0.000	-0.000	0.000**	0.000**	0.000***	0.000***	0.001***	0.001***	0.001***	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PER CAPITA OIL-GAS × 2002	0.001**	0.002**	0.002**	0.002**	0.000***	0.001***	0.001***	0.001***	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.155	0.147	0.149	0.152	0.002	0.002	0.003	0.003	0.011	0.014	0.015	0.016
Village FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE or Segment-year FE	year	year	segment	segment	year	year	segment	segment	year	year	segment	segment
Sample	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km
Geographical controls				cubic				cubic				cubic
Observations	20,423	16,431	16,431	16,431	20,423	16,431	16,431	16,431	20,422	16,430	16,430	16,430
Number of vv	5,107	4,109	4,109	4,109	5,107	4,109	4,109	4,109	5,107	4,109	4,109	4,109
Number of clusters	26	23	23	23	26	23	23	23	26	23	23	23

Note: robust standard errors in parentheses clustered at the district level as in 1993. *** p<0.01, ** p<0.05, * p<0.1. All specifications exclude mountainous areas, i.e., parts of North Sumatra and Jambi. Columns (1)-(3), (5)-(7), (9)-(11) show the coefficient estimates associated with specification (1), i.e., the Difference-in-Difference strategy. Columns (4), (8) and (12) show the coefficient estimates associated with specification (2), i.e., the spatial Regression Discontinuity strategy.

TABLE 4

IMPACT OF RESOURCE TRANSFERS CONTROLLING FOR PRODUCING DISTRICTS: SUMATRA AREA

	Access to paved road				Junior high school				Permanent market in village			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PANEL A: BINARY TREATMENT												
TREATMENT × 2005	0.031	0.034	0.028	0.037	0.054***	0.056**	0.071*	0.081**	0.014	0.025	0.059***	0.062***
	(0.025)	(0.024)	(0.047)	(0.045)	(0.018)	(0.022)	(0.036)	(0.033)	(0.018)	(0.018)	(0.011)	(0.012)
TREATMENT × 2002	0.026	0.005	0.038	0.046	0.047**	0.058***	0.081**	0.087***	0.027	0.034**	0.042**	0.048**
	(0.025)	(0.021)	(0.045)	(0.040)	(0.017)	(0.019)	(0.032)	(0.030)	(0.017)	(0.015)	(0.015)	(0.018)
TREATMENT × 1999	-0.025	-0.056	-0.036	-0.021	0.020	0.024	0.018	0.025	-0.004	-0.002	-0.003	0.000
	(0.045)	(0.050)	(0.028)	(0.016)	(0.016)	(0.019)	(0.026)	(0.024)	(0.016)	(0.011)	(0.013)	(0.013)
PRODUCING DISTRICT × 2005	-0.037	-0.013	-0.011	-0.018	0.064*	0.063*	0.060**	0.052	0.071***	0.060**	0.052***	0.050***
	(0.037)	(0.044)	(0.045)	(0.046)	(0.032)	(0.037)	(0.029)	(0.031)	(0.019)	(0.026)	(0.010)	(0.011)
PRODUCING DISTRICT × 2002	0.011	0.071	0.058	0.053	0.016	-0.000	-0.007	-0.012	0.076***	0.091***	0.091***	0.086***
	(0.067)	(0.080)	(0.067)	(0.069)	(0.033)	(0.042)	(0.034)	(0.036)	(0.020)	(0.019)	(0.017)	(0.016)
PRODUCING DISTRICT × 1999	-0.076**	-0.056**	-0.063***	-0.075**	0.010	-0.005	-0.003	-0.008	0.053**	0.068***	0.070***	0.067***
	(0.035)	(0.023)	(0.018)	(0.027)	(0.016)	(0.016)	(0.016)	(0.018)	(0.022)	(0.020)	(0.023)	(0.022)
R-squared	0.006	0.008	0.010	0.011	0.018	0.019	0.020	0.021	0.011	0.014	0.017	0.018
PANEL B: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS	0.002***	0.002***	0.003***	0.003***	0.002***	0.002***	0.002***	0.002***	0.001***	0.002***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PRODUCING DISTRICT × 2005	-0.084***	-0.087***	-0.114***	-0.117***	0.014	0.007	-0.000	-0.006	0.035	0.006	0.016	0.015
	(0.019)	(0.029)	(0.026)	(0.027)	(0.017)	(0.020)	(0.023)	(0.024)	(0.023)	(0.022)	(0.031)	(0.034)
PRODUCING DISTRICT × 2002	-0.021	0.008	-0.008	-0.010	-0.018	-0.032	-0.038	-0.042	0.054**	0.060**	0.065**	0.063**
	(0.050)	(0.060)	(0.048)	(0.050)	(0.020)	(0.022)	(0.026)	(0.026)	(0.021)	(0.029)	(0.029)	(0.030)
PRODUCING DISTRICT × 1999	-0.082**	-0.085**	-0.079***	-0.085***	0.014	0.006	0.004	0.002	0.052**	0.067***	0.069***	0.067***
	(0.038)	(0.039)	(0.027)	(0.028)	(0.015)	(0.016)	(0.019)	(0.021)	(0.020)	(0.020)	(0.023)	(0.022)
R-squared	0.006	0.008	0.012	0.013	0.021	0.021	0.021	0.022	0.012	0.016	0.017	0.017
PANEL C: CONTINUOUS TREATMENT												
PER CAPITA OIL-GAS × 2005	0.001***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PER CAPITA OIL-GAS × 2002	0.003***	0.003***	0.004***	0.004***	0.002***	0.002***	0.003***	0.003***	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
PRODUCING DISTRICT × 2005	-0.069***	-0.069**	-0.090***	-0.094***	0.016	0.012	0.011	0.005	0.041	0.011	0.023	0.022
	(0.023)	(0.029)	(0.031)	(0.032)	(0.017)	(0.021)	(0.026)	(0.026)	(0.024)	(0.023)	(0.031)	(0.033)
PRODUCING DISTRICT × 2002	-0.050	-0.026	-0.050	-0.051	-0.021	-0.041	-0.057**	-0.060**	0.044*	0.051	0.055	0.050
	(0.038)	(0.057)	(0.041)	(0.044)	(0.023)	(0.025)	(0.027)	(0.029)	(0.025)	(0.036)	(0.035)	(0.036)
PRODUCING DISTRICT × 1999	-0.082**	-0.084**	-0.079***	-0.085***	0.014	0.006	0.004	0.002	0.052**	0.067***	0.069***	0.067***
	(0.038)	(0.039)	(0.027)	(0.028)	(0.015)	(0.016)	(0.019)	(0.021)	(0.020)	(0.020)	(0.023)	(0.022)
R-squared	0.007	0.008	0.012	0.013	0.021	0.021	0.022	0.022	0.012	0.016	0.017	0.017
Village FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE or Segment-year FE	year	year	segment	segment	year	year	segment	segment	year	year	segment	segment
Sample	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km	<300km	<200km	<200km	<200km
Geographical controls				cubic				cubic				cubic
Observations	19,410	15,511	15,511	15,511	20,423	16,431	16,431	16,431	20,422	16,430	16,430	16,430
Number of vv	5,025	4,033	4,033	4,033	5,107	4,109	4,109	4,109	5,107	4,109	4,109	4,109
Number of clusters	26	23	23	23	26	23	23	23	26	23	23	23

Note: robust standard errors in parentheses clustered at the district level as in 1993. *** p<0.01, ** p<0.05, * p<0.1. All specifications exclude mountainous areas, i.e., parts of North Sumatra and Jambi. Columns (1)-(3), (5)-(7), (9)-(11) show the coefficient estimates associated with specification (1), i.e., the Difference-in-Difference strategy. Columns (4), (8) and (12) show the coefficient estimates associated with specification (2), i.e., the spatial Regression Discontinuity strategy.

TABLE 5

DESCRIPTIVE STATISTICS: KALIMANTAN AREA

Sample	<100 kilometers			<75 kilometers			<50 kilometers			<25 kilometers		
Treatment	Oil-rich	Oil-scarce	Difference	Oil-rich	Oil-scarce	Difference	Oil-rich	Oil-scarce	Difference	Oil-rich	Oil-scarce	Difference
Statistic	mean	mean	t-stat	mean	mean	t-stat	mean	mean	t-stat	mean	mean	t-stat
Village located on the coast	0.065	0.033	(0.518)	0.045	0.028	(0.376)	0.019	0.039	(-0.680)	0.019	0.059	(-0.953)
Village located in a valley	0.058	0.062	(-0.098)	0.068	0.066	(0.035)	0.076	0.111	(-0.602)	0.019	0.141	(-1.401)
Village located in a hilly area	0.178	0.115	(0.752)	0.194	0.122	(0.707)	0.209	0.114	(0.892)	0.327	0.119	(1.316)
Village located in a plane	0.698	0.8	(-0.794)	0.694	0.796	(-0.801)	0.696	0.749	(-0.459)	0.635	0.681	(-0.275)
Urban village	0.011	0.031	(-4.391) ***	0.009	0.024	(-2.965) ***	0.013	0.005	(1.385)	0	0	.
Official urban village	0.069	0.035	(0.527)	0.023	0.028	(-0.254)	0.013	0.016	(-0.198)	0	0	.
Population	986.135	1066.572	(-0.226)	877.896	978.426	(-0.301)	817.563	847.271	(-0.095)	773.385	805.844	(-0.155)
Number of households	220.095	249.574	(-0.347)	201.396	232.907	(-0.383)	184.114	206.914	(-0.287)	173.346	198.696	(-0.412)
Number of households in agriculture	142.789	138.293	(0.100)	132.257	131.487	(0.018)	111.253	139.278	(-0.870)	110.154	150.993	(-0.967)
Electricity in the village	0.625	0.81	(-2.654) ***	0.595	0.817	(-2.960) ***	0.627	0.752	(-1.175)	0.596	0.689	(-0.381)
Share of households with electricity	0.287	0.394	(-1.964) **	0.267	0.395	(-2.182) **	0.294	0.317	(-0.301)	0.269	0.22	(0.359)
Public phone in the village	0.011	0.043	(-2.774) ***	0.014	0.037	(-2.105) **	0.013	0.026	(-0.549)	0	0.007	(-1.089)
Number of households with phone[1]	0.002	0.007	(-3.148) ***	0.002	0.006	(-1.781) *	0.002	0.002	(0.070)	0	0	(-1.089)
Main road is lighted	0.196	0.498	(-2.891) ***	0.171	0.485	(-2.699) ***	0.171	0.394	(-2.102) **	0.154	0.156	(-0.023)
Majority uses LPG/Kerosene for cooking	0.033	0.024	(0.398)	0.023	0.021	(0.142)	0.025	0.002	(1.353)	0.019	0	(1.116)
Majority litters in bin, then delivered	0.015	0.048	(-2.769) ***	0.009	0.046	(-2.628) ***	0.013	0.021	(-0.467)	0	0	.
Majority households has private toilet	0.135	0.165	(-0.379)	0.131	0.159	(-0.358)	0.095	0.114	(-0.262)	0.038	0.133	(-1.355)
Majority households has public toilet	0.793	0.803	(-0.161)	0.797	0.799	(-0.039)	0.816	0.821	(-0.067)	0.885	0.793	(0.978)
Streaming sewage system in village	0.204	0.342	(-2.256) **	0.203	0.351	(-1.789) *	0.184	0.411	(-2.012) **	0.058	0.437	(-1.712) *
Share of permanent dwellings	0.028	0.02	(0.778)	0.019	0.02	(-0.144)	0.017	0.017	(-0.011)	0.004	0.015	(-0.884)
Slum in village	0.036	0.042	(-0.185)	0.041	0.015	(0.910)	0.038	0.007	(1.472)	0.077	0.007	(1.745) *
Share of households living in slum	0.011	0.01	(0.199)	0.012	0.003	(1.400)	0.014	0.002	(1.987) **	0.009	0.006	(0.382)

Note: the "Difference" columns report the difference-in-mean test between oil-rich and oil-scarce villages, where standard errors have been clustered at the district level using district borders as in 1990

TABLE 5 (CONTINUED)
DESCRIPTIVE STATISTICS: KALIMANTAN AREA

Sample	<100 kilometers			<75 kilometers			<50 kilometers			<25 kilometers		
Treatment	Oil-rich	Oil-scarce	Difference	Oil-rich	Oil-scarce	Difference	Oil-rich	Oil-scarce	Difference	Oil-rich	Oil-scarce	Difference
Statistic	mean	mean	t-stat	mean	mean	t-stat	mean	mean	t-stat	mean	mean	t-stat
Primary school in the village	0.825	0.927	(-1.435)	0.802	0.92	(-1.488)	0.785	0.926	(-1.636)	0.788	0.881	(-1.050)
Junior-high school in the village	0.156	0.165	(-0.172)	0.135	0.152	(-0.332)	0.139	0.139	(0.001)	0.135	0.141	(-0.135)
Senior-high school in the village	0.044	0.051	(-0.781)	0.041	0.047	(-0.631)	0.044	0.035	(0.579)	0	0.022	(-1.089)
Number of primary schools in the village[1]	1.407	1.779	(-0.779)	1.351	1.742	(-0.759)	1.247	1.626	(-0.884)	1.019	1.496	(-1.778) *
Number of junior-high schools in the village[1]	0.193	0.203	(-0.127)	0.176	0.185	(-0.108)	0.177	0.158	(0.239)	0.135	0.156	(-0.367)
Number of senior-high schools in the village[1]	0.062	0.071	(-0.390)	0.063	0.064	(-0.033)	0.07	0.039	(0.773)	0	0.03	(-1.089)
Hospital in the village	0.007	0.008	(-0.212)	0.009	0.007	(0.509)	0.013	0.005	(1.385)	0	0	.
Maternity house in the village	0.004	0.005	(-0.256)	0.005	0.003	(0.272)	0.006	0.005	(0.236)	0	0	.
Health center in the village	0.102	0.079	(1.190)	0.086	0.077	(0.315)	0.089	0.07	(1.010)	0.115	0.089	(1.398)
Doctor in the village	0.113	0.079	(1.320)	0.108	0.076	(0.997)	0.12	0.072	(1.621)	0.115	0.074	(1.245)
Midwife in the village	0.251	0.168	(0.919)	0.243	0.153	(0.838)	0.209	0.128	(0.858)	0.192	0.119	(0.981)
Majority has access to piped water	0.062	0.166	(-3.220) ***	0.032	0.152	(-2.784) ***	0.025	0.093	(-1.901) *	0.019	0.015	(0.201)
Main road is paved	0.283	0.659	(-2.518) **	0.287	0.631	(-2.294) **	0.321	0.628	(-1.906) *	0.35	0.441	(-0.471)
Majority traffic through road	0.502	0.823	(-3.118) ***	0.518	0.866	(-3.539) ***	0.494	0.805	(-2.140) **	0.385	0.756	(-2.340) **
Bus terminal in the village	0.022	0.025	(-0.303)	0.023	0.025	(-0.272)	0.019	0.012	(0.539)	0	0.007	(-1.089)
Post office in village	0.084	0.063	(1.924) *	0.072	0.058	(1.107)	0.076	0.053	(1.565)	0.077	0.067	(0.384)
Land area (ha)	46528.305	31434.728	(0.874)	48882.959	28070.428	(1.141)	54919.823	37296.427	(0.778)	66531.25	59518	(0.165)
Ratio population/land (ha)	0.084	0.235	(-2.157) **	0.084	0.22	(-1.656) *	0.098	0.08	(0.430)	0.16	0.035	(4.999) ***
Permanent market in village	0.08	0.091	(-0.270)	0.072	0.104	(-0.900)	0.063	0.132	(-1.896) *	0.077	0.133	(-0.825)
Temporary market in village	0.091	0.096	(-0.173)	0.108	0.099	(0.272)	0.127	0.1	(0.717)	0.231	0.141	(1.232)
Community safety post	0.64	0.752	(-1.270)	0.653	0.73	(-0.682)	0.62	0.766	(-0.942)	0.442	0.652	(-1.028)
Police house in village	0.047	0.06	(-0.523)	0.041	0.056	(-0.641)	0.032	0.06	(-1.173)	0.019	0.052	(-1.186)
Village head finished junior-high	0.349	0.473	(-1.750) *	0.333	0.457	(-1.551)	0.354	0.397	(-0.424)	0.288	0.348	(-0.435)
Village head finished high school	0.178	0.218	(-0.694)	0.144	0.211	(-1.491)	0.177	0.165	(0.240)	0.135	0.156	(-0.279)
Number of villages	*275*	*1276*		*222*	*952*		*158*	*431*		*52*	*135*	
Number of districts	*4*	*11*		*4*	*10*		*2*	*6*		*2*	*4*	

Note: the "Difference" columns report the difference-in-mean test between oil-rich and oil-scarce villages, where standard errors have been clustered at the district level using district borders as in 1990

TABLE 6A

IMPACT OF RESOURCE TRANSFERS ON TRANSPORTATION AND EDUCATION INFRASTRUCTURES: KALIMANTAN AREA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
PANEL A: TRANSPORTATION INFRASTRUCTURES															
	Majority traffic through land					Main road is paved					Bus terminal				
TREATMENT × 2005	0.242***	0.267***	0.246**	0.236**	0.235**	0.070**	0.044	-0.039	0.005	0.008	0.002	0.010	0.010	0.010*	0.010*
	(0.037)	(0.047)	(0.084)	(0.091)	(0.085)	(0.025)	(0.025)	(0.052)	(0.032)	(0.031)	(0.010)	(0.008)	(0.006)	(0.004)	(0.004)
TREATMENT × 2002	0.117***	0.146***	0.116	0.151**	0.150**	0.007	-0.045**	-0.113	-0.068	-0.068	-0.005	0.001	0.001	0.003	0.003
	(0.036)	(0.035)	(0.072)	(0.057)	(0.055)	(0.035)	(0.018)	(0.061)	(0.040)	(0.040)	(0.007)	(0.005)	(0.005)	(0.005)	(0.005)
TREATMENT × 1999	-0.062	-0.062	-0.071	-0.009	-0.009	-0.035**	-0.060***	-0.095*	-0.051*	-0.048*	0.004	0.011**	0.023*	0.029***	0.029***
	(0.074)	(0.076)	(0.085)	(0.074)	(0.074)	(0.014)	(0.016)	(0.047)	(0.024)	(0.022)	(0.005)	(0.005)	(0.010)	(0.008)	(0.008)
Observations	6,204	4,696	2,356	2,356	2,356	4,997	3,942	1,813	1,813	1,813	6,204	4,696	2,356	2,356	2,356
R-squared	0.112	0.131	0.139	0.154	0.163	0.007	0.014	0.022	0.024	0.029	0.001	0.001	0.005	0.006	0.006
Number of villages	1,551	1,174	589	589	589	1,376	1,081	523	523	523	1,551	1,174	589	589	589
Number of clusters	15	14	8	8	8	15	13	8	8	8	15	14	8	8	8
PANEL A: EDUCATION INFRASTRUCTURES															
	Primary school in village					Junior high school					Senior high school				
TREATMENT × 2005	0.082**	0.090*	0.115*	0.088	0.087	0.119***	0.113***	0.111**	0.094**	0.093**	0.127***	0.102***	0.113***	0.107**	0.106**
	(0.037)	(0.044)	(0.050)	(0.056)	(0.057)	(0.017)	(0.035)	(0.033)	(0.028)	(0.030)	(0.012)	(0.022)	(0.032)	(0.036)	(0.040)
TREATMENT × 2002	0.015	-0.001	-0.005	-0.023	-0.023	0.056***	0.042	0.039*	0.028*	0.028*	0.025	0.013	0.008	0.023*	0.022**
	(0.015)	(0.014)	(0.013)	(0.014)	(0.015)	(0.008)	(0.024)	(0.019)	(0.015)	(0.014)	(0.023)	(0.013)	(0.015)	(0.011)	(0.009)
TREATMENT × 1999	0.033*	0.034	0.029	0.024	0.024	0.036	0.041	0.038	0.008	0.007	0.019	0.007*	0.003	0.005	0.005
	(0.017)	(0.020)	(0.018)	(0.021)	(0.021)	(0.034)	(0.049)	(0.049)	(0.045)	(0.047)	(0.018)	(0.004)	(0.007)	(0.010)	(0.010)
Observations	6,204	4,696	2,356	2,356	2,356	6,204	4,696	2,356	2,356	2,356	6,204	4,696	2,356	2,356	2,356
R-squared	0.016	0.024	0.035	0.046	0.048	0.036	0.035	0.051	0.057	0.060	0.044	0.040	0.063	0.076	0.086
Number of villages	1,551	1,174	589	589	589	1,551	1,174	589	589	589	1,551	1,174	589	589	589
Number of clusters	15	14	8	8	8	15	14	8	8	8	15	14	8	8	8
Village FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE or Segment-year FE	year	year	year	segment	segment	year	year	year	segment	segment	year	year	year	segment	segment
Sample	<100km	<75km	<50km	<50km	<50km	<100km	<75km	<50km	<50km	<50km	<100km	<75km	<50km	<50km	<50km
Geographical controls					cubic					cubic					cubic

Note: robust standard errors in parentheses clustered at the district level as in 1993. *** p<0.01, ** p<0.05, * p<0.1. Columns (1)-(3), (6)-(8), (11)-(13) show the coefficient estimates associated with specification (1), i.e., the Difference-in-Difference strategy. Columns (4)-(5), (9)-(10) and (14)-(15) show the coefficient estimates associated with specification (2), i.e., the spatial Regression Discontinuity strategy.

TABLE 6B

IMPACT OF RESOURCE TRANSFERS ON HEALTH AND OTHER INFRASTRUCTURES: KALIMANTAN AREA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	PANEL A: HEALTH INFRASTRUCTURES														
	Maternity house in village					Health center in village					Access to piped water				
TREATMENT × 2005	0.013***	0.015***	0.019***	0.026***	0.026***	0.073*	0.090*	0.110**	0.086*	0.086*	-0.039	-0.038	-0.057	-0.024	-0.023
	(0.003)	(0.002)	(0.004)	(0.004)	(0.005)	(0.038)	(0.048)	(0.044)	(0.041)	(0.043)	(0.028)	(0.022)	(0.036)	(0.040)	(0.037)
TREATMENT × 2002	0.008	0.007	0.015	0.028**	0.028**	-0.019***	-0.013**	-0.014	-0.008	-0.008	-0.019	0.001	0.007	0.031*	0.032**
	(0.007)	(0.009)	(0.013)	(0.010)	(0.010)	(0.006)	(0.005)	(0.009)	(0.007)	(0.007)	(0.021)	(0.016)	(0.021)	(0.014)	(0.013)
TREATMENT × 1999	0.006**	0.005	0.011**	0.013*	0.013*	-0.021***	-0.013***	-0.014*	-0.008	-0.008	-0.015	-0.008	-0.021*	-0.012	-0.011
	(0.002)	(0.003)	(0.004)	(0.006)	(0.007)	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)	(0.014)	(0.011)	(0.009)	(0.009)	(0.008)
Observations	6,204	4,696	2,356	2,356	2,356	6,204	4,696	2,356	2,356	2,356	6,204	4,696	2,356	2,356	2,356
R-squared	0.003	0.004	0.006	0.010	0.012	0.030	0.038	0.070	0.086	0.090	0.011	0.016	0.025	0.029	0.035
Number of villages	1,551	1,174	589	589	589	1,551	1,174	589	589	589	1,551	1,174	589	589	589
Number of clusters	15	14	8	8	8	15	14	8	8	8	15	14	8	8	8
	PANEL A: OTHER INFRASTRUCTURES														
	Public phone in village					Post office in village					Permanent market in village				
TREATMENT × 2005	0.130*	0.114*	0.112*	0.141***	0.141***	0.031***	0.035***	0.043**	0.026**	0.026**	-0.002	0.009	0.042	0.088***	0.087***
	(0.073)	(0.054)	(0.050)	(0.028)	(0.028)	(0.007)	(0.009)	(0.017)	(0.009)	(0.011)	(0.012)	(0.020)	(0.040)	(0.019)	(0.017)
TREATMENT × 2002	0.155**	0.137**	0.135**	0.198***	0.197***	-0.001	-0.001	0.005	0.003	0.002	0.013	0.012	0.017	0.007	0.006
	(0.071)	(0.063)	(0.053)	(0.028)	(0.027)	(0.004)	(0.003)	(0.004)	(0.003)	(0.002)	(0.030)	(0.030)	(0.035)	(0.026)	(0.027)
TREATMENT × 1999	0.065	0.049	0.047	0.063*	0.063*	0.022**	0.016***	0.006	0.000	0.000	0.025	0.032	0.061*	0.064***	0.064***
	(0.052)	(0.037)	(0.028)	(0.029)	(0.028)	(0.008)	(0.002)	(0.009)	(0.011)	(0.010)	(0.027)	(0.022)	(0.027)	(0.015)	(0.016)
Observations	6,204	4,696	2,356	2,356	2,356	6,204	4,696	2,356	2,356	2,356	6,204	4,696	2,356	2,356	2,356
R-squared	0.094	0.095	0.109	0.129	0.130	0.004	0.003	0.005	0.010	0.012	0.006	0.005	0.012	0.019	0.021
Number of villages	1,551	1,174	589	589	589	1,551	1,174	589	589	589	1,551	1,174	589	589	589
Number of clusters	15	14	8	8	8	15	14	8	8	8	15	14	8	8	8
Village FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE or Segment-year FE	year	year	year	segment	segment	year	year	year	segment	segment	year	year	year	segment	segment
Sample	<100km	<75km	<50km	<50km	<50km	<100km	<75km	<50km	<50km	<50km	<100km	<75km	<50km	<50km	<50km
Geographical controls					cubic					cubic					cubic

Note: robust standard errors in parentheses clustered at the district level as in 1993. *** p<0.01, ** p<0.05, * p<0.1. Columns (1)-(3), (6)-(8), (11)-(13) show the coefficient estimates associated with specification (1), i.e., the Difference-in-Difference strategy. Columns (4)-(5), (9)-(10) and (14)-(15) show the coefficient estimates associated with specification (2), i.e., the spatial Regression Discontinuity strategy.

TABLE 7

IMPACT OF RESOURCE TRANSFERS CONTROLLING FOR PRODUCING DISTRICTS: KALIMANTAN AREA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
PANEL A: EDUCATION INFRASTRUCTURES															
	Primary school in village					Junior high school					Senior high school				
TREATMENT × 2005	0.084**	0.092*	0.115*	0.089	0.088	0.125***	0.121***	0.121***	0.100***	0.099***	0.130***	0.106***	0.117***	0.109**	0.107**
	(0.037)	(0.044)	(0.050)	(0.055)	(0.057)	(0.017)	(0.034)	(0.032)	(0.024)	(0.026)	(0.012)	(0.022)	(0.033)	(0.035)	(0.039)
TREATMENT × 2002	0.017	0.002	-0.002	-0.021	-0.021	0.057***	0.043	0.044*	0.031**	0.032**	0.026	0.014	0.009	0.022*	0.021**
	(0.015)	(0.014)	(0.013)	(0.012)	(0.014)	(0.009)	(0.025)	(0.020)	(0.013)	(0.013)	(0.023)	(0.013)	(0.016)	(0.010)	(0.009)
TREATMENT × 1999	0.033*	0.035*	0.029	0.025	0.025	0.039	0.044	0.043	0.012	0.012	0.018	0.007	0.001	0.003	0.003
	(0.018)	(0.020)	(0.018)	(0.021)	(0.021)	(0.034)	(0.049)	(0.049)	(0.042)	(0.044)	(0.018)	(0.004)	(0.008)	(0.011)	(0.012)
R-squared	0.017	0.024	0.035	0.046	0.049	0.037	0.037	0.052	0.059	0.061	0.046	0.042	0.064	0.077	0.087
PANEL B: HEALTH AND OTHER INFRASTRUCTURES															
	Majority traffic through land					Health center in village					Post office in village				
TREATMENT × 2005	0.244***	0.263***	0.230**	0.227**	0.225**	0.075*	0.094*	0.116**	0.090**	0.089*	0.028***	0.031***	0.037*	0.023*	0.023
	(0.037)	(0.049)	(0.091)	(0.088)	(0.082)	(0.038)	(0.048)	(0.044)	(0.038)	(0.040)	(0.007)	(0.008)	(0.017)	(0.010)	(0.012)
TREATMENT × 2002	0.115***	0.144***	0.113	0.147**	0.147**	-0.016**	-0.008**	-0.006	-0.003	-0.004	-0.002	-0.003	0.003	0.002	0.001
	(0.036)	(0.036)	(0.073)	(0.056)	(0.054)	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)	(0.005)	(0.003)	(0.003)
TREATMENT × 1999	-0.063	-0.064	-0.071	-0.012	-0.012	-0.019***	-0.010***	-0.009	-0.005	-0.005	0.021**	0.015***	0.001	-0.002	-0.002
	(0.074)	(0.076)	(0.085)	(0.072)	(0.072)	(0.004)	(0.003)	(0.005)	(0.004)	(0.004)	(0.008)	(0.002)	(0.010)	(0.010)	(0.009)
R-squared	0.113	0.131	0.141	0.156	0.166	0.031	0.039	0.072	0.088	0.092	0.004	0.004	0.006	0.011	0.013
Village FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE or Segment-year FE	year	year	year	segment	segment	year	year	year	segment	segment	year	year	year	segment	segment
Sample	<100km	<75km	<50km	<50km	<50km	<100km	<75km	<50km	<50km	<50km	<100km	<75km	<50km	<50km	<50km
Geographical controls					cubic					cubic					cubic
Observations	6,204	4,696	2,356	2,356	2,356	6,204	4,696	2,356	2,356	2,356	6,204	4,696	2,356	2,356	2,356
Number of villages	1,551	1,174	589	589	589	1,551	1,174	589	589	589	1,551	1,174	589	589	589
Number of clusters	15	14	8	8	8	15	14	8	8	8	15	14	8	8	8

Note: robust standard errors in parentheses clustered at the district level as in 1993. *** p<0.01, ** p<0.05, * p<0.1. Columns (1)-(3), (6)-(8), (11)-(13) show the coefficient estimates associated with specification (1), i.e., the Difference-in-Difference strategy. Columns (4)-(5), (9)-(10) and (14)-(15) show the coefficient estimates associated with specification (2), i.e., the spatial Regression Discontinuity strategy.