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When Regional Policies Fail: An Evaluation of Indonesia's Integrated Economic Development Zones

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ABSTRACT

Throughout the developing world, many countries have created special economic zones to attract investment and spur industrial growth. In some cases, these zones are designed to promote development in poorer regions with limited market access and lower quality infrastructure, an example of a "big push" development strategy. In this paper, we study the effects of Indonesia's Integrated Economic Development Zone (KAPET) program. This program provided substantial tax-breaks for firms that locate in certain districts in the Outer Islands of Indonesia, a country with large regional differences in per-capita income and a history of policies to promote inclusive growth. We find that along many dimensions, KAPET districts experienced no better development outcomes, and in some cases fared even worse, than their non-treated counterparts. If anything, the strongest finding is that firms in KAPET districts paid lower taxes, but these tax reductions neither encouraged greater firm entry, increased migration, nor raised local measures of output or welfare. Overall, the KAPET program does not appear to have achieved the intended outcome of promoting growth in lagging regions. While there are many possible reasons that the KAPET program failed, our findings suggest caution in spending scarce resources to subsidize development in lagging regions.

1 Introduction

In developing countries, manufacturing firms are often characterized by small scale and persistently low growth. Such firms are constrained by restricted access to markets, capital, and technologies, as well as by unfavorable investment climates (Tybout, 2000). To spur industrial growth, many developing countries have established special economic zones, a particular place-based policy that provides tax incentives and reduced regulatory burdens for firms who locate in specific places. Such policies are commonplace in developing world; examples include China's special economic zones (Wang, 2013), export processing zones in Bangladesh, Thailand, and Vietnam, and free trade zones in Honduras (Farole and Akinci, 2011). Although some countries choose to locate these special economic zones in favorable, high-growth areas, others are using them to attract investment to some of those countries' poorest regions.

If threshold effects and multiple equilibria are important features of economic growth, these policies may attract enough manufacturing activity to constitute a "big push" that generates huge increases in productivity, improving welfare not only in the affected localities but also throughout the country (e.g., Rosenstein-Rodan, 1943; Murphy et al., 1989; Azariadis and Stachursky, 2005). Although the subsidies associated with a special economic zone may be costly initially, because of productivity spillovers, the zone may attract new firms that make existing firms more productive and encourage even further entry. This could create a self-sustaining, virtuous circle of development with growth dividends that ultimately make the subsidy pay for itself.

However, even theoretically, the relative costs and benefits of place-based policies are difficult to discern. If firms and workers are perfectly mobile, all of the benefits of these policies should accrue to landowners (Rosen, 1979; Roback, 1982).[1] Even if mobility is relaxed, whether or not a place-based policy improves national welfare through agglomeration effects hinges on whether the agglomeration function, a mapping between the density of manufacturing employment and productivity, is sufficiently non-linear (Kline and Moretti, 2014a). In the absence of such productivity spillovers, place-based policies could just be reshuffling economic activity from one place to another without increasing aggregate welfare (Bartik, 1991; Glaeser and Gottlieb, 2009).

This paper investigates the short- and long-run effects of a large place-based intervention in Indonesia known as the Integrated Economic Development Zone (*Kawasan Pengembangan Ekonomui Terpadu*, or KAPET) program. This program provided substantial tax-breaks for firms that locate in certain districts in the Outer Islands of Indonesia, a country with large regional differences in per-capita income and a history of policies to promote inclusive growth. KAPET districts are located in separate provinces throughout the country, and we combine the rich spatial variation in treated districts with high quality data on demographic outcomes, measures of regional output and growth, and firm-level outcomes. We first present a model for how place based subsidies, like the KAPET program, may increase regional and national welfare. Then, using a series of reduced form exercises, we estimate the average treatment effect of KAPET zones on firm entry, output, productivity, and wages in treated districts. We also evaluate the impact of KAPET on demographic outcomes and measures of regional output and growth.

In estimating the impact of place-based policies like the KAPET program, a central concern is that

[1] In developing countries, we may also be particularly concerned about these policies because of institutional or political economy concerns. The allocation of spatially targeted investment subsidies may be given to cities where politically connected individuals or firms stand to directly benefit.

there are omitted variables correlated with treatment that influenced selection into the program and also affect outcomes. We document that KAPET zones were established in poorer districts that were more rugged, farther from Jakarta, and less populated that other districts. This endogenous program placement creates a negative targeting bias that leads naive treated vs. non-treated comparisons to underestimate program impacts. To improve identification, we first restrict the non-treated sample to only include districts on the Outer Islands, which are more comparable to KAPET districts than districts on Java and Bali. Next, we use an inverse probability weighting (IPW) approach that explicitly adjust for potential *ex ante* differences between KAPET districts and non-KAPET districts. This approach reweights the contribution of non-treated districts to the counterfactual in accordance with their odds of treatment. These odds are constructed from a propensity score estimation, where treatment selection depends on observable, pre-determined characteristics.

We find that along many dimensions, KAPET districts experienced no better development outcomes, and in some cases fared even worse, than their non-treated counterparts. Although the program seems to have generated an increase in migration in the first few years, most demographic impacts vanish completely after a decade. Using data on regional gross domestic product, we also find that the program was not associated with increased economic growth or changes in the composition of economic activity. Similarly, we find that treated districts did not see any increases in the intensity of nighttime lighting, another commonly used measure of regional output (Henderson et al., 2012; Olivia and Gibson, 2013).

However, in looking at outcomes for firms, we do find significant productivity improvements for micro and small firms in treated districts, as measured by value added per worker. To the extent that these micro and small firms represent a substantial portion of total firms in Indonesia, these productivity impacts could represent significant welfare gains (Hsieh and Olken, 2014; Rothenberg et al., 2016). However, we find no changes in entry across the size distribution of firms, and because we do not have pre-treatment data on MSMEs, it is hard to say whether these effects represent changes from before the program took place.

Our strongest evidence comes from panel data on medium and large sized manufacturers, from Indonesia's Industrial Survey (*Survei Industri*, or SI). We find that incumbent medium and large firms may have slightly increased their use of labor in treated districts, but generally they also reduced their use of capital and did not experience any changes in capacity utilization. If anything, our strongest set of results pertain to taxes: firms in treated districts paid substantially lower sales, licenses, buildings, and land taxes than firms in non-treated districts. This is not surprising, given that the KAPET program was designed to directly reduce taxes in treated districts. However, it also suggests that firms locating in KAPET districts were more profitable and directly benefited from the tax subsidy, but because the program did not generate increases in entry or migration, the scope for productivity spillovers and growth impacts is quite limited.

There are many possible reasons for the lack of success of the KAPET program. The program was started around the time of the Asian Financial Crisis and subsequent political upheaval, so firms may have been dissuaded from making use of the incentives, given the substantial political and macroeconomic instability. This is why, for many outcomes, our analysis begins with data from 2000 and focuses on the changes that took place between 2000 and 2010. Another concern is that because the program operated at the district level, variations in local implementation could have lead to differences in project performance. Separately, the tax incentives put in place by the program may just not have been a big enough "big push" to overcome the threshold effects necessary to push treated districts to a new equilibrium.

However, our findings are also consistent with the strand of literature that suggests that policies to encourage firms to locate in lagging regions may suffer from fundamental challenges. Because firms do not internalize productive externalities, they tend to locate in cities that are too small from the perspective of maximizing social welfare (Henderson, 1974). To the extent that location fundamentals are important determinants of how economic activity is configured across space (e.g. Davis and Weinstein, 2002), it may have been impossible even with very large subsidies to attract investment to areas with insufficient market access, communications and transportation infrastructure, or other suitable natural amenities.[2] Moreover, if firms are heterogeneous in productivity, place-based policies to subsidize firms in the poorest regions may be attracting the least productive firms, exacerbating the problem of productivity spillovers by creating vicious circles, instead of virtuous circles (Gaubert, 2015). Instead of encouraging firms to locate in remote areas, it may be more optimal to reduce land rents and barriers to growth in the largest cities (Albouy et al., 2016).

This paper contributes to the literature on evaluations of place-based policies by providing more evidence on their impacts in a developing country setting, where possibly the productivity spillover rationale for the effectiveness of place-based policies is most salient. We focus on a program that was significantly less impactful than China's special economic zones (Wang, 2013) and considerably smaller than a program like the Tennessee Valley Authority (Kline and Moretti, 2014a). In doing so, we provide credible evidence that may help policymakers better understand when and where place-based policies may be effective and when they may instead just represent a tax giveaway for firms who would have behaved similarly in the absence of such subsidies.

The rest of this paper is organized as follows. Section 2 presents a spatial general equilibrium model of the impacts of regional policies which is used to guide our empirical work and generate hypotheses to be tested. Section 3 presents background information on the KAPET program and other regional policies in Indonesia. Section 4 describes the different datasets we use in evaluating the KAPET program and presents summary statistics. Section 5 discusses results, and Section 6 concludes.

2 A Model of the Impacts of Regional Policies

In this section, we describe a model for how regional policies may influence the spatial configuration of economic activity and affect national welfare. The model, which is static, is based on the two-region model of Kline and Moretti (2014b), but expands upon it in several ways. First, we extend their model to multiple regions. Next, we add non-traded capital to firm production functions, which generates a downward sloping inverse labor demand curve in the wage-employment space. We also focus on how local firm productivity may depend on agglomeration externalities, and finally, we expand upon the welfare analysis. These extensions of Kline and Moretti (2014b) can help enrich the empirical analysis of programs like Indonesia's KAPET. In discussing the model, we review some of the literature on the

[2]Much of the success of China's special economic zones may have been due to the fact that the initial SEZs were on established in coastal areas with substantial market access (Wang, 2013).

impacts of regional policies.

2.1 Space

Suppose there are multiple communities, indexed by $c = 1, ..., C$. Output is freely traded between communities. Each community has a local consumer amenity, A_c, which is valued by consumer-workers, and a local producer amenity, X_c, which shifts the productivity of firms.

2.2 Consumer-Workers

We assume that throughout the economy, there is a measure 1 continuum of workers. Each worker supplies one unit of labor, inelastically, and rents one unit of housing.[3] The inelastic demand for housing and the inelastic labor supply provide a simple linear specification for the consumer's indirect utility function:

$$U_{ic} = w_c - r_c + A_c + \varepsilon_{ic} = V_c + \varepsilon_{ic}$$

where w_c is the local nominal wage in location c, r_c is the rental cost of housing, A_c is a measure of the value of local amenities, and ε_{ic} represents worker i's idiosyncratic tastes for living in c. We assume that ε_{ic} is distributed i.i.d. extreme value type 1 across locations for each consumer, with scale parameter s, and location (mean) parameter 0.[4] From this expression, we can see that consumer i's indirect utility depends on a mean utility component, V_c, which depends on prices (wages, rents) and amenities specific to location c, and an idiosyncratic component.

As in traditional spatial equilibrium models (Rosen, 1979; Roback, 1982), we assume that workers are mobile across space and choose locations to maximize welfare. The share of workers who choose location c, equal to the probability that location c is chosen by an individual, is given by:

$$N_c = P\left\{i \text{ chooses location } c\right\} = \frac{\exp\left\{V_c/s\right\}}{\sum_{j=1}^{C}\exp\left\{V_j/s\right\}} \tag{1}$$

The scale parameter, s, is a way of capturing migration costs and measuring immobility. If s is large, workers will require large differences in mean utility to be compelled to move. If s is small, workers are not particularly attached to locations, and they will migrate to arbitrage away mean utility differences.[5]

2.3 Firms

Firms produce a single good using labor, capital, a fixed factor, and a local amenity. The good they produce is freely traded, with prices determined on international markets. We can set the price of output

[3]Note that the inelastic labor supply formulation is an attractive simplification to the model, but it is in stark contrast to the data in Indonesia. For example, currently, only 50 percent of women in Indonesia participate in the labor force (Schaner and Das, 2016).

[4]In other words, ε has the following cumulative distribution function: $F(\varepsilon) = \exp\left\{-\exp\left\{-\varepsilon/s\right\}\right\}$.

[5]Another way of thinking about how s parameterizes migration costs is to note that the variance of ε is equal to $\pi^2/6 \cdot s^2$. So, as s increases, the idiosyncratic component of indirect utility is more likely to have very large draws which dominate the mean utility components and hence, are more likely to govern location choices.

to 1 as the numeraire in the model. Firms' production functions are given by:

$$Y_c = X_c N_c^{\alpha} K_c^{\beta} Z_c^{1-\alpha-\beta}$$

where N_c is the share of labor in location c, K_c is mobile capital, Z_c is fixed, non-traded capital, and X_c is a location-specific productivity shifter. We assume that mobile capital is globally traded, so that firms can rent as much of it as they want at fixed price ρ, but we also assume that each city is endowed with a fixed amount of capital, which cannot be traded. The fixed capital is introduced into the model to allow for a downward sloping labor demand curve, creating one congestion force that prevents communities from becoming too large (Gottlieb and Glaeser, 2008). To model agglomeration forces, we assume that X_c takes on the following form:

$$\ln\left(X_c\right) = \gamma_c + g\left(\frac{N_c}{T_c}\right) \tag{2}$$

Here, γ_c is a location-specific productivity shifter (natural amenities), and T_c is the total square kilometers, so that $g\left(\cdot\right)$, the agglomeration function, maps population density into productivity.

To model regional policies, we assume that in certain cities, wages are subsidized by the government, so that instead of paying w_c for a unit of labor, the firm pays $w_c(1-\tau_c)$ where $\tau_c \in [0,1)$ is the local ad valorem wage subsidy. As τ_c increases, the actual wages paid by the firm falls.[6]

Firms choose N_c and K_c to maximize profits, ignoring the way that their choice of N_c affects aggregate productivity (Chipman, 1970). In optimizing, firms treat both X_c and Z_c as fixed and solve the following problem:

$$\max_{N_c, K_c} \; X_c N_c^{\alpha} K_c^{\beta} Z_c^{1-\alpha-\beta} - w_c\left(1-\tau_c\right) N_c - \rho K_c$$

The firm's first order conditions for labor and capital are as follows:

$$\begin{aligned} \frac{\partial \Pi_c}{\partial N_c} &\overset{\text{set}}{=} 0 \quad \Longrightarrow \quad \alpha X_c N_c^{\alpha-1} K_c^{\beta} Z_c^{1-\alpha-\beta} = w_c\left(1-\tau_c\right) \\ \frac{\partial \Pi_c}{\partial K_c} &\overset{\text{set}}{=} 0 \quad \Longrightarrow \quad \alpha X_c N_c^{\alpha} K_c^{\beta-1} Z_c^{1-\alpha-\beta} = \rho \end{aligned}$$

We can rearrange the firm's first order condition for capital as follows:

$$K_c = \beta^{\frac{1}{1-\beta}} \rho^{\frac{-1}{1-\beta}} X_c^{\frac{1}{1-\beta}} N_c^{\frac{\alpha}{1-\beta}} Z_c^{\frac{1-\alpha-\beta}{1-\beta}}$$

Plugging this expression into the firm's first order condition for labor, taking logs, and rearranging, we obtain the following expression for labor demand:

$$\begin{aligned} \ln w_c = C &+ \left(\frac{1}{1-\beta}\right)\ln X_c - \left(\frac{1-\alpha-\beta}{1-\beta}\right)\ln N_c + \left(\frac{1-\alpha-\beta}{1-\beta}\right)\ln Z_c \\ &- \ln\left(1-\tau_c\right) - \left(\frac{\beta}{1-\beta}\right)\ln \rho \end{aligned} \tag{3}$$

[6] Here, we also assume that this subsidy is paid for by an international government, instead of being financed locally by domestic taxes. This simplifies the model but is not essential for the main conclusions. Moreover, this assumption is arguably more in line with the setting in developing countries like Indonesia where much of local spending is financed by the central government as opposed to the local tax base.

where $C \equiv \ln\left(\alpha\beta^{\beta/(1-\beta)}\right)$ is a constant. So, the inverse labor demand is downward sloping in wage-employment space, holding productive amenities, X_c, fixed.

2.4 Housing

Housing is supplied competitively and priced at marginal cost. As the number of units produced increases, the marginal costs of supplying additional housing units increase, because land is fixed and it becomes increasingly difficult to supply housing. We assume that the inverse supply function of housing takes the following constant elasticity form:

$$r_c = \theta_c N_c^{\kappa_c} \tag{4}$$

where $N_c = H_c$, because of the consumer's inelastic, single-unit demand for housing, and location-specific constants that shift the housing costs are given by θ_c and κ_c. The term κ_c governs the elasticity of housing supply in location c with respect to population. As κ_c increases, it becomes more costly to build new houses, and rents increase faster with population increases. This formulation of housing represents another congestion force in the model.

Landlord profits are simply given by the area above the inverse supply curve:

$$\begin{aligned}\Pi_c(L) &= \int_0^{N_c} \left(r_c - \theta_c N_c^{\kappa_c}\right) \\ &= \left(\frac{\kappa_c}{\kappa_c + 1}\right) r_c N_c\end{aligned}$$

2.5 Spatial Equilibrium and Welfare Analysis

A spatial equilibrium is a collection of wages, w_j, rents, r_j, and population shares, N_j such that firms earn zero profits, workers choose locations that maximize their utility, and housing supplied is equal to housing demanded. Equations (1), (3), and (4) form a system of equations that characterize the spatial equilibrium. Equilibria may not necessarily be unique, depending on the shape of $g(\cdot)$.

From Small and Rosen (1981), we know that the average welfare for consumers is given by the following log sum expression:

$$\mathbb{E}_\varepsilon\left[\max_j \{U_i\}\right] = \ln\left[\sum_{j=1}^{C} \exp\{V_j/s\}\right] + \mu$$

where μ is the expected value of the ε_{ij} term (equal to the Euler constant ≈ 0.5572). This expression for average consumer welfare is convenient, and in particular, we can show that if τ_c were increased by some small amount, average consumer welfare would change as follows:

$$\frac{\partial \mathbb{E}[U_i]}{\partial \tau_c} = \sum_{j=1}^{C} \frac{N_j}{s}\left(\frac{\partial w_j}{\partial \tau_c} - \frac{\partial r_j}{\partial \tau_c}\right)$$

This expression is just the sum of the total population shares times the amount through which increases in τ in location c affect local welfare, by altering local wages or housing rents in all locations j.

From equation (3), we can see that as we increase the subsidy for location c, this affects wages in location j in three different ways:

$$
\begin{aligned}
\frac{\partial w_j}{\partial \tau_c} &= w_j \frac{\partial \ln w_j}{\partial \tau_c} \\
&= w_j \left[\underbrace{\left(\frac{1}{1-\beta}\right) g'(N_j/T_j) \frac{\partial N_j}{\partial \tau_c}}_{\text{(A)}} - \underbrace{\left(\frac{1-\alpha-\beta}{1-\beta}\right) \frac{1}{N_j} \frac{\partial N_j}{\partial \tau_c}}_{\text{(B)}} + \underbrace{\mathbf{1}\{j=c\} \left(\frac{1}{1-\tau_c}\right)}_{\text{(C)}} \right]
\end{aligned}
$$

Term (A) reflects the impact of the subsidy on wages through agglomeration effects. As τ_c increases, this may increase or decrease population in the city ($\partial N_j / \partial \tau_c \gtrless 0$), and this raises (lowers) wages by increasing (decreasing) density and productivity, through the agglomeration function (2). On the other hand, because of fixed capital, labor demand is downward sloping, and this effect is reflected in the second term, term (B). The third term, (C), is the direct effect of the subsidy on local wages, which is only non-zero for community c.

The impact of the subsidy on local rents just depends on how local population changes shift the marginal housing supply costs:

$$
\begin{aligned}
\frac{\partial r_j}{\partial \tau_c} &= \theta_c \kappa_c N_c^{\kappa_c - 1} \left(\frac{\partial N_j}{\partial \tau_c}\right) \\
&= \left(\frac{r_j \kappa_j}{N_j}\right) \left(\frac{\partial N_j}{\partial \tau_c}\right)
\end{aligned}
$$

Putting these results together, we obtain the following expression for how changes in a local wage subsidy affect average welfare:

$$
\frac{\partial \mathbb{E}\left[U_i\right]}{\partial \tau_c} = \sum_{j=1}^{C} s^{-1} \left[\left\{ g'(N_j/T_j) \frac{w_j N_j}{1-\beta} - \left(\frac{1-\alpha-\beta}{1-\beta}\right) w_j - r_j \kappa_j \right\} \frac{\partial N_j}{\partial \tau_c} + \mathbf{1}\{j=c\} \left(\frac{w_j N_j}{1-\tau_c}\right) \right]
$$

Broadly speaking, the impacts of a regional policy on national welfare depend on whether they induce agglomeration benefits, by increasing local productivity in some areas and not decreasing local productivity too much in other areas. These agglomeration benefits are offset by congestion effects (downward sloping labor demand, housing costs). To provide more intuition, we focus on this expression for a two-community case.

2.6 Two Community Case

Suppose that in the initial equilibrium, region 1 is less populated than region 2, and it has lower wages ($w_1 < w_2$) and lower rents ($r_1 < r_2$). Let τ denote a wage subsidy attempting to attract investment into region 1, and let $\tau_2 = 0$. With two communities, the total population is equal to $1 = N_1 + N_2$. This means that increasing the population in region 1 necessarily reduces the population in region 2 by the same amount. Using this, we can write our expression for the change in welfare as follows:

$$\begin{aligned}\frac{\partial \mathbb{E}\left[U_i\right]}{\partial \tau_c} = & \frac{1}{s(1-\beta)} \frac{\partial N_1}{\partial \tau}\left[g'\left(\frac{N_1}{T_1}\right) w_1 N_1 - g'\left(\frac{N_2}{T_2}\right) w_2 N_2\right] \\ & -\left(\frac{1-\alpha-\beta}{s(1-\beta)}\right) \frac{\partial N_1}{\partial \tau}\left(w_1 - w_2\right) \\ & -\left(\frac{1}{s}\right) \frac{\partial N_1}{\partial \tau}\left(r_1 \kappa_1 - r_2 \kappa_2\right) \\ & +\left(\frac{1}{s}\right)\left(\frac{w_1 N_1}{1-\tau}\right)\end{aligned}$$

The first term in this expression reflects the differences in agglomeration effects, and will be discussed in more detail. The second two terms reflect differences in the impacts of two congestion forces. If the wage subsidy increases population movements into region 1, so that $\partial N_1/\partial \tau > 0$, there is downward pressure on wages through downward-sloping labor demand, but this also increases the marginal costs of housing, making rents more expensive. If region 1 is initially less populated than region two, both of these congestion-force effects may contribute positively to average welfare. A policy to make population distributions more equal will dampen the negative congestion effects in region 2, and as long as congestion does not increase too much in region 1 in response, it can be welfare improving. The fourth term reflects the direct impact of the wage subsidy on wages in region 1, which is unambiguously positive.

So far, we have not specified the functional form for the agglomeration function, $g(\cdot)$, which governs the first term in the welfare impacts of regional policies. Figure 1 depicts three different possibilities for what this function might look like. In Panel A, the agglomeration function is linear, so that increases in density map linearly into increases in productivity. Moving community 1 from point A to point A' increases density and positively contributes to welfare, but this comes at the loss of productivity in region 2, and these two effects cancel each other out in the aggregate ($+\Delta g = -\Delta g$). This is one case discussed by Kline and Moretti (2014a) in their study of the long-term impacts of the Tennessee Valley Authority (TVA).

In Panel B, the agglomeration function displays diminishing returns, so that reducing density in region 2 causes some productivity losses, but these are overwhelmed by productivity gains in region 1. The shape of this agglomeration function is what policymakers have in mind when they are subsidizing firms to invest in poorer regions. In Dinkelman and Schulhofer-Wohl (2015), the absence of land-markets encourages excessive migration, and this leads to congestion in the provision of public services. These congestion effects cause productivity growth to slow as density increases. This leads to situations where the largest cities are too large, and growth-enhancing redistribution could occur through spatial reallocation.

In Panel C, the agglomeration function displays increasing returns, so that when region 2 becomes smaller, the productivity losses are much larger than the productivity gains in region 1. Gaubert (2015) presents a model of heterogeneous firms in spatial equilibrium where the agglomeration function looks like this. In the competitive equilibrium of her model, firms locate in cities that are too small, because they do not internalize the positive externalities that they create for other firms, and because the social benefits of locating in a larger city are larger than the private benefits. Policies that would encourage growth of the largest cities, such as removing housing restrictions, would be welfare enhancing, while policies that subsidize smaller cities would not be welfare improving.

Armed with this theoretical background, in the next section, we provide an overview of different policies that have been used to promote regional development in Indonesia. We describe the KAPET program in detail before introducing the data we use in our empirical analysis.

3 Regional Policies in Indonesia

Spatial differences in the concentration of economic activity, employment, and output have been a feature of Indonesia's economy for centuries. According to the Central Statistical Agency (BPS), in 1983, the per capita gross regional product of the richest district in Indonesia (Central Jakarta) was over 23 times the per capita gross regional product of the poorest district in Indonesia (South Bengkulu, in southwest Sumatra).[7] These economic inequalities, interacting together with the vast diversity of ethnolinguistic groups scattered across the archipelago, have often threatened to undermine the viability of Indonesia as a nation state.

In the colonial period, the Dutch East India Company (VOC) practiced a very uneven development strategy in Indonesia, beginning with their arrival in the early 17th century. The VOC promoted extractive enclaves in the form of plantations and natural resource extraction on Sumatra, Sulawesi, and Kalimantan, while at the same time encouraging more balanced, diversified growth in West Java (Hill, 2000). Before and after World War II, the movement for Indonesia's independence from the Dutch and eventually the Japanese was arguably only successful because of its focus on "*Bhinneka Tunggal Ikea*", the national motto, which translates to "Unity in Diversity". However, in the 1950s, violent separatist movements in Sumatra and Kalimantan, notably in Aceh, threatened to overwhelm Sukarno's early presidency (1945–1967) and dissolve the Indonesian nation.

Later, under Suharto's New Order regime (1967–1998), several policy initiatives were put into place to combat regional inequality (Soenandar, 2005). Beginning in the late 1960s, Suharto's first five-year development plan (*Repelita* I) introduced several investment incentives to combat disparities. These included providing tax holidays for firms locating outside of Java, starting in 1967 and expanding into 1970.[8] However, in 1984, the tax holidays and other fiscal benefits for firms locating off of Java were finally eliminated, in an effort to simplify taxation and expand revenue (Pangestu and Bora, 1996).[9]

KAPET. Although there were some fiscal incentives in place to promote growth in lagging regions after the elimination of the tax holiday in the early 1990s, efforts were quite limited until the creation of the Integrated Economic Development Zones (*Kawasan Pengembangan Ekonomui Terpadu*, or KAPET), first announced in 1996. The KAPET program was designed to accelerate growth and development in Eastern Indonesia, which consists of the island groups of Kalimantan, Sulawesi, Maluku, Papua, and Nusa Tenggara. By law, businesses locating in KAPET zones were eligible for several fiscal and accounting incentives. These incentives included a partial tax holiday, with a 30 percent reduction of

[7] This figure excludes oil in the calculation of gross domestic regional product. Were we to include oil, regional disparities would appear even larger.

[8] For an in-depth discussion of the history of regional policies in Indonesia, see Temenggung (2013).

[9] Some policies that expanded in the late 1970s and early 1980s, such as Indonesia's Transmigration program, were also designed in part to stimulate economic activity in unpopulated, underdeveloped regions (Bazzi et al., 2016).

taxes on capital, expanded choices for depreciation and amortization of capital and losses, fiscal loss compensation for 10 consecutive years, and a reduced income tax on dividends for foreign taxpayers. Other benefits included: (1) an income tax exemption on imports of capital goods, raw materials, and other equipment directly related to production activities (Presidential Decree 9/1998, Article 22); (2) a 50 percent reduction of building and land taxes for both new construction and expansion; and (3) additional deduction benefits, including being able to deduct 50 percent of employee costs from taxable income.

KAPET zones also included several different non-financial incentives, including 31 priority programs in human, economic, and national resources, facilities and infrastructure, and investment facilitation services. Temenggung (2013) argues that these non-financial incentives were possibly even more important than the financial incentives. There were also several programs targeted at micro, small, and medium-sized enterprises (MSMEs), including counseling and assistance programs, programs to assist MSMEs in applying for loans from the banking sector, and the promotion of a one-stop-shop integrated licensing system (*Pelayanan Terpadu Satu Pintu*, or PTSP) to reduce the costs of business registration.[10]

By using these fiscal and non-financial incentives, policymakers hoped that KAPETs would attract investment, stimulate manufacturing growth, and promote the growth of exports. Planners also intended to encourage the creation, expansion, and development of MSMEs. Another goal was to reduce unemployment and poverty, and it was thought that manufacturing growth from large, medium-sized, and small firms would provide jobs and also expand economic development.

Presidential Decree No. 89 of 1996 created the KAPET program, building on a small number of earlier programs aimed at accelerating regional development in Eastern Indonesia. Apart from one KAPET zone created in Papua (which we ignore in our analysis because of data quality concerns), 12 KAPET zones were launched by presidential decree in January 1998, before Suharto resigned, and in September 1998, after Habibie became president. Table 1 lists the names and locations of these 12 KAPETs, the presidential decree that established them, and the dates they started operation. Although one KAPET was established in Banda Aceh, in Aceh, North Sumatra, the remaining 12 other KAPETs were located in Eastern Indonesia.

In total, 35 different districts were treated by the program.[11] Districts were selected for the KAPET program according to several different selection criteria: (1) favorable geography, (2) potential for economic growth, (3) leading sectors capable of boosting the economic growth of hinterland areas, and (4) potential for large investment returns. Each KAPET zone was established in a different province in Eastern Indonesia. Within provinces, it was hoped that KAPETs would be growth centers, attracting activity from hinterland areas. Figure 2 presents a map of the districts treated by the program.

On paper, the KAPET program looks very similar to the wage subsidy as modeled in Section 2. In practice, the program suffered from several implementation issues. First, many KAPETs were created in 1998, right before the Asian Financial Crisis and subsequent political upheaval, which brought tremendous uncertainty to the business and investment climate in Indonesia. Despite the tax breaks offered by the program, these political and macroeconomic events may have dissuaded foreign investment away

[10]For more background on the PTSP program, as well as an evaluation of the program's impact on business registration outcomes for MSMEs, see Rothenberg et al. (2016).

[11]Note that based on the legislation documents, 27 districts were fully treated by the program, but 8 districts were only partially treated, with specific sub-districts only affected by the program. Because our data generally only operates at the district level, we ignore these differences between fully treated and partially treated districts in our empirical work.

from the region, particularly in the early years of the program. In 2000, Regulation No. 20 offered some streamlining of the KAPET incentive structures and more flexibility to firms who would be using them, but this may not have made much of a difference.

Second, KAPETs were managed under a decentralized structure, and local governments had substantial authority over how to use program funds. In the early days of Indonesia's "big bang" decentralization, there was considerable uncertainty over administrative authority and obligations. Local governments had trouble coordinating with the central government and often lacked the capacity to manage and implement many programs transferred to them (Hofman and Kaiser, 2004). Several early reviews of the program highlighted the substantial heterogeneity in the performance of different KAPET zones, and this may be because of how the federal program was inconsistently implemented in different localities (Temenggung, 2013).

4 Data

In this section, we first define districts, the spatial unit of analysis used in the empirical work. Then, we describe the several different datasets used in the paper: (1) geographic characteristics and satellite data; (2) census data to measure demographic characteristics; and (3) data on economic and industrial activity.[12]

KAPET. Throughout the paper, we use Indonesia's districts (*kabupaten*) as the primary spatial unit of analysis. The district is the second administrative division in Indonesia, nested below the province, but above the subdistrict (*kecamatan*) and village (*desa* or *kelurahan*). Because many districts were divided and partitioned into new districts during the process of decentralization after the fall of Suharto, we aggregate variables back to the 1990 definitions in order to achieve a consistent geographic unit of analysis. The sample contains 301 districts, with a median land area of 1,886 square kilometers. This is slightly larger than the size of U.S. counties, which have a median area of 1,595 square kilometers. Indonesia's major cities (*kota*) are also given separate district identifiers, and these designations are also used in the analysis.

Geographic Characteristics. We use data from the *Harmonized World Soil Database* (HWSD) and other sources to measure many agroclimatic characteristics of districts. These include important measures of topography, such as elevation, slope, ruggedness, and distance to rivers and the coast, all of which capture aspects of districts' natural amenities which may influence productivity. We also construct measures of centroid distance to Jakarta, distances to major roads, and distances to ports to proxy for access to markets. These variables should capture many important aspects of the "favorable geography" criterion used to govern selection into treatment as KAPET districts.

Demographic Characteristics. For the last 40 years, Indonesia's Central Statistical Agency, *Badan Pusat Statistik* (BPS), has collected high quality decennial population censuses. We use IPUMS extracts of the

[12] More information on these variables, including precise details on how various outcome measures were calculated, can be found in Appendix A.

1971, 1980, 1990, 2000, and 2010 Indonesian Censuses to measure demographic characteristics at the district level. Measures include the size of the total population, the number of employed and unemployed people, the average household size, literacy rates, the percent of the population with different levels of educational attainment, and the share of the population working in different economic sectors. From each IPUMS extract, we also construct migration measures, using the fraction of the population born in a different province, or the share of the population that moved to the current district within the last 5 years.

Economic and Industrial Activity. We use two different indicators as broad measures of economic activity at the district level: (1) annual data on real non-oil gross domestic product and (2) annual data on nighttime light intensity from the National Oceanic and Atmospheric Administration (Henderson et al., 2012). Light intensity has been identified as a strong proxy for local income within Indonesia, over a period of rapid electrification beginning in the late 1980s (Olivia and Gibson, 2013). We analyze the night lights data by measuring average intensity at the district level.

We combine these broad measures of economic activity with data from two different firm-level surveys from BPS: (1) two rounds of the Survey of Micro and Small Enterprises (*Survei Industri Mikro Dan Kecil*, or IMK), and (2) an annual plant-level survey of medium and large firms, the Survey of Manufacturing Establishments (*Survei Tahunan Perusahaan Industri Pengolahan*, or SI). Recent waves of the IMK consist of 1 percent samples of all micro and small firms in Indonesia.[13] The 2013 wave of the survey collects data on more than 40,000 micro and small firms, and the survey also provides weights to allow for representativeness at the district level. Firms are asked a range of different questions about their production, output, value added, capital, labor, and production technologies, among others. We use the IMK data from 2010 and 2013; these data represent a repeated cross section of firms, but have been used to make a short panel of district-level outcomes.[14]

Data on micro and small firms are combined with the SI, which is intended to be a complete annual enumeration of manufacturing plants with 20 or more employees. The survey is extremely detailed, recording information on plant employment sizes, their industry of operation, cost variables, and measures of value added. Enumerators record each plant's operating location at the district level. We construct district-level aggregates of the SI data, but we also use the individual firm-year panel structure of the data in our analysis below.

4.1 Pre-Treatment Summary Statistics

Table 2 presents summary statistics of several different variables, each measured before the KAPET program was launched in 1998. The first set of columns reports the means, standard deviations, and sample sizes of variables for districts treated by the KAPET program. The second set of columns reports the difference in means between the treated and "all non-treated" districts, where this sample includes all districts in Indonesia that were not host to the KAPET program. Finally, in the third set of columns, we report the difference in means for the non-treated districts in the Outer Islands; this comparison excludes districts on Java and Bali which were not targeted by the policy.

[13] Micro firms have between 1 and 4 employees, while small firms have between 5 and 19 employees.

[14] Unfortunately, earlier data on micro and small firms in Indonesia is quite limited, so we were unable to go back further than 2010.

Panel A reports summary statistics on geographic characteristics. Compared to all non-treated districts, KAPET districts are more rugged and have greater portions of area with larger slopes than non-treated districts. They are also more likely to be farther away from Jakarta. While most of these differences are significantly different from all non-treated districts, significance tends to fall (and differences tend to be reduced) when comparing treated districts to their non-treated counterparts in the Outer Islands.

In Panel B, we use manufacturing data from the SI, regional output accounts, and data on nighttime light intensity to measure pre-treatment differences in economic activity between treated and non-treated districts. When comparing treated districts to all non-treated districts, treated areas had fewer firms in 1985 and 1995, fewer workers in manufacturing firms, lower overall GDP, and lower nighttime light intensity. Pre-treatment trends in economic activity also look slightly weaker in treated districts, although there were no significant differences in measured GDP. However, when comparing treated districts to non-treated districts within the Outer Islands, many of these differences attenuate and lose significance, again pointing to the significant disparities in economic activity between Java/Bali and the Outer islands.

In Panel C, we show that relative to all non-treated districts, KAPET districts had smaller populations in both 1980 and 1990, and they also had a lower share of the population working in manufacturing. However, there were no significant educational differences between treated and non-treated districts. Interestingly, there seems to be a significantly lower share of individuals who were born in the same province in treated areas, suggesting that these districts may have experienced some significant immigration flows in 1990, 8 years before the program was launched. Again, most of these differences become insignificant when comparing treated to non-treated districts within the Outer Islands; the only marginally significant difference at baseline is a lower share of the population born in the same province in 1990. We also look for pre-treatment differences in the quality of infrastructure in Panel D. Generally, there were no significant differences between treated and non-treated districts.

Overall, the results shown in Table 2 suggest that compared to all other Indonesian districts, KAPET districts were more rugged, poorer, less developed, and less manufacturing-oriented than non-treated districts, suggesting negative selection. This is not surprising given that the program was designed to promote growth in the Outer Islands, which is traditionally less developed than Java or Bali. However, many of the differences between treated and non-treated districts become smaller and less significant when comparing treated districts to non-treated districts on the Outer Islands. This suggests that non-KAPET zones in the Outer Islands may provide a stronger counterfactual, allowing us to address first order concerns about endogenous program placement.

5 Evaluating Indonesia's KAPET Program

To evaluate the impact of Indonesia's KAPET program on outcomes in a given year t, we estimate parameters of the following regression equation:

$$y_{ct} = \alpha + \theta T_c + \mathbf{x}_c' \beta + \varepsilon_{ct} \tag{5}$$

where $c = 1, ..., C$ indexes communities (districts, or *kabupaten*), T_c is an indicator for whether or not district c received the KAPET program in the late 1990s, $\mathbf{x}_c$ is a vector of predetermined controls, and ε_{ct} is an error term. The key parameter of interest is θ, which measures the average treatment effect on the treated (ATT) of being a KAPET district.

A major concern in assigning a causal interpretation to θ is that T_c is not randomly assigned. As discussed in Section 3, the KAPET program targeted specific districts located in the Outer Islands. Although program documents emphasized that these districts were selected for their economic growth potential, the results in Table 2 suggest that KAPET districts were, on average, not very different than other districts in the Outer Islands. However, to the extent that policymakers targeted KAPET to relatively poorer districts with limited prior growth, we would expect a naive comparison of treated and non-treated districts to result in a downward bias in estimates of θ even within the Outer Islands.

We address these potential biases by implementing a double robust estimator that, in addition to controlling for $\mathbf{x}_c$, reweights non-treated districts according to their odds of treatment based on propensity scores that are a function of predetermined KAPET selection criteria. In particular, we implement both the Robins et al. (1995) two-step, double robust and the Oaxaca-Blinder reweighting approach of Kline (2011). Both approaches assign greater counterfactual weight to the non-treated districts with similar underlying natural advantages and pre-trends in economic development. Additionally, where data permit, we estimate panel difference-in-difference specifications that directly control for pre-trends.

Demographic Changes. We begin in Table 3 by providing estimates of θ for demographic outcomes that were plausibly influenced by the KAPET program. Each cell in this table corresponds to estimates from a separate regression, with the dependent variable listed in the far left column. For each demographic characteristic, we examine short-run level effects in 2000, long-run level effects in 2012, and differences between 2000 and 2012.

We estimate a series of specifications for each outcome in order to clarify the sources of identification. In column 1, we report the unadjusted comparison between treated districts and all non-treated districts. In columns 2–5, we restrict the non-treated sample to districts in the Outer Islands. Similar to column 1, column 2 is an unadjusted treated and non-treated comparison, while column 3 includes as regressors any predetermined variables in $\mathbf{x}_c$ that may influence selection into treatment, including some measures capturing pre-trends (a subset of the variables summarized in Table 2).[15] Column 4 implements the Robins et al. (1995) double robust estimator.[16] Column 5 uses the Oaxaca-Blinder reweighting approach of Kline (2011).

The first three rows of Table 3 provide estimates of the effect of KAPET on the log total population in the district in 2000 (row 1), log total population in 2010 (row 2), and the percent change in the popu-

[15] The exact controls we use include the average elevation of the district, the percent of the district with slope between 0-0.5 percent, the percent of the district with slope between 0.5-5 percent, the percent of the district with slope between 5-16 percent, the district's average Sappington et al. (2007) vector ruggedness measure, variables measuring distance to Jakarta, distance to the coast, distance to the nearest river, distance to the nearest port, distance to nearest major road, average district light intensity in 1992, the average change in light intensity between 1992-1997, whether or not the district had attained Kota designation in 1990, the total number of medium and large manufacturers in 1985, log total population in 1990, and the rank of the district's population in the province in 1990.

[16] Note that because the odds of treatment are estimated from a propensity score, standard errors need to be adjusted in the second step. We make this adjustment by bootstrapping the entire estimation procedure; results are shown when standard errors are calculated from 1000 bootstrap replications.

lation over the decade. In column 1, a comparison between treated and non-treated districts throughout Indonesia reveals that treated districts had lower populations in 2000 and 2010, but this is due to negative selection. When we restrict the sample to non-treated districts in the Outer Islands, the differences attenuate and become statistically insignificant. The lack of significance continues through columns 3-5, when we add controls, reweight the control areas by their odds of treatment, and implement the Oaxaca-Blinder estimator. The rest of the demographic outcomes in this table show similar patterns, with the all Indonesia non-treated comparison underestimating true effects, but once we restrict the non-treated sample to the Outer-Islands, many of the effect sizes attenuate and become insignificant.

Although our sample sizes are relatively small (288 districts in column 1, 28 treated districts and 143 control districts in columns 2-5), the lack of statistical significance is not entirely due to power limitations. For instance, in Column 5, Row 3, the point estimate and 95 percent confidence interval for the impact of KAPET on population growth from 2000 to 2010 is -0.019 $\in [-0.199, 0.161]$. Decadalizing this estimate, we obtain a point estimate and 95 percent confidence interval of -0.002 $\in [-0.020, 0.016]$. So, we can rule out negative effects of a 2 percent decline in population per year and a 1.6 percent increase in population per year over the period, roughly 0.7-0.8 standard deviations in population growth.

These relatively limited impacts on aggregate population mask two important changes in the origin and skill levels of the population. First, we find a short-run increase in immigration from other districts within the same province in 2000, suggesting that the program may have attracted workers from nearby areas in the first few years after the KAPET program began. However, these increases are short-lived and do not extend through the 2000s. Second, we see an increase in the growth rate of primary school attainment. These results are economically significant in all specifications but not precisely estimated in the Oaxaca-Blinder approach.

In Section 2, we argued that demographic shifts were important from the perspective of evaluating the welfare effects of place-based policies. If a place-based policy encourages greater in-migration, the agglomeration benefits of such in-migration must be weighed against the congestion and dispersion impacts that are associated with an increase in population. The fact that our results show limited, if any, persistent demographic effects of the KAPET program suggests that the program probably did very little to improve national welfare.[17]

Aggregate Output Changes. In Table 4, we provide estimates of θ for measures of regional output and economic growth. This table is organized similarly to Table 3. Although some specifications show that KAPET districts had significant increases in the levels of GDRP in 2000 and 2012, as well as the levels of manufacturing output and agricultural output, the significance of these results is not always robust across specifications. Moreover, the growth specifications tend to be insignificant. This suggests that the KAPET program may have been associated with some initial level shifts in GDP, but it was not responsible for accelerating economic growth in treated districts in the early 2000s. On the other hand, in looking at the effects of the KAPET program on average nighttime light intensity or the share of districts with any night time lights, Columns 2-5 show no significant impacts of the KAPET program on either levels or growth.

[17] If the KAPET program had spillovers across districts, drawing economic activity away from non-treated districts and moving it into treated districts, the treated vs. control comparison could be exaggerating program effects. This makes the lack of significant effects based on our specifications even more striking.

Overall, the results in Table 4 do not indicate substantial impacts of the KAPET program on economic growth or changes in the composition of economic activity. Note that the results in Tables 3 and 4 are robust to the inclusion of additional measures of pre-1996 levels and trends in population and economic activity in both the main estimating equation and the propensity score model. To understand why this large intervention led to such limited impacts on aggregate economic activity, we turn now to an investigation of firm-level responses to KAPET.

5.1 Effects of KAPET on Firms

Table 5 displays estimates of θ on district-level manufacturing outcomes. The first three rows focus on the effects of the program on the number of medium and large manufacturing firms in the district, using SI data. Overall, the program was not associated with an increase in the number of medium and large firms in 2000, 2012, or with a change in the growth of entrants. If anything, the program seems to be associated with slightly fewer large firms, though the point estimates are insignificant.

In the next ten rows, we look at outcomes from the 2010 and 2013 rounds of the IMK data, which covers micro and small firms. Unfortunately, the IMK data represent a repeated cross section, and the data do not extend earlier than 2010, so it is hard to say whether the program is associated with changes in outcomes for micro and small firms. Nevertheless, particularly in 2010, the program seems to be associated with increases in total value added and the number of workers for micro and small firms, despite no overall increase in entry. Moreover, as measured by value added per worker, it looks like the KAPET program was associated with a 38 percent increase in total value added for micro and small firms in 2010, and a 30 percent increase in productivity for micro and small firms in 2010 and 2013. Because components of the program were designed to target MSMEs, these outcomes could reflect important gains brought about by the program.

However, we also find in Table 5 that the program was not associated with an increase in the total number of firms, and employment remained flat. Moreover, these effects are estimated off of a repeated cross section, and we cannot say whether they reflect true gains or are instead reflective of persistent, long-run differences between treated and non-treated Outer Island districts initiated before the program was implemented.

Panel Data Estimates for Large Firms. In Table 6, we report estimates of the effects of the KAPET program on firm-level outcomes, using panel data on medium and large manufacturers. The first column reports fixed-effects least squares estimates of the impact of KAPET on firms, conditional on year, industry, and district fixed effects. In the second column, we restrict the sample to only include "incumbent" firms that were started before 1998, when the program was implemented. Finally, in column 3, we replace the industry and district fixed effects with firm-fixed effects, looking at how the KAPET program changed outcomes for incumbent firms. In all cases, we restrict our analysis to the years from 1985 to 2012 and restrict to firms operating in the Outer Islands.

The first row shows that the KAPET program was not associated with any significant increases in value added for firms. The second row shows that while firms did not increase their overall use of labor in response to the KAPET program, incumbent firms did increase their labor use by 5 percent, relative to the labor they used before the program was implemented. However, we find a substantial a decrease in total capital, both for all firms and incumbent firms.

Because the KAPET program involved tax reductions, it is reassuring to see large, statistically significant decreases in taxes paid on sales, business licenses, building permits, and land for firms affected by the program. In some sense, this can be viewed as a "first stage," corroborating that the program indeed led to significant reductions in the tax burden. However, capital utilization possibly fell in response to the program, and there were no overall changes in TFP, as measured by Olley and Pakes (1996) residuals. In Appendix Table B.11, we show that the lack of substantial TFP effects is robust to different ways of estimating TFP. Moreover, the estimates are largely robust to including district-specific time trends and/or the inverse probability (of treatment) weights used in the preceding tables.

In sum, the KAPET program does not seem to be associated with entry of new, productive firms. While total value added and total value added per worker may have increased for micro and small firms, there were no value added effects for large firms. If anything, the strongest findings for medium and large manufacturers are that they paid lower taxes and reduced their use of capital, with possibly a small increase in employment at incumbent firms.

6 Conclusion

This paper presents estimates of the impact of Indonesia's KAPET program on demographic outcomes, measures of regional output, and on the performance of firms across the size distribution. We find that the program reduced the tax burdens faced by firms, but these tax reductions did not increase the entry of large, productive firms or generate substantial increases in productivity or value added. Consequently, we do not see sustained increased migration rates or population growth in response to the program, and overall, treated districts did not grow faster after the introduction of the program.

As we discuss above, there are many possible reasons for the lack of success of the KAPET program. The fact that the program was started around the time of the Asian Financial Crisis and its subsequent political upheaval meant that firms may not have been interested in making use of the incentives, given the political uncertainty and the volatile exchange-rate environment, at least initially. Moreover, because the program operated at the district level during a period of "big bang" decentralization, it may have operated differently across treated districts, leading to large variation in project performance.

However, our work also supports the view that it may be difficult for tax incentives to compensate firms adequately for locating in poorer regions, as these tend to have unfavorable natural amenities, poor market access, and low quality infrastructure. Consequently, the firms that benefit from these special economic zones may have located there in the absence of these policies.

A related strand of literature also casts doubt on the use of regional policies that encourage firms to relocate in lagging regions, arguing instead that large cities are not large enough, and if anything, place-based policies should be targeted towards improving growth in the largest cities (Gaubert, 2015; Albouy et al., 2016). Like many externalities, firms do not internalize the productivity spillovers they generate for other firms when they choose an industrial location, and consequently, in equilibrium they tend to locate in cities that are smaller than socially optimal. This strand of literature suggests that encouraging firms to locate in the largest and most productive cities, either by improving transport infrastructure to reduce commuting and congestion costs, or by relaxing housing and commercial real-estate restrictions to reduce land prices, may improve overall welfare.

It is clear that more theoretical and empirical research on the effectiveness of place-based policies in developing countries is needed, especially to determine whether such policies may have different justifications, either from the perspective of reducing poverty for immobile workers or by removing capital constraints in poorer regions. This case study on the effects of the KAPET program suggests that such policies face an uphill battle, but it is by no means definitive, and more examples need rigorous empirical assessment.

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Table 1: KAPET Locations

Name	Province	# of Kabu	Year	Pres. Decree #
KAPET Batulicin	Kalimantan Selatan	1	1998	Keppres 11/1998
KAPET Sasamba	Kalimantan Timur	3	1998	Keppres 12/1998
KAPET Sanggau / Khatulistiwa	Kalimantan Barat	3	1998	Keppres 13/1998
KAPET Minado-Bintung	Sulawesi Utara	3	1998	Keppres 14/1998
KAPET Mbay	Nusa Tenggara Timur	1	1998	Keppres 15/1998
KAPET Pare-Pare	Sulawesi Selatan	5	1998	Keppres 164/1998
KAPET Seram	Maluku Tengah	1	1998	Keppres 165/1998
KAPET Bima	Nusa Tenggara Barat	2	1998	Keppres 166/1998
KAPET Batui	Sulawesi Tengah	1	1998	Keppres 167/1998
KAPET Bukari / Bank Sejahtera Sultra	Sulawesi Tenggara	3	1998	Keppres 168/1998
KAPET DAS Kakab	Kalimantan Tengah	3	1998	Keppres 170/1998
KAPET Sabang / Bandar Aceh Darussalam	Propinsi D.I. Aceh	2	1998	Keppres 171/1998

Source: BAPPENAS and various presidential decrees (KEPPRES). This list differs slightly from Soenandar (2005), who does not include KAPET Sabang in his analysis. In our empirical work, because of concerns about data quality, we drop Papua and KAPET Biak entirely from the analysis.

Table 2: Summary Statistics: Pre-Treatment Characteristics

	Treated		All Non-Treated		Outer Island Non-Treated	
Panel A: Geographic Characteristics	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Avg elevation of district (meters)	257.78 (200.61)	28	-41.99	260	-63.87	143
% of kabu w/ slope between 0-0.5%	2.96 (3.25)	28	-2.02***	260	-1.43*	143
% of kabu w/ slope between 0.5-5%	34.29 (29.73)	28	-16.76***	260	-8.86	143
% of kabu w/ slope between 5-16%	26.20 (10.26)	28	4.14*	260	4.56**	143
% of kabu w/ slope greater than 16%	34.93 (22.57)	28	9.48**	260	3.10	143
Vector ruggedness measure, (3x3 window)	0.28 (0.07)	28	0.06***	260	0.01	143
Distance to Jakarta	912.50 (276.81)	28	380.04***	260	168.42***	143
Distance to the coast	26.76 (31.10)	28	-4.12	260	-8.34	143
Distance to nearest river	5.11 (3.74)	27	0.79	260	-0.60	143
Distance to major ports	110.00 (107.52)	28	15.06	256	-0.11	142
Distance to nearest major road	0.09 (0.08)	28	0.02	260	-0.01	143
Kota Designation (0 1)	0.25 (0.44)	28	0.03	260	0.04	143
Panel B: Economic Activity						
Number of Medium Firms, 1985 (SI)	6.57 (7.99)	28	-31.96***	260	-4.44*	143
Number of Large Firms, 1985 (SI)	3.93 (6.45)	28	-7.04***	260	0.16	143
Number of Employees, SI 1985	2424.89 (4491.79)	28	-3890.41***	260	431.06	143
Number of Medium Firms, 1995 (SI)	11.32 (10.96)	28	-46.84***	260	-6.13*	143
Number of Large Firms, 1995 (SI)	4.86 (8.80)	28	-21.27***	260	-2.69	143
Number of Employees, SI 1995	3815.85 (7490.45)	28	-12027.76***	260	-519.98	143
Median value added per worker, SI 1985	1706.13 (1131.66)	23	391.35	241	-108.94	124
Median value added per worker, SI 1995	5613.64 (5782.36)	27	2074.80*	249	1137.94	132
Total GDRP, Constant Prices, 1986	230.64 (656.66)	23	-42.74	252	77.99	137
Total GDRP ex oil, Constant Prices, 1993	629.82 (657.16)	28	-418.63**	259	67.31	143
Total GDRP ex oil, Constant Prices, 1996	831.65 (947.09)	28	-518.76**	259	106.95	143
Percent Change in GDRP (1993-1996)	0.23 (0.14)	28	-0.00	259	-0.02	143
Avg Night-time Light Intensity, 1992	1.25 (2.57)	28	-4.32***	260	-1.10	143
Change in Average Light Intensity, 1992-1997	0.00 (0.00)	27	-0.00***	260	-0.00	143
Change in Any Lights, 1992-1997	0.14 (0.19)	27	-0.10**	260	0.02	143
Panel C: Demographic Characteristics						
Total population, 1980	302.35 (204.17)	28	-264.97***	260	-51.78	143
% of pop w/ no primary school, 1980	38.23 (11.42)	28	-0.97	260	-0.65	143
% of pop w/ senior high school, 1980	1.19 (1.25)	28	0.23	260	0.25	143
% working in agriculture, 1980	60.98 (23.96)	28	6.30	260	-0.99	143
% working in manufacturing, 1980	5.57 (3.26)	28	-2.97***	260	-0.63	143
% born in same province, 1980	0.89 (0.10)	28	-0.04*	260	-0.02	143
% in same province 5 years ago, 1980	0.80 (0.05)	28	-0.03**	260	-0.01	143
Total population, 1990	394.12 (233.25)	27	-303.97***	260	-69.59	143
% of pop w/ no primary school, 1990	16.60 (8.64)	27	-1.43	260	0.15	143
% of pop w/ senior high school, 1990	4.39 (2.72)	27	0.47	260	0.52	143
% working in agriculture, 1990	55.38 (24.74)	27	5.44	260	-2.89	143
% working in manufacturing, 1990	6.80 (6.26)	27	-3.15**	260	0.19	143
% born in same province, 1990	0.83 (0.15)	27	-0.07**	260	-0.05*	143
% in same province 5 years ago, 1990	0.83 (0.06)	27	-0.03**	260	-0.01	143
Panel D: Infrastructure						
% of HH w/ Access to Electricity, 1996-1997	64.26 (20.59)	28	-6.71	254	4.54	138
% of HH w/ Access to Safe Water, 1996-1997	40.93 (20.46)	28	1.93	254	7.16*	138
% of HH w/ Access to Phone Lines, 1996	3.90 (4.35)	28	-0.25	255	0.07	139
% of HH w/ Access to Safe Sanitation, 1996-1997	53.44 (16.50)	28	3.23	254	2.32	138

Notes: Authors' calculations using data described in Appendix A. The Δ Mean columns report the difference in means between treated and non-treated districts. In the first set of columns, all non-treated districts are used as the comparson group, while in the second set of columns, only non-treated districts off of Java and Bali are used. The signifance stars in this table are computed by conducting a two-sided equality of means t-test between comparison groups. */**/*** denotes significant at the 10% / 5% / 1% levels.

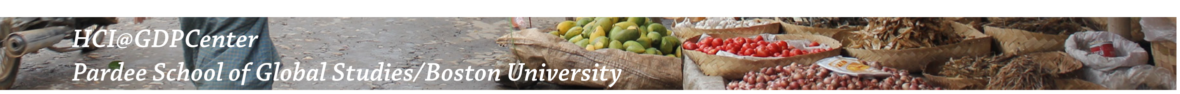


Table 3: ATT Estimates of the Effect of KAPET, Demographics

	(1)	(2)	(3)	(4)	(5)
% Δ Total Population (2000-2010)	0.112 (0.078)	0.052 (0.080)	-0.018 (0.082)	-0.006 (0.085)	-0.019 (0.092)
% Δ Recent Migrants from Diff Province (2000-2010)	0.091 (0.090)	0.026 (0.092)	-0.066 (0.093)	-0.048 (0.098)	-0.057 (0.105)
% Δ Recent Migrants from Same Province, Diff District (2000-2010)	0.248 (0.125)**	0.091 (0.131)	-0.027 (0.126)	-0.002 (0.139)	-0.021 (0.136)
Δ % Working in Agriculture	2.219 (2.267)	-1.989 (2.357)	-0.729 (1.301)	-0.389 (1.382)	-0.791 (1.416)
Δ % Working in Manufacturing	-3.516 (0.515)***	-0.676 (0.464)	-0.590 (0.520)	-0.509 (0.607)	-0.732 (0.724)
Δ % of pop w/ primary school	0.194 (0.664)	0.079 (0.675)	1.001 (0.523)*	1.118 (0.628)*	0.872 (0.568)
Δ % of pop w/ high school	-0.035 (0.418)	-0.250 (0.428)	0.169 (0.460)	0.143 (0.478)	0.349 (0.588)
Outer-Islands Only	.	X	X	X	X
Controls	.	.	X	X	X
Logistic Reweighting	.	.	.	X	.
Oaxaca-Blinder	.	.	.	.	X

Notes: Each cell reports the coefficient from a regression of the given dependent variable (listed in the left-most column) on an indicator for whether or not the district is a KAPET district. Column 1 reports the unadjusted comparison of KAPET districts to all other districts, while Column 2 restricts the non-treated districts to only include districts in the Outer Islands. Columns 3 includes adds controls (described in Footnote 15), Column 4 is a double-robust specification that both includes controls and reweights non-treated districts by $\hat{\kappa} = \hat{P}/(1-\hat{P})$, where $\hat{P}$ is the estimated probability that the district is a KAPET district. Column 5 is a control function specification based on a Oaxaca-Blinder decomposition, described in Kline (2011). Robust standard errors are reported in parentheses and are estimated using a bootstrap procedure, with 1000 replications, in column 4 to account for the generated $\hat{\kappa}$ weights. Sample sizes vary across outcomes but include as many 288 districts in column 1, and 28 treated districts and 143 control districts in columns 2-5. */**/*** denotes significant at the 10% / 5% / 1% levels.

Table 4: ATT Estimates of KAPET Effects on Regional Output Measures

	(1)	(2)	(3)	(4)	(5)
% Δ GDRP, Total	0.074 (0.034)**	0.043 (0.035)	0.038 (0.039)	0.028 (0.046)	0.032 (0.041)
% Δ GDRP, Agriculture	0.085 (0.034)**	0.013 (0.035)	0.024 (0.039)	0.002 (0.048)	0.011 (0.042)
% Δ GDRP, Manufacturing	-0.149 (0.089)*	-0.134 (0.094)	-0.121 (0.095)	-0.148 (0.106)	-0.142 (0.107)
Δ % Light Intensity	0.212 (0.115)*	0.038 (0.122)	-0.076 (0.117)	-0.112 (0.122)	-0.077 (0.131)
Δ % with Any Night Light	0.045 (0.024)*	0.001 (0.025)	-0.016 (0.017)	-0.019 (0.016)	-0.015 (0.023)
Outer-Islands Only	.	X	X	X	X
Controls	.	.	X	X	X
Logistic Reweighting	.	.	.	X	.
Oaxaca-Blinder	.	.	.	.	X

Notes: Each cell reports the coefficient from a regression of the given dependent variable (listed in the left-most column) on an indicator for whether or not the district is a KAPET district. Column 1 reports the unadjusted comparison of KAPET districts to all other districts, while Column 2 restricts the non-treated districts to only include districts in the Outer Islands. Columns 3 includes adds controls (described in Footnote 15), Column 4 is a double-robust specification that both includes controls and reweights non-treated districts by $\hat{\kappa} = \hat{P}/(1-\hat{P})$, where $\hat{P}$ is the estimated probability that the district is a KAPET district. Column 5 is a control function specification based on a Oaxaca-Blinder decomposition, described in Kline (2011). Robust standard errors are reported in parentheses and are estimated using a bootstrap procedure, with 1000 replications, in column 4 to account for the generated $\hat{\kappa}$ weights. Sample sizes vary across outcomes but include as many 308 districts in column 1, and 28 treated districts and 143 control districts in columns 2-5. */**/*** denotes significant at the 10% / 5% / 1% levels.

Table 5: ATT Estimates of KAPET Effects on Small, Medium, and Large Firms

	(1)	(2)	(3)	(4)	(5)
Total Medium and Large Manufacturers, 2000	-71.034	-7.498	-3.752	-4.450	-4.922
	(10.570)***	(4.634)	(3.228)	(3.637)	(4.515)
Total Medium and Large Manufacturers, 2012	-76.867	-10.109	-7.681	-7.389	-9.289
	(10.964)***	(4.578)**	(5.383)	(5.694)	(7.658)
Δ Total Medium and Large Manufacturers	-6.529	-2.935	-3.882	-2.940	-4.302
	(3.980)	(2.324)	(3.071)	(3.383)	(3.991)
Log Number of Micro/Small Firms, 2010	-0.308	0.166	0.293	0.334	0.265
	(0.204)	(0.209)	(0.162)*	(0.217)	(0.181)
Log Number of Micro/Small Firms, 2013	-0.523	0.024	0.120	0.116	0.069
	(0.224)**	(0.229)	(0.185)	(0.196)	(0.205)
Log Total Workers, Micro/Small Firms, 2010	-0.411	0.127	0.297	0.337	0.247
	(0.200)**	(0.203)	(0.158)*	(0.201)*	(0.177)
Log Total Workers, Micro/Small Firms, 2013	-0.658	-0.016	0.135	0.127	0.081
	(0.232)***	(0.236)	(0.197)	(0.218)	(0.218)
Log Total Value Added, Micro/Small Firms, 2010	-0.300	0.203	0.415	0.443	0.384
	(0.191)	(0.193)	(0.170)**	(0.195)**	(0.182)**
Log Total Value Added, Micro/Small Firms, 2013	-0.632	0.067	0.323	0.322	0.284
	(0.241)***	(0.248)	(0.227)	(0.252)	(0.250)
Log Value Added Per Worker, Micro/Small Firms, 2010	0.340	0.231	0.294	0.278	0.293
	(0.127)***	(0.134)*	(0.137)**	(0.175)	(0.150)*
Log Value Added Per Worker, Micro/Small Firms, 2013	0.245	0.249	0.331	0.277	0.307
	(0.115)**	(0.121)**	(0.119)***	(0.129)**	(0.131)**
Outer-Islands Only	.	X	X	X	X
Controls	.	.	X	X	X
Logistic Reweighting	.	.	.	X	.
Oaxaca-Blinder	.	.	.	.	X

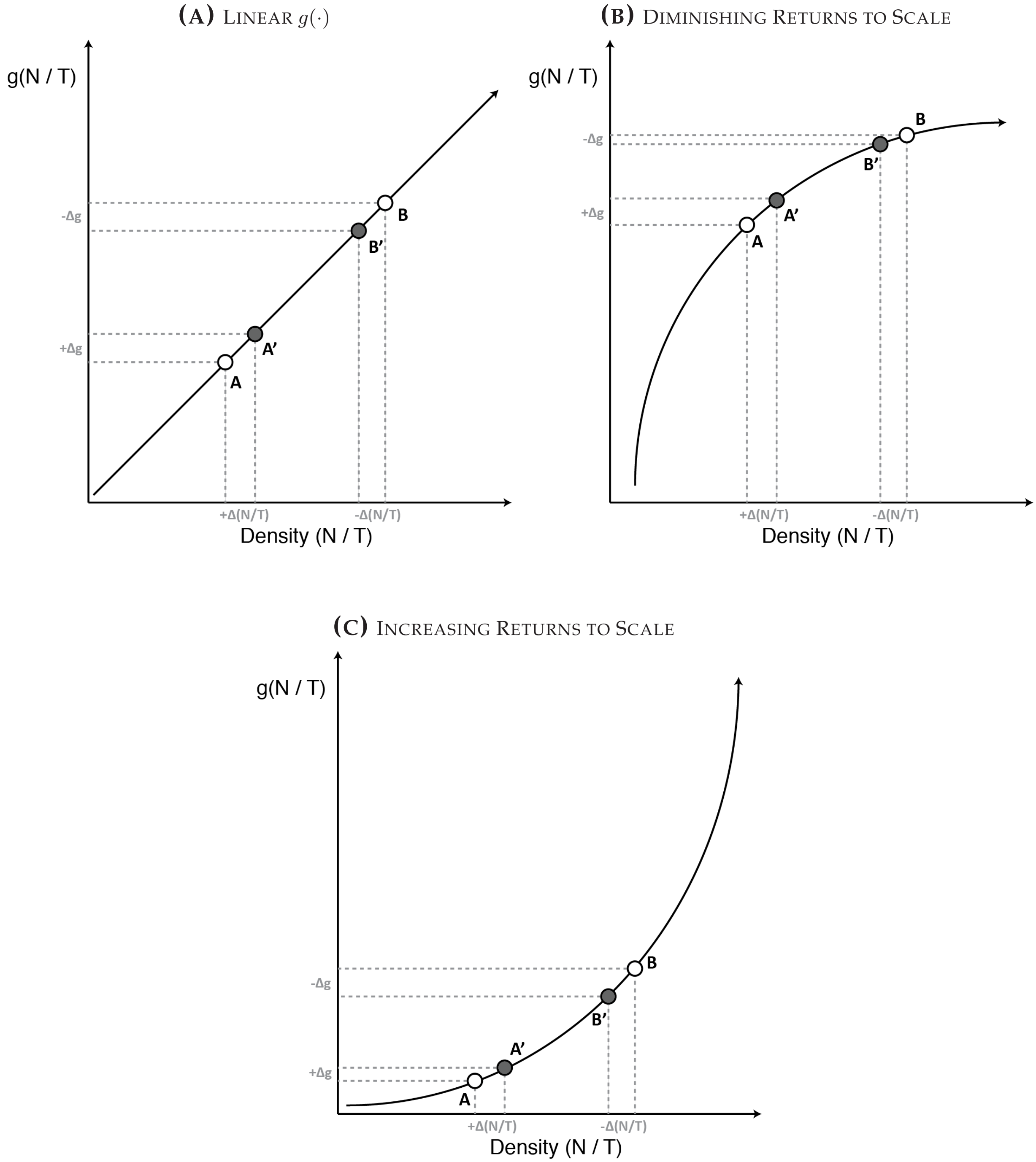
Notes: Each cell reports the coefficient from a regression of the given dependent variable (listed in the left-most column) on an indicator for whether or not the district is a KAPET district. Column 1 reports the unadjusted comparison of KAPET districts to all other districts, while Column 2 restricts the non-treated districts to only include districts in the Outer Islands. Columns 3 includes adds controls (described in Footnote 15), Column 4 is a double-robust specification that both includes controls and reweights non-treated districts by $\hat{\kappa} = \hat{P}/(1-\hat{P})$, where $\hat{P}$ is the estimated probability that the district is a KAPET district. Column 5 is a control function specification based on a Oaxaca-Blinder decomposition, described in Kline (2011). Robust standard errors are reported in parentheses and are estimated using a bootstrap procedure, with 1000 replications, in column 4 to account for the generated $\hat{\kappa}$ weights. Sample sizes vary across outcomes but include as many 308 districts in column 1, and 28 treated districts and 143 control districts in columns 2-5. */**/*** denotes significant at the 10% / 5% / 1% levels.

Table 6: Firm-Level Regressions

	All Firms	Incumbent Firms	
	(1)	(2)	(3)
Log Value Added	-0.058	-0.069	0.009
	(0.131)	(0.131)	(0.114)
N	90940	76170	75265
Adjusted R^2 (Overall)	0.606	0.600	0.856
Adjusted R^2 (Within)	0.000	0.000	-0.000
F-Stat	0.20	0.28	0.01
Log Number of Workers	-0.044	-0.031	0.057
	(0.059)	(0.059)	(0.030)*
N	91103	76304	75398
Adjusted R^2 (Overall)	0.418	0.439	0.887
Adjusted R^2 (Within)	0.000	0.000	0.000
F-Stat	0.57	0.28	3.57
Log Wages per Worker	-0.045	-0.057	0.016
	(0.053)	(0.046)	(0.051)
N	68385	61849	60788
Adjusted R^2 (Overall)	0.614	0.614	0.735
Adjusted R^2 (Within)	0.000	0.000	-0.000
F-Stat	0.71	1.53	0.09
Log Capital	-1.956	-1.892	-1.576
	(0.651)***	(0.712)***	(0.709)**
N	80402	67520	66577
Adjusted R^2 (Overall)	0.129	0.140	0.388
Adjusted R^2 (Within)	0.001	0.001	0.001
F-Stat	9.01	7.06	4.94
Log Taxes on Sales, Licenses, Buildings and Land	-1.061	-1.304	-1.135
	(0.517)**	(0.542)**	(0.540)**
N	90633	76006	75099
Adjusted R^2 (Overall)	0.117	0.139	0.368
Adjusted R^2 (Within)	0.001	0.001	0.001
F-Stat	4.21	5.79	4.41
Log Capacity Utilization	-0.613	-0.579	-0.626
	(0.344)*	(0.382)	(0.467)
N	77809	63911	63040
Adjusted R^2 (Overall)	0.131	0.136	0.256
Adjusted R^2 (Within)	0.001	0.001	0.001
F-Stat	3.17	2.30	1.79
OP Log Productivity Residual (Investment Proxy)	-0.070	-0.058	-0.044
	(0.077)	(0.085)	(0.089)
N	53370	45873	45197
Adjusted R^2 (Overall)	0.335	0.334	0.563
Adjusted R^2 (Within)	0.000	0.000	0.000
F-Stat	0.82	0.47	0.25
Year FE	X	X	X
District FE	X	X	.
Industry FE	X	X	.
Firm FE	.	.	X

Notes: Each row reports the coefficient estimate of being a KAPET district on the outcome listed in the left-most column, using firm-level panel data for analysis. The first column uses all outer Island firms to estimate the effects, while columns 2 and 3 only focus on incumbent firms, which were in existence before 1998, when the program took place. */**/*** denotes significant at the 10% / 5% / 1% levels. Robust standard errors in parentheses, clustered at the district level.

Figure 1: Agglomeration Functions, Density, and Productivity



Notes: This figure plots different hypothetical agglomeration functions, which map density into productivity. Depending on the shape of the agglomeration function, different types of regional policies may be preferable, as discussed in Section 2.

Figure 2: Map of Treated Districts

Notes: Authors' calculations using BPS district shapefiles. Information on treated districts was taken from the text of various presidential decrees, listed in Table 1. In our empirical work, because of concerns about data quality, we drop Papua and KAPET Biak entirely from the analysis; these areas are not shown on the map.

A Data Appendix

A.1 Administrative Boundaries

Administrative boundary shapefiles were constructed by BPS for use during the 2010 Household Census. These shapefiles contain the polygon boundaries of all provinces, kabupatens, kecamatans, and desas for the entire extent of the Indonesian archipelago. However, after the fall of Suharto and a massive decentralization program, many new kabupatens were created, splitting existing kabupatens into new ones. For instance, in 1990 there were 290 kabupatens and kotas, but by 2003, there were 416 kabupatens and kotas. The fact that administrative boundaries are not fixed over time creates difficulties for the analysis.

Because of the need for a geographic unit of analysis that was consistently defined over time, we used kabupaten borders as they were defined in 1998, the year that the KAPET program was launched. BPS provided the administrative boundary shapefile for 2010, as well as a correspondence table between kabupaten codes in 2010 and kabupaten codes from 1990 to the present. This information was processed using ArcView to create the 1998 shapefiles that form the basis of the analysis. Throughout the paper, all survey data were appropriately merged back to the 1998 kabupaten definitions.

A.2 Spatial, Topographical, and Agro-climatic Variables

Agricultural and climatic variables were created from a variety of sources and often were calculated with the assistance of GIS software (ArcView). This section describes those data in detail and how each of the variables were constructed.

NOAA Data on Light Intensity, 1992-2010. To proxy for economic activities at the local level, we make use of an innovative technique, developed by Henderson et al. (2012), which uses satellite data on nighttime lights. Daily between 8:30 PM and 10:00 PM local time, satellites from the United States Air Force Defense Meteorological Satellite Program (DMSP) record the light intensity of every 30-arc-second-square of the Earths surface (corresponding to roughly 0.86 square kilometers). DMSP cleans this daily data, dropping anomalous observations, and provides the public with annual averages of light intensity from multiple satellites. After averaging the data across multiple satellites, we obtain annual estimates of light intensity for every 30-arc-second square of the Earths surface from 1992-2010.

Henderson et al. (2012) show that across countries, growth in night-lights (measured as the change in the spatial average digital number of light intensity over time) is linearly related to growth in output. We use the night-lights growth measure in the analysis, but we calculate the changes at the village-level.

Slope, Aspect, and Elevation Data. Topographical variables were created using raster data from the *Harmonized World Soil Database* (HWSD), Version 2.0 (Fischer et al., 2008).[18] The raster files are compiled from high-resolution source data and aggregated to 30 arc-second grids.

Elevation data were computed for each village as the average elevation over the entire village polygon, using raster data from HWSD.[19] Slope and aspect data were also recorded for each village and calculated similarly. Variables equal to the average share of each village corresponding to each slope class (0-2%, 2-4%, etc.) were constructed using ArcView.

Ruggedness. A 30 arc-second ruggedness raster was computed for Indonesia according to the methodology described by Sappington et al. (2007), and village-level ruggedness was recorded as the average raster value. The authors propose a Vector Ruggedness Measure (VRM), which captures the distance or dispersion between a vector orthogonal to a topographical plane and the orthogonal vectors in a neighborhood of surrounding elevation planes. To calculate the measure, one first calculates the x, y, and z coordinates of vectors that are orthogonal to each 30-arc second grid of the Earth's surface. These coordinates are computed using a digital elevation model and standard trigonometric techniques.

[18]Data from the HWSD project are publicly available and can be downloaded here: http://www.iiasa.ac.at/Research/LUC/luc07/External-World-soil-database/HTML/index.html?sb=1. The terrain, slope, and aspect database provided by HWSD researchers was compiled from a high-resolution digital elevation map constructed by the Shuttle Radar Topography Mission (SRTM). SRTM data is also publicly available as 3 arc-second digital elevation maps (DEM) (approximately 90 meters resolution at the equator), available here: ftp://e0srp01u.ecs.nasa.gov/srtm/.

[19]The HWSD elevation raster file records the median elevation (in meters) for each 30 arc-second grid of the Earth's surface. The median is computed across space, from the values of all 3 arc-second cells in the SRTM database.

Given this, a resultant vector is computed by adding a given cell's vector to each of the vectors in the surrounding cells; the neighborhood or window is supplied by the researcher. Finally, the magnitude of this resultant vector is divided by the size of the cell window and subtracted from 1. This results in a dimensionless number that ranges from 0 (least rugged) to 1 (most rugged).[20]

For example: on a (3×3) flat surface, all orthogonal vectors point straight up, and each vector can be represented by $(0, 0, 1)$ in the Cartesian coordinate system. The resultant vector obtained from adding all vectors is equal to $(0, 0, 9)$, and the VRM is equal to $1 - (9/9) = 0$. As the (3×3) surface deviates from a perfect plane, the length of the resultant vector gets smaller, and the VRM increases to 1.

Soil Quality Covariates. We also make use of the HWSD data for soil quality measures. HWSD provides detailed information on different soil types across the world. The HWSD data for Indonesia is taken from information printed in the FAO-UNESCO Soil Map of the World (FAO 1971-1981), a map printed at a 1:5,000,000 scale. For each village, we created the following measures of soil types: percentage of land covered by coarse, medium, and fine soils, percentage of land covered by soils with poor or excessive drainage, average organic carbon percentage, average soil salinity, average soil sodicity, and average topsoil pH.

A.3 Demographic and Economic Variables

Population Census Data, 2000. Indonesia's 2000 Population Census is a dataset issued by Indonesia's statistical agency, *BPS Statistics* (hereafter, BPS), that was designed as a complete enumeration of the individual members of every household in Indonesia with 100% coverage. However, due to riots and communal violence following the political transition, the population numbers for the provinces of Aceh, Maluku, Papua, and Central Sulawesi had to be estimated (instead of enumerated) by the provincial statistical offices (Surbakti et al., 2000).

The census contains information on the respondents' religion, ethnicity, birth information (year, month, and province), as well as the sector of their employment (if they were working) and their province of residence in 1995. It also includes questions on the respondents' sex, marital status, education, and main activities in the past week. We aggregate the individual-level observations to construct village-level demographic variables and population weights for the similarity indices, and use the individual-level observations to examine occupation choice among the transmigrants.

***Susenas* 2004, *SUPAS* 1985, and Population Census Data 1980.**

We also included three additional national-level datasets published by BPS. First, we use the 2004 *Susenas*, which is a household survey, to estimate the relationship between the education of the household head and rice productivity at the household level. Second, we use the 1985 Intercensal Survey, or *SUPAS* to calculate the inter-district migration flows in the early 1980s. Finally, we use the 5% population subset of the 1980 Indonesia Population Census that are available from IPUMS to construct the pre-1980 district-level characteristics that are included as control variables.

[20] The authors have generously provided a Python script for computing their Vector Ruggedness Measure (VRM) in ArcView. The script and detailed instructions for installation can be found here: `http://arcscripts.esri.com/details.asp?dbid=15423`.

B Appendix Tables and Figures

Table B.1: Summary Statistics: GIS Variables

	Treated		All Non-Treated		Outer Island Non-Treated	
	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Avg elevation of district (meters)	257.78 (200.61)	28	-41.99	260	-63.87	143
% of kabu w/ slope between 0-0.5%	2.96 (3.25)	28	-2.02***	260	-1.43*	143
% of kabu w/ slope between 0.5-2%	17.15 (14.86)	28	-8.38***	260	-4.43	143
% of kabu w/ slope between 2-5%	18.06 (9.22)	28	-3.40*	260	-1.90	143
% of kabu w/ slope between 5-8%	16.04 (7.44)	28	1.98	260	2.58*	143
% of kabu w/ slope between 8-16%	10.17 (4.38)	28	2.16**	260	1.98**	143
% of kabu w/ slope between 16-30%	19.20 (11.31)	28	4.77**	260	2.15	143
% of kabu w/ slope between 30-45%	10.14 (7.53)	28	3.08**	260	0.76	143
% of kabu w/ slope greater than 45%	5.58 (5.08)	28	1.64	260	0.19	143
Vector ruggedness measure, (3x3 window)	0.28 (0.07)	28	0.06***	260	0.01	143
Distance to the coast	26.76 (31.10)	28	-4.12	260	-8.34	143
Distance to nearest river	5.11 (3.74)	27	0.79	260	-0.60	143
Distance to nearest major road	0.09 (0.08)	28	0.02	260	-0.01	143
Distance to major ports	110.00 (107.52)	28	15.06	256	-0.11	142
Distance to Jakarta	912.50 (276.81)	28	380.04***	260	168.42***	143

Authors' calculations. The t-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

Table B.2: Summary Statistics: SI Variables

	Treated		All Non-Treated		Outer Island Non-Treated	
	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Number of Medium Firms, 1985 (SI)	6.57 (7.99)	28	-31.96***	260	-4.44*	143
Number of Large Firms, 1985 (SI)	3.93 (6.45)	28	-7.04***	260	0.16	143
Number of Employees, SI 1985	2424.89 (4491.79)	28	-3890.41***	260	431.06	143
Total value added, SI 1985	6.63e+06 (1.36e+07)	28	-7.50e+06**	260	424394.21	143
Median value added per worker, SI 1985	1706.13 (1131.66)	23	391.35	241	-108.94	124
Median wage per worker, SI 1985	707.81 (299.85)	23	153.40**	241	3.64	124
Number of Medium Firms, 1995 (SI)	11.32 (10.96)	28	-46.84***	260	-6.13*	143
Number of Large Firms, 1995 (SI)	4.86 (8.80)	28	-21.27***	260	-2.69	143
Number of Employees, SI 1995	3815.85 (7490.45)	28	-12027.76***	260	-519.98	143
Total value added, SI 1995	4.23e+07 (1.03e+08)	28	-8.30e+07***	260	-4.91e+05	143
Median value added per worker, SI 1995	5613.64 (5782.36)	27	2074.80*	249	1137.94	132
Median wage per worker, SI 1995	1718.63 (736.15)	27	220.54	249	-3.10	132

Authors' calculations. The t-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

Table B.3: Summary Statistics: Pre-Treatment Characteristics, IPUMS 1971

	Treated		All Non-Treated		Outer Island Non-Treated	
	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Literacy rate, 1971	52.52 (16.54)	23	4.28	246	2.89	131
Average household size, 1971	6.45 (0.81)	23	0.30	246	0.03	131
% of pop w/ no primary school, 1971	49.02 (16.20)	23	-3.41	246	-1.94	131
% of pop w/ some primary school, 1971	26.97 (8.25)	23	-1.89	246	-2.80	131
% of pop w/ primary school, 1971	18.06 (7.60)	23	4.50**	246	3.90**	131
% of pop w/ junior high school, 1971	3.06 (2.59)	23	0.56	246	0.49	131
% of pop w/ senior high school, 1971	0.76 (1.24)	23	-0.12	246	-0.01	131
% of pop w/ Diploma I/II, 1971	0.00 (0.00)	23	0.00	246	0.00	131
% of pop w/ Academy/Diploma III, 1971	0.10 (0.18)	23	-0.03	246	-0.00	131
% of pop w/ University/Diploma IV, 1971	0.12 (0.38)	23	0.03	246	0.05	131
% working in agriculture, 1971	62.22 (29.31)	23	2.90	246	-3.12	131
% working in mining, 1971	0.48 (1.33)	23	0.04	246	-0.25	131
% working in manufacturing, 1971	4.88 (8.65)	23	-2.23	246	-0.09	131
% working in electricity, gas and water, 1971	0.13 (0.39)	23	-0.04	246	0.01	131
% working in construction, 1971	1.88 (3.44)	23	-0.20	246	0.03	131
% working in wholesale and retail trade, 1971	5.71 (8.43)	23	-2.52	246	-0.59	131
% working in hotels and restaurants, 1971	0.75 (1.23)	23	-1.78***	246	-0.95**	131
% working in transport and communications, 1971	2.22 (3.43)	23	-0.50	246	-0.17	131
% working in fin. services and insurance, 1971	0.09 (0.29)	23	-0.39***	246	-0.10	131
% working in public admin. and defense, 1971	8.95 (10.53)	23	3.45	246	2.83	131
% working in private household services, 1971	6.05 (6.35)	23	0.78	246	1.70	131
% working in other services, 1971	3.23 (2.62)	23	-0.01	246	-0.05	131
% working in unknown field, 1971	3.37 (5.13)	23	0.57	246	0.81	131
% working in real estate, bus. services, 1971	0.05 (0.20)	23	-0.05	246	-0.07	131
Total population, 1971	241198.22 (160290.90)	23	-2.31e+05***	246	-42778.40	131
Number of employed people, 1971	0.44 (0.14)	23	-0.04	246	-0.03	131
Number of unemployed people, 1971	0.01 (0.01)	23	-0.00	246	-0.00	131
% born in same province, 1971	0.91 (0.15)	23	-0.03	246	-0.01	131
% in same province 5 years ago, 1971	0.00 (0.00)	23	0.00	246	0.00	131
% born in same district, 1971	. (.)	.	.	.	.	.
% in same district 5 years ago, 1971	. (.)	.	.	.	.	.

Authors' calculations. The t-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

Table B.4: Summary Statistics: Pre-Treatment Characteristics, IPUMS 1976

	Treated		Non-Treated			
Panel D: Demographic Chars., 1976	Mean (Sd)	N	Mean (Sd)	N	t-stat	
Literacy rate, 1976	60.15 (11.64)	18	4.90	173	0.21	59
Average household size, 1976	6.58 (0.75)	18	0.47**	173	-0.04	59
% of pop w/ no primary school, 1976	38.65 (13.30)	18	-4.12	173	0.88	59
% of pop w/ some primary school, 1976	33.77 (7.03)	18	-2.79	173	-4.88**	59
% of pop w/ primary school, 1976	11.03 (4.42)	18	1.74	173	1.10	59
% of pop w/ junior high school, 1976	4.41 (2.87)	18	2.15***	173	1.65**	59
% of pop w/ senior high school, 1976	0.88 (0.97)	18	0.11	173	0.10	59
% of pop w/ Diploma I/II, 1976	0.00 (0.00)	18	0.00	173	0.00	59
% of pop w/ Academy/Diploma III, 1976	0.13 (0.26)	18	-0.03	173	0.01	59
% of pop w/ University/Diploma IV, 1976	0.16 (0.28)	18	0.05	173	0.09	59
% working in agriculture, 1976	56.62 (37.29)	18	-0.95	173	-4.99	59
% working in mining, 1976	0.25 (0.59)	18	0.16	173	0.13	59
% working in manufacturing, 1976	3.91 (3.16)	18	-3.40***	173	-0.70	59
% working in electricity, gas and water, 1976	0.12 (0.19)	18	-0.03	173	0.06	59
% working in construction, 1976	3.21 (3.91)	18	0.83	173	1.06	59
% working in wholesale and retail trade, 1976	11.29 (11.93)	18	-1.94	173	-1.20	59
% working in hotels and restaurants, 1976	1.09 (1.25)	18	-0.76**	173	-0.54	59
% working in transport and communications, 1976	3.55 (4.04)	18	0.72	173	0.93	59
% working in fin. services and insurance, 1976	0.23 (0.56)	18	0.04	173	0.07	59
% working in public admin. and defense, 1976	7.39 (9.34)	18	3.01	173	2.80	59
% working in private household services, 1976	8.36 (11.09)	18	1.54	173	2.15	59
% working in other services, 1976	3.09 (4.66)	18	0.50	173	0.31	59
% working in unknown field, 1976	0.70 (1.07)	18	0.15	173	-0.19	59
% working in real estate, bus. services, 1976	0.16 (0.52)	18	0.13	173	0.11	59
Total population, 1976	404138.89 (316977.77)	18	-3.17e+05***	173	-2.59e+05**	59
Number of employed people, 1976	0.54 (0.14)	18	-0.06	173	-0.01	59
Number of unemployed people, 1976	0.02 (0.02)	18	-0.00	173	-0.00	59
% born in same province, 1976	0.00 (0.00)	18	0.00	173	0.00	59
% in same province 5 years ago, 1976	0.81 (0.06)	18	-0.02	173	-0.00	59
% born in same district, 1976	0.00 (0.00)	18	0.00	173	0.00	59
% in same district 5 years ago, 1976	0.95 (0.06)	18	-0.01	173	-0.01	59

Authors' calculations. The t-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

Table B.5: Summary Statistics: Pre-Treatment Characteristics, IPUMS 1980

	Treated		All Non-Treated		Outer Island Non-Treated	
	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Literacy rate, 1980	57.30 (10.89)	28	0.37	260	0.11	143
Average household size, 1980	6.38 (0.45)	28	0.23**	260	-0.06	143
% of pop w/ no primary school, 1980	38.23 (11.42)	28	-0.97	260	-0.65	143
% of pop w/ some primary school, 1980	33.86 (4.14)	28	-0.61	260	-1.02	143
% of pop w/ primary school, 1980	9.55 (3.24)	28	-0.29	260	0.29	143
% of pop w/ junior high school, 1980	2.83 (1.61)	28	0.34	260	0.25	143
% of pop w/ senior high school, 1980	1.19 (1.25)	28	0.23	260	0.25	143
% of pop w/ Diploma I/II, 1980	0.00 (0.00)	28	0.00	260	0.00	143
% of pop w/ Academy/Diploma III, 1980	0.18 (0.17)	28	0.01	260	0.03	143
% of pop w/ University/Diploma IV, 1980	0.18 (0.31)	28	0.04	260	0.05	143
% working in agriculture, 1980	60.98 (23.96)	28	6.30	260	-0.99	143
% working in mining, 1980	0.78 (1.34)	28	-0.25	260	-0.61	143
% working in manufacturing, 1980	5.57 (3.26)	28	-2.97***	260	-0.63	143
% working in electricity, gas and water, 1980	0.15 (0.30)	28	-0.02	260	0.01	143
% working in construction, 1980	2.94 (2.30)	28	-0.21	260	0.25	143
% working in wholesale and retail trade, 1980	8.77 (5.57)	28	-3.61***	260	-0.86	143
% working in hotels and restaurants, 1980	0.23 (0.26)	28	-0.10*	260	-0.03	143
% working in transport and communications, 1980	3.33 (3.42)	28	0.20	260	0.56	143
% working in fin. services and insurance, 1980	0.25 (0.38)	28	0.03	260	0.07	143
% working in public admin. and defense, 1980	6.66 (6.22)	28	1.75	260	1.78	143
% working in private household services, 1980	5.45 (4.71)	28	-1.81*	260	-0.13	143
% working in other services, 1980	3.67 (2.46)	28	0.47	260	0.32	143
% working in unknown field, 1980	0.53 (0.30)	28	-0.08	260	-0.00	143
% working in real estate, bus. services, 1980	0.68 (1.34)	28	0.29	260	0.28	143
Total population, 1980	302346.11 (204165.83)	28	-2.65e+05***	260	-51778.07	143
Number of employed people, 1980	0.46 (0.09)	28	-0.03	260	-0.02	143
Number of unemployed people, 1980	0.01 (0.01)	28	0.00	260	0.00	143
% born in same province, 1980	0.89 (0.10)	28	-0.04*	260	-0.02	143
% in same province 5 years ago, 1980	0.80 (0.05)	28	-0.03**	260	-0.01	143
% born in same district, 1980	. (.)	.	.	.	.	.
% in same district 5 years ago, 1980	. (.)	.	.	.	.	.

Authors' calculations. The *t*-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

Table B.6: Summary Statistics: Pre-Treatment Characteristics, IPUMS 1985

	Treated		All Non-Treated		Outer Island Non-Treated	
	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Literacy rate, 1985	65.79 (8.97)	28	-0.55	260	-0.63	143
Average household size, 1985	5.99 (0.46)	28	0.15	260	-0.11	143
% of pop w/ no primary school, 1985	20.79 (9.99)	28	-0.95	260	0.72	143
% of pop w/ some primary school, 1985	41.67 (6.20)	28	-0.43	260	-2.23*	143
% of pop w/ primary school, 1985	13.04 (4.19)	28	-1.21	260	-0.03	143
% of pop w/ junior high school, 1985	4.09 (2.56)	28	0.35	260	0.27	143
% of pop w/ senior high school, 1985	2.27 (1.84)	28	0.35	260	0.39	143
% of pop w/ Diploma I/II, 1985	0.27 (0.67)	28	0.13	260	0.12	143
% of pop w/ Academy/Diploma III, 1985	0.20 (0.23)	28	-0.03	260	0.01	143
% of pop w/ University/Diploma IV, 1985	0.31 (0.58)	28	0.08	260	0.10	143
% working in agriculture, 1985	58.24 (24.10)	28	3.88	260	-3.46	143
% working in mining, 1985	1.37 (2.64)	28	0.53	260	0.31	143
% working in manufacturing, 1985	5.65 (3.14)	28	-2.90***	260	-0.31	143
% working in electricity, gas and water, 1985	0.16 (0.33)	28	0.03	260	0.03	143
% working in construction, 1985	2.99 (3.15)	28	-0.31	260	0.28	143
% working in wholesale and retail trade, 1985	12.12 (8.56)	28	-2.04	260	0.97	143
% working in hotels and restaurants, 1985	1.20 (1.82)	28	0.50	260	0.33	143
% working in transport and communications, 1985	2.89 (2.47)	28	-0.33	260	0.21	143
% working in fin. services and insurance, 1985	0.15 (0.31)	28	-0.06	260	-0.02	143
% working in public admin. and defense, 1985	9.95 (7.82)	28	2.69*	260	2.08	143
% working in private household services, 1985	3.72 (2.94)	28	-1.45**	260	0.01	143
% working in other services, 1985	1.32 (1.25)	28	-0.59**	260	-0.54*	143
% working in unknown field, 1985	0.01 (0.04)	28	-0.00	260	-0.01	143
% working in real estate, bus. services, 1985	0.22 (0.52)	28	0.05	260	0.11	143
Total population, 1985	353697.43 (204293.36)	28	-2.76e+05***	260	-50974.87	143
Number of employed people, 1985	0.50 (0.09)	28	-0.02	260	-0.02	143
Number of unemployed people, 1985	0.50 (0.09)	28	0.02	260	0.02	143
% born in same province, 1985	0.88 (0.11)	28	-0.05**	260	-0.04	143
% in same province 5 years ago, 1985	0.82 (0.05)	28	-0.03***	260	-0.02	143
% born in same district, 1985	0.78 (0.16)	28	-0.07**	260	-0.05	143
% in same district 5 years ago, 1985	0.93 (0.06)	28	-0.02	260	-0.02	143

Authors' calculations. The *t*-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

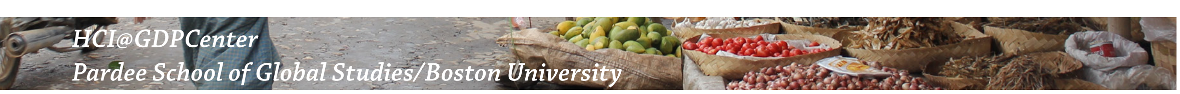


Table B.7: Summary Statistics: Pre-Treatment Characteristics, IPUMS 1990

	Treated		All Non-Treated		Outer Island Non-Treated	
	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Literacy rate, 1990	71.67 (8.77)	27	0.40	260	0.59	143
Average household size, 1990	5.87 (0.61)	27	0.26**	260	-0.01	143
% of pop w/ no primary school, 1990	16.60 (8.64)	27	-1.43	260	0.15	143
% of pop w/ some primary school, 1990	38.35 (5.79)	27	1.54	260	-0.67	143
% of pop w/ primary school, 1990	15.20 (3.68)	27	-2.82***	260	-0.46	143
% of pop w/ junior high school, 1990	5.57 (2.24)	27	0.19	260	0.05	143
% of pop w/ senior high school, 1990	4.39 (2.72)	27	0.47	260	0.52	143
% of pop w/ Diploma I/II, 1990	0.36 (0.27)	27	0.10*	260	0.09	143
% of pop w/ Academy/Diploma III, 1990	0.41 (0.34)	27	-0.01	260	0.01	143
% of pop w/ University/Diploma IV, 1990	0.68 (0.93)	27	0.02	260	0.12	143
% working in agriculture, 1990	55.38 (24.74)	27	5.44	260	-2.89	143
% working in mining, 1990	1.63 (2.66)	27	0.44	260	0.16	143
% working in manufacturing, 1990	6.80 (6.26)	27	-3.15**	260	0.19	143
% working in electricity, gas and water, 1990	0.28 (0.48)	27	0.01	260	-0.01	143
% working in construction, 1990	3.38 (2.59)	27	-0.34	260	0.35	143
% working in wholesale and retail trade, 1990	11.59 (7.66)	27	-2.41	260	0.45	143
% working in hotels and restaurants, 1990	0.41 (0.73)	27	0.05	260	0.16	143
% working in transport and communications, 1990	4.13 (3.83)	27	0.49	260	0.89	143
% working in fin. services and insurance, 1990	0.32 (0.51)	27	-0.17	260	0.01	143
% working in public admin. and defense, 1990	7.84 (5.24)	27	1.38	260	0.61	143
% working in private household services, 1990	3.16 (3.01)	27	-1.50**	260	-0.01	143
% working in other services, 1990	4.77 (3.62)	27	-0.30	260	0.03	143
% working in unknown field, 1990	0.00 (0.02)	27	-0.03***	260	-0.02**	143
% working in real estate, bus. services, 1990	0.31 (0.94)	27	0.08	260	0.08	143
Total population, 1990	394115.41 (233253.33)	27	-3.04e+05***	260	-69593.15	143
Number of employed people, 1990	0.50 (0.08)	27	-0.03*	260	-0.02	143
Number of unemployed people, 1990	0.02 (0.01)	27	0.00	260	0.00	143
% born in same province, 1990	0.83 (0.15)	27	-0.07**	260	-0.05*	143
% in same province 5 years ago, 1990	0.83 (0.06)	27	-0.03**	260	-0.01	143
% born in same district, 1990	0.00 (0.00)	27	0.00	260	0.00	143
% in same district 5 years ago, 1990	0.00 (0.00)	27	0.00	260	0.00	143

Authors' calculations. The *t*-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

Table B.8: Summary Statistics: Pre-Treatment Characteristics, IPUMS 1995

	Treated		All Non-Treated		Outer Island Non-Treated	
	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Literacy rate, 1995	72.58 (5.66)	5	-2.66	208	-2.69	91
Average household size, 1995	5.62 (0.30)	5	0.46**	208	0.10	91
% of pop w/ no primary school, 1995	11.74 (3.44)	5	-1.84	208	-0.05	91
% of pop w/ some primary school, 1995	36.59 (4.43)	5	3.36	208	-0.01	91
% of pop w/ primary school, 1995	18.04 (7.06)	5	-2.32	208	0.60	91
% of pop w/ junior high school, 1995	6.71 (3.28)	5	-0.33	208	-0.51	91
% of pop w/ senior high school, 1995	6.94 (3.11)	5	1.00	208	1.08	91
% of pop w/ Diploma I/II, 1995	0.32 (0.16)	5	-0.03	208	-0.04	91
% of pop w/ Academy/Diploma III, 1995	0.56 (0.26)	5	-0.03	208	0.02	91
% of pop w/ University/Diploma IV, 1995	0.90 (0.39)	5	-0.14	208	-0.05	91
% working in agriculture, 1995	56.70 (15.32)	5	13.39	208	2.09	91
% working in mining, 1995	0.95 (0.48)	5	0.07	208	-0.15	91
% working in manufacturing, 1995	6.28 (3.64)	5	-5.89**	208	-0.90	91
% working in electricity, gas and water, 1995	0.13 (0.12)	5	-0.27***	208	-0.24***	91
% working in construction, 1995	3.18 (1.51)	5	-1.47*	208	-0.55	91
% working in wholesale and retail trade, 1995	12.20 (5.68)	5	-4.57	208	-1.53	91
% working in hotels and restaurants, 1995	0.24 (0.42)	5	-0.77***	208	-0.43*	91
% working in transport and communications, 1995	3.38 (1.69)	5	-0.99	208	-0.32	91
% working in fin. services and insurance, 1995	0.16 (0.20)	5	-0.42***	208	-0.13	91
% working in public admin. and defense, 1995	6.27 (5.27)	5	2.15	208	1.86	91
% working in private household services, 1995	0.18 (0.41)	5	0.16	208	0.17	91
% working in other services, 1995	6.55 (2.67)	5	1.42	208	1.02	91
% working in unknown field, 1995	3.71 (2.02)	5	-2.71**	208	-0.90	91
% working in real estate, bus. services, 1995	0.08 (0.11)	5	-0.09	208	0.02	91
Total population, 1995	368831.80 (367316.81)	5	-4.54e+05**	208	-1.88e+05	91
Number of employed people, 1995	0.54 (0.07)	5	0.00	208	0.01	91
Number of unemployed people, 1995	0.05 (0.02)	5	0.00	208	0.00	91
% born in same province, 1995	0.97 (0.02)	5	0.06***	208	0.08***	91
% in same province 5 years ago, 1995	0.87 (0.02)	5	-0.00	208	0.01	91
% born in same district, 1995	. (.)	.	.	.	.	.
% in same district 5 years ago, 1995	. (.)	.	.	.	.	.

Authors' calculations. The t-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

Table B.9: Summary Statistics: Pre-Treatment Characteristics, DAPOER

	Treated		All Non-Treated		Outer Island Non-Treated	
	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Total DAU (IDR), 1994	1.43E+10 (1.05E+10)	28	4.68E+09**	260	2.18E+09	143
Total DBH SDA (IDR), 1994	1.37E+09 (3.63E+09)	28	9.32E+08	260	7.60E+08	143
Total DAK (IDR Billion), 1994	10.04 (5.60)	28	-0.85	260	-0.25	143
Total DAU (IDR), 1995	1.78E+10 (1.21E+10)	28	5.67E+09**	260	2.87E+09	143
Total DBH SDA (IDR), 1995	1.88E+09 (5.45E+09)	28	1.21E+09	260	9.04E+08	143
Total DAK (IDR Billion), 1995	11.10 (5.92)	28	-0.55	260	-0.19	143
Total DAU (IDR), 1996	2.00E+10 (1.43E+10)	28	5.88E+09**	260	2.63E+09	143
Total DBH SDA (IDR), 1996	2.13E+09 (5.86E+09)	28	1.38E+09	260	1.10E+09	143
Total DAK (IDR Billion), 1996	12.98 (7.04)	28	0.19	260	0.63	143
Palm Oil Land Area: Total (in Hectares), 1996	3198.96 (10801.22)	28	732.36	260	-1241.74	143
Palm Production: Total (in Tons), 1996	3634.25 (11198.11)	28	-188.01	260	-3238.92	143
Literacy Rate for Population age 15 and over, 1996	87.74 (7.15)	28	2.35	253	0.03	137
% of HH w/ Access to Electricity, 1996	60.95 (21.94)	28	-7.40	253	4.42	137
% of HH w/ Access to Safe Water, 1996	39.41 (20.69)	28	1.41	253	7.02	137
% of HH w/ Access to Phone Lines, 1996	3.90 (4.35)	28	-0.25	255	0.07	139
% of HH w/ Access to Safe Sanitation, 1996	51.91 (17.05)	28	3.46	253	2.67	137
Total DAU (IDR), 1997	2.35E+10 (1.58E+10)	28	5.04E+09	260	2.45E+09	143
Total DBH SDA (IDR), 1997	2.45E+09 (6.34E+09)	28	1.58E+09	260	1.34E+09	143
Total DAK (IDR Billion), 1997	16.55 (7.72)	28	0.70	260	0.22	143
Palm Oil Land Area: Total (in Hectares), 1997	3070.36 (10610.63)	28	315.72	260	-1894.04	143
Palm Production: Total (in Tons), 1997	5376.96 (20386.65)	28	1122.73	260	-2261.80	143
Literacy Rate for Population age 15 and over, 1997	89.22 (6.55)	28	1.95	254	-0.15	138
% of HH w/ Access to Electricity, 1997	67.56 (19.70)	28	-5.97	254	4.86	138
% of HH w/ Access to Safe Water, 1997	42.45 (20.95)	28	2.52	254	7.50*	138
% of HH w/ Access to Safe Sanitation, 1997	54.97 (16.70)	28	3.08	254	2.13	138

Authors' calculations. The t-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

Table B.10: Summary Statistics: Pre-Treatment Characteristics, GDRP

	Treated		All Non-Treated		Outer Island Non-Treated	
	Mean (sd)	N	Δ Mean	N	Δ Mean	N
Total GDRP, Constant Prices, 1983	183608.61 (512158.30)	23	-16390.09	223	56052.54	136
Total GDRP, Constant Prices, 1984	217184.26 (646485.03)	23	121.07	223	80155.62	136
Total GDRP, Constant Prices, 1985	226193.43 (667842.45)	23	2619.65	224	82779.36	137
Total GDRP, Constant Prices, 1986	230643.35 (656664.83)	23	-42744.70	252	77994.49	137
Total GDRP, Constant Prices, 1987	252438.22 (723990.97)	23	-38851.24	252	89733.06	137
Total GDRP, Constant Prices, 1988	269786.60 (766184.36)	25	-42596.96	252	94424.38	137
Total GDRP, Constant Prices, 1989	412846.00 (924205.08)	28	76649.06	256	223219.33	141
Total GDRP, Constant Prices, 1990	428609.79 (945420.97)	28	69989.46	256	224377.91	141
Total GDRP, Constant Prices, 1991	456199.68 (996500.26)	28	68687.93	257	238377.29	141
Total GDRP, Constant Prices, 1992	488600.89 (1.05E+06)	28	74242.58	258	256187.55	142
Total GDRP, Constant Prices, 1993	520306.21 (1.12E+06)	28	72571.52	258	268355.28	142
Total GDRP ex oil, Constant Prices, 1993	629824.13 (657159.87)	28	-4.19E+05**	259	67313.11	143
Total GDRP ex oil, Constant Prices, 1994	684974.95 (720938.99)	28	-4.50E+05**	259	76421.65	143
Total GDRP ex oil, Constant Prices, 1995	756503.16 (816930.93)	28	-4.83E+05**	259	89517.02	143
Total GDRP ex oil, Constant Prices, 1996	831651.52 (947089.85)	28	-5.19E+05**	259	106949.45	143

Authors' calculations. The t-statistic reported is for a two-sided equality of means tests with unequal variances. */**/*** denotes significant at the 10% / 5% / 1% levels. This table was produced with the following do file: `$do_files/Analysis/summ_stats.do`.

Table B.11: Firm-Level Regressions: Productivity Robustness

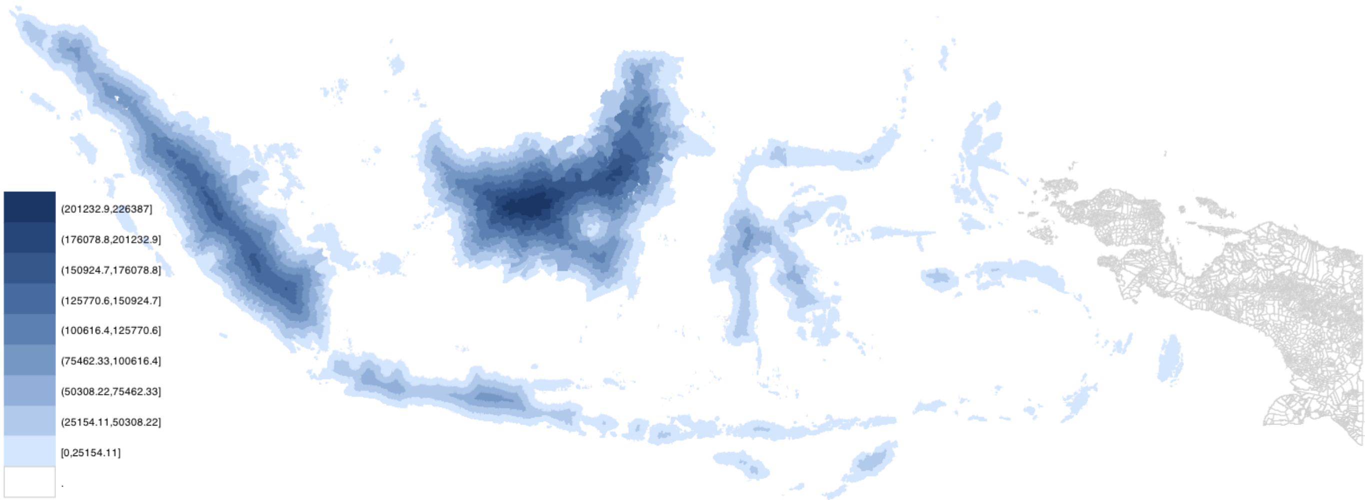
	All Firms	Incumbent Firms	
	(1)	(2)	(3)
OP Log Productivity Residual (Investment Proxy)	-0.070	-0.058	-0.044
	(0.077)	(0.085)	(0.089)
N	53370	45873	45197
Adjusted R^2 (Overall)	0.335	0.334	0.563
Adjusted R^2 (Within)	0.000	0.000	0.000
F-Stat	0.82	0.47	0.25
LP Log Productivity Residual (Electricity as Proxy)	-0.075	-0.061	-0.040
	(0.083)	(0.091)	(0.091)
N	53370	45873	45197
Adjusted R^2 (Overall)	0.401	0.405	0.645
Adjusted R^2 (Within)	0.000	0.000	0.000
F-Stat	0.83	0.45	0.19
ACF Log Productivity Residuals	-0.049	-0.033	-0.024
	(0.082)	(0.085)	(0.073)
N	53158	45779	45103
Adjusted R^2 (Overall)	0.826	0.832	0.916
Adjusted R^2 (Within)	0.000	-0.000	-0.000
F-Stat	0.36	0.15	0.10
Wooldridge Log Productivity Residuals	-0.005	-0.003	-0.005
	(0.072)	(0.077)	(0.065)
N	41371	36523	35823
Adjusted R^2 (Overall)	0.083	0.078	0.280
Adjusted R^2 (Within)	-0.000	-0.000	-0.000
F-Stat	0.00	0.00	0.01
ACR Log Productivity Residuals	0.078	0.100	0.127
	(0.073)	(0.067)	(0.054)**
N	54958	46177	45172
Adjusted R^2 (Overall)	0.543	0.547	0.712
Adjusted R^2 (Within)	0.000	0.000	0.001
F-Stat	1.12	2.25	5.55
Year FE	X	X	X
District FE	X	X	.
Industry FE	X	X	.
Firm FE	.	.	X

Authors' calculations. */**/*** denotes significant at the 10% / 5% / 1% levels. Robust standard errors in parentheses, clustered at the district level.

Figure B.1: Distance to Jakarta

Source: Authors' calculations. This figure was produced with the following do file: `$do_files/Analysis/GIS_plots.do`.

Figure B.2: Distance to the Nearest Coast

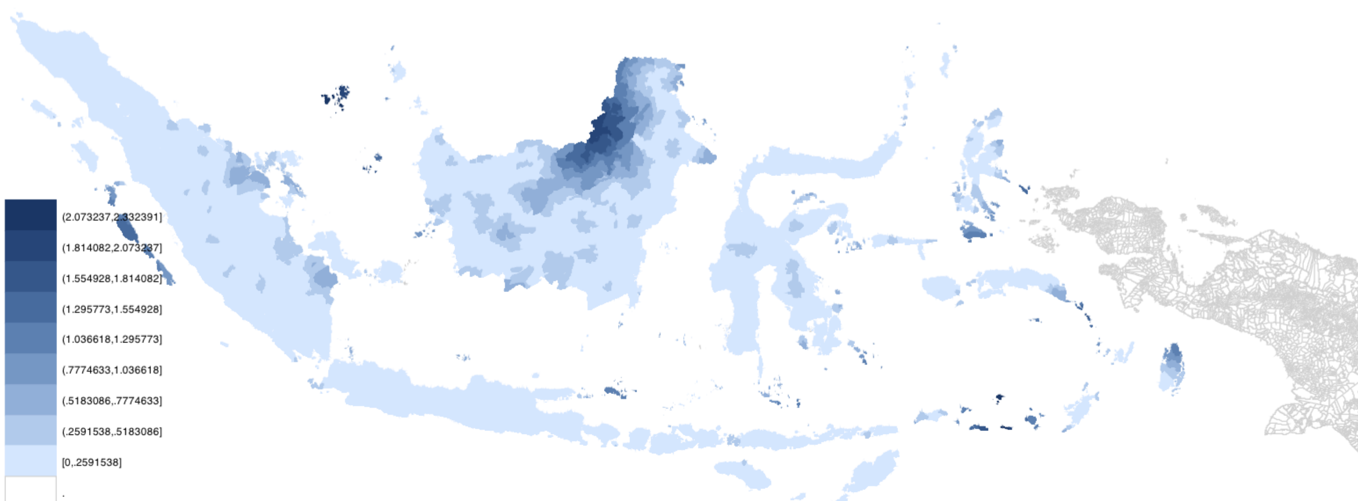


Source: Authors' calculations. This figure was produced with the following do file: `$do_files/Analysis/GIS_plots.do`.

Figure B.3: Distance to the Nearest Major River

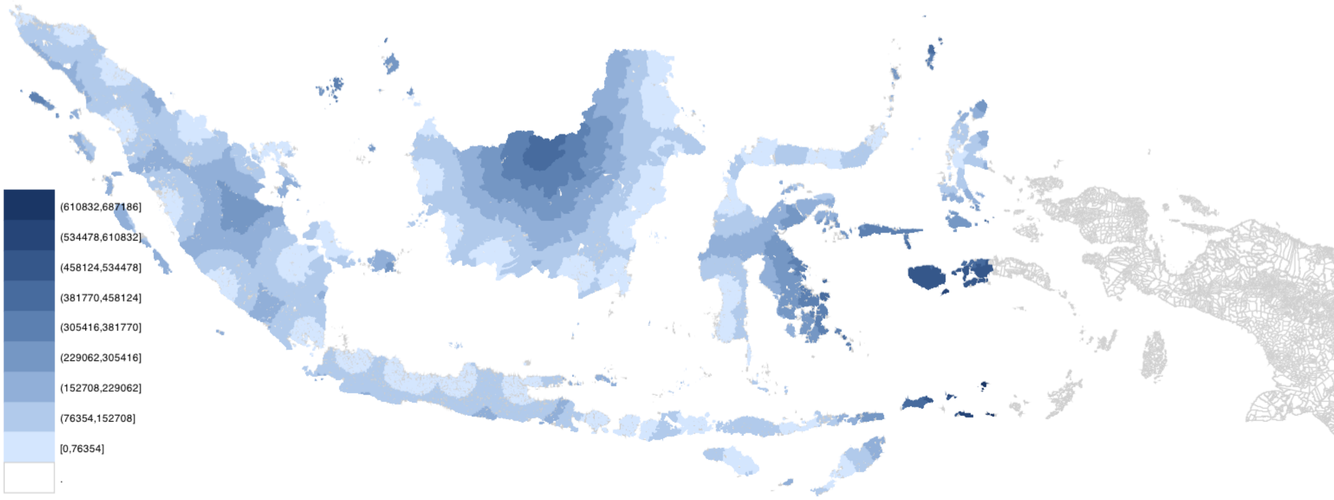
Source: Authors' calculations. This figure was produced with the following do file: `$do_files/Analysis/GIS_plots.do`.

Figure B.4: Distance to the Nearest Major Road



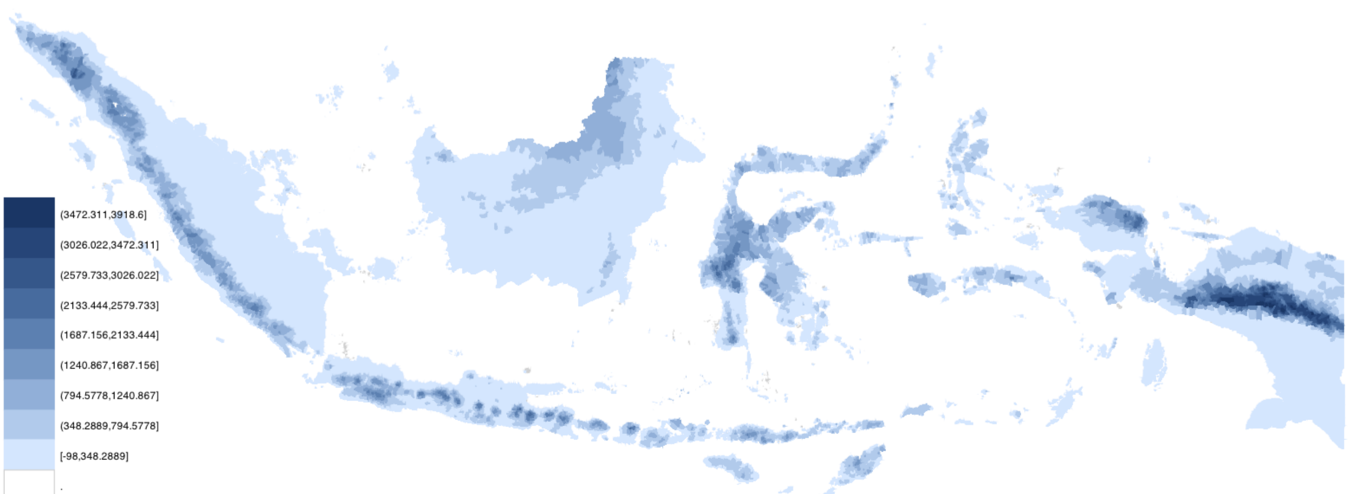
Source: Authors' calculations. This figure was produced with the following do file: `$do_files/Analysis/GIS_plots.do`.

Figure B.5: Distance to the Nearest Major Port



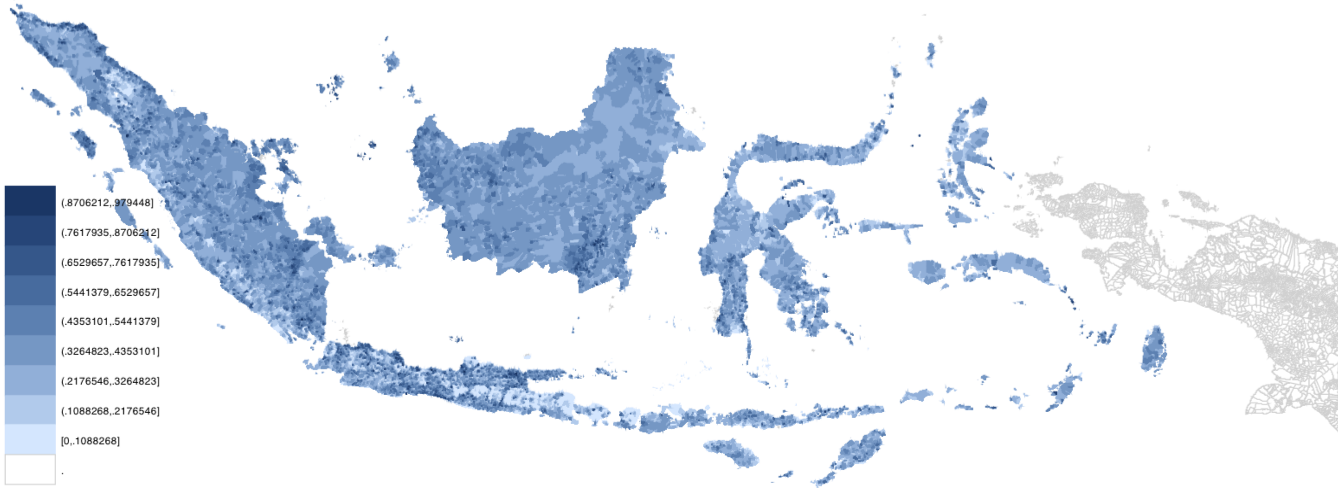
Source: Authors' calculations. This figure was produced with the following do file: `$do_files/Analysis/GIS_plots.do`.

Figure B.6: Elevation



Source: Authors' calculations. This figure was produced with the following do file: `$do_files/Analysis/GIS_plots.do`.

Figure B.7: Ruggedness

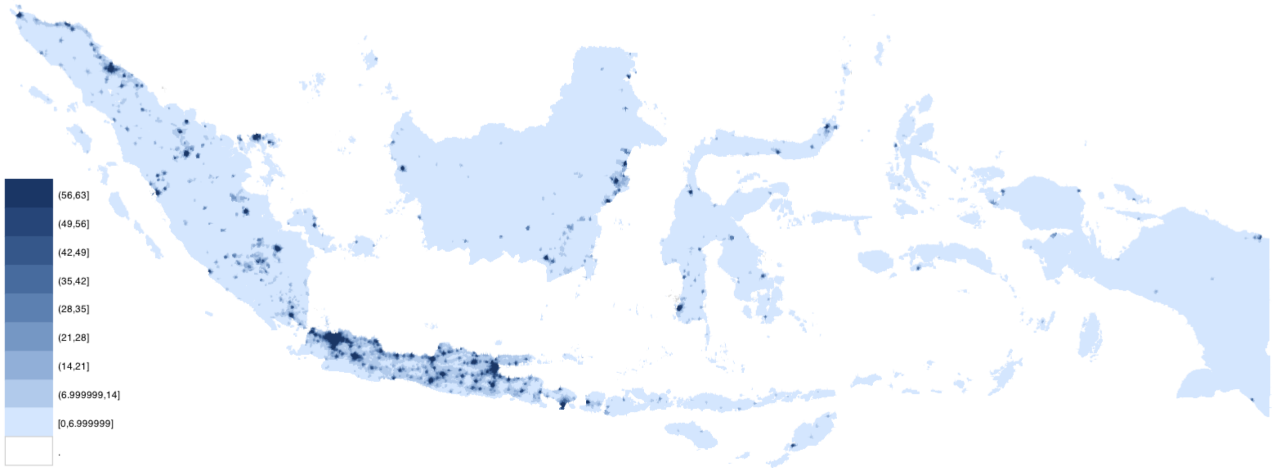


Source: Authors' calculations. This figure was produced with the following do file: `$do_files/Analysis/GIS_plots.do`.

Figure B.8: Light Intensity in 1992

Source: Authors' calculations. This figure was produced with the following do file: `$do_files/Analysis/GIS_plots.do`.

Figure B.9: Light Intensity in 2010



Source: Authors' calculations. This figure was produced with the following do file: `$do_files/Analysis/GIS_plots.do`.

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