Land Rezoning and Structural Transformation in Rural India: Evidence from the Industrial Areas Program^{*}

David Blakeslee[†] Ritam Chaurey[‡] Ram Fishman[§] Samreen Malik[¶]

Abstract

Zoning laws that restrict rural land to agricultural production pose an important institutional barrier to industrial development. We study the effects of the Industrial Areas (IA) program in Karnataka, India, which rezoned agricultural land for industrial use, but without the economic incentives common with other place-based policies. We find that the program caused a large increase in firm creation and employment in villages overlapping the IAs. Moreover, the surrounding areas experienced spillover effects, with workers shifting from agricultural to non-agricultural employment, and entrepreneurs establishing numerous small-scale manufacturing, agricultural, and service sector firms.

Key words: Industrial Areas, Place-based Policies, Spillovers, Labor Market. *JEL code:* 012, 025, R2

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[†]Email: david.blakeslee@nyu.edu. New York University (AD).

[‡]Email: rchaurey@jhu.edu. Johns Hopkins University.

[§]Email: ramf@post.tau.ac.il. Tel Aviv University.

[¶]Email: samreen.malik@nyu.edu. New York University (AD).

1 Introduction

Place-based policies are used by governments around the world in an attempt to stimulate localized economic activity. These policies usually employ generous financial incentives in order to attract firms to desired locations,¹ and are justified by the presence of coordination and market failures, which would otherwise lead to inefficiently low levels of industrial agglomeration (Kline and Moretti, 2014b). They have also been promoted as a means of generating broader economic development in economically marginalized areas (Greenstone et al., 2010a; Greenstone and Looney, 2010; Kline and Moretti, 2014a). The evidence on the effectiveness of such policies remains mixed, and is relatively scarce for developing countries.

In this paper, we study a different type of place-based policy which is motivated by regulatory barriers on land-use that impede economic activity, rather than market failures. Such barriers are thought to constrain firm creation, productivity, and growth in many developing countries (Duranton et al., 2015). For example, in India, the difficulty of procuring large parcels of land for industrial use has been frequently cited as a particularly important bottleneck (Rajan, 2013). This is due to land-use laws that reserve most rural land for agricultural production, and impose considerable bureaucratic obstacles to its conversion for industrial production. Because systemic reform of such regulations is rendered extremely difficult by India's political economy, policy makers have attempted to circumvent them through localized interventions that involve land acquisition and rezoning by the government itself (Kazmin, 2015). It is unclear, however, whether such policies are sufficient for attracting firms, or what their broader effects are on the local economy.

In this paper, we study the Industrial Areas (IA) program in the Indian state of Karnataka. Under this program, the government of Karnataka acquires and consolidates contiguous parcels of privately-held agricultural land, rezones it for non-agricultural activities, and makes it available to private firms for sale or lease at market rates (Government of India, 2009). Most significantly, no financial incentives are offered to firms to locate their operations in the IAs, in stark contrast to other place-based policies, leading policymakers to describe the IA program in a technical manual as "essentially a piece of real estate promotion" (Government of India, 2009). The intention of the policy, therefore, is to harness market forces to promote industrialization, with the government acting primarily as the facilitator of the necessary rezoning to enable non-agricultural production.

Our analysis addresses two fundamental questions. First, we examine whether such limited incentives succeed in drawing large manufacturing firms to the IAs. In contrast to other place-based policies that offer financial benefits to attract firms, it is far less clear that

 $^{^{1}}$ The popular form of place-based policies across the world is to provide financial incentives such as tax exemptions, wage subsidies, hiring credits, land grants, infrastructure grants in a particular region to incentivize firms to locate there.

the availability of land, by itself, will suffice to attract firms to rural locations that may have other disadvantages. Insofar as such a policy is successful, it would indicate the land scarcity represents a binding constraint on local manufacturing activity, as is often claimed by policy analysts in India.

Second, we test whether the IAs generate economic spillovers to surrounding villages. Even if IAs succeed in attracting firms, it is not clear that these firms will recruit a substantial share of their labor force from surrounding areas. Given the low levels of human capital in the areas in which IAs are established, firms may prefer to bring in labor from elsewhere, or may be more capital intensive and employ fewer workers. The effect of IAs on local labor markets therefore provides important insights on whether characteristics of the rural labor force are an important factor impeding the structural transformation of rural economies.

For similar reasons, the effect on firm activity in areas near to, but outside the IAs is also unclear. The literature often hypothesizes that the arrival of firms in a given location will trigger firm creation and increased productivity in surrounding areas through agglomeration economies (Greenstone et al., 2010b). However, given that land regulations are not relaxed outside the IAs, firm creation (size and sector) will depend on whether positive externalities are sufficiently strong to offset the prevailing costs of overcoming land-use regulations.

Evaluating the effects of place-based policies poses two key empirical challenges: (i) the construction of valid counterfactuals to deal with their non-random placement; and (ii) accounting for possible negative and positive spillovers to nearby areas.² Our data is particularly well suited to dealing with these issues, as the key outcomes and explanatory variables are available at the village level, constituting an extremely high level of spatial resolution. This includes variables such as firm and labor market outcomes, as well as infrastructure, night-light density, village amenities, and the location of Industrial Areas.

Our analysis makes use of a difference-in-differences identification strategy to identify the effects of IAs created between the years 1991–2011. Nearly 50 IAs were established in Karnataka during this time. In order to identify the appropriate control group in the presence of possible spillovers, we conduct a semi-parametric analysis of the impacts of IA creation in the villages overlapping the IA, and extending up to 30 kms away, in a flexible and spatially precise manner. This approach provides evidence that spillovers occur up to a distance of 5 kms from the IA, leading us to designate villages up to this distance as "spillover" villages, and to use as the control group villages located more than 5 kms away.

Although we are not able to observe village level data preceding the study period (pre-1990) in order to compare pre-1990 trends, we show that villages receiving IAs later in the study period (2001–2011) displayed temporal trends in the preceding decade (1991–2001) that were indistinguishable from the respective comparison groups. As an additional test of

²See Neumark and Simpson (2015) and Ham et al. (2011) for a discussion of these issues.

parallel trends, we use an event study design to show that light density (the only variable for which we have year-by-year data) displayed similar trends in the treatment and control groups prior to the establishment of the IAs, and then experienced a sharp divergence after their creation.

To address the concern that IA sites were chosen on the basis of unobservable factors that influence the outcomes of interest, we employ an additional test that makes use of IAs established after our study period (i.e., post 2012) as a comparison group. It is reasonable to assume that these sites share the potential unobservable attributes that could have impacted the selection of IAs during the study period, such as political influence of local business interests (see for example, Busso et al., 2013). The resulting estimates are similar to those obtained by our main analysis, lending added confidence to the causal interpretation of our results.

We document two main results capturing the effects of IAs on economic activity. First, we find that IAs have been highly successful in promoting economic development. IAs established between 1991–2011 led to a two-fold increase in night-light density, and the creation of roughly 30 new firms and 1000 new jobs within each IA.

Second, we find evidence of substantial economic spillovers. In the local labor markets, there is a decrease in the share of male workers involved in agriculture, and a symmetric increase in those working as non-agricultural wage labor. The magnitude of these changes is largest in villages overlapping the IA, but also extends farther out, falling monotonically with distance up to 5 kms from the boundary of the IA. The decline in agricultural employment is largely driven by a falling share of men cultivating their own land, with only a small change in the share engaged in agricultural wage labor, a population which tends to be less educated and more economically marginalized.

We also find substantial increases in the number of firms in areas outside the IAs, again up to a distance of 5 kms. While the majority of firms coming up within the IAs are in the manufacturing sector, those created outside are evenly divided across manufacturing, commercial agriculture,³ and the service sector. Amongst manufacturing firms created outside the IA, the most common are food processing firms, while service sector firms are primarily in the restaurant, retail, and transport sectors. Notably, while most new employment within the IA occurs in large firms, outside the IAs employment growth is overwhelmingly driven by firms employing fewer than 10, and generally only 1 or 2 employees. This suggests that land-use restrictions, which pose the greatest impediment to large firms, continue to restrict economic activity outside the IAs, and that positive externalities triggered by firms established within the IAs are not sufficient to overcome them.

 $^{^{3}\}mathrm{The}$ Economic Census includes both firms producing a gricultural goods and firms producing animal products under the rubric of "agriculture."

Our findings contribute to the growing literature on place-based policies in developing countries. Several papers have documented substantial effects for special economic zones (SEZs) in developing countries (Wang, 2013; Cheng, 2014; Alder et al., 2016; Lu et al., 2018). A smaller body of research has explored the effects of other types of place-based policies (Chaurey, 2016; Shenoy, 2018). While such policies have generally proven effective, their high pecuniary costs and administrative obligations may be prohibitive for many developing countries. As such, our paper makes an important contribution in understanding whether place-based policies consisting primarily of local institutional reforms through land zoning can be successful in promoting industrialization.

Another crucial question in this literature is the nature and extent of the spillovers generated by place-based policies. Such spillovers may take the form of traditional Marshallian agglomeration economies (Ellison and Glaeser, 1999; Rosenthal and Strange, 2004; Ellison et al., 2010; Greenstone et al., 2010b; Kline and Moretti, 2014b); or, alternatively, may operate on the demand side through income channels (Rosenstein-Rodan, 1943; Murphy et al., 1989). The evidence for spillovers from program sites to surrounding areas is mixed. For example, Criscuolo et al. (2019) (UK regional selective assistance), Neumark and Kolko (2010) and Freedman (2013) (California and Texas enterprise zones, respectively), and Martin et al. (2011) (clusters in France) find no local spillovers outside of program areas. On the other hand, Zheng et al. (2017) and Alder et al. (2016) find evidence for positive spillovers of Chinese SEZs and industrial parks, and Greenstone et al. (2010b) find large agglomeration effects on incumbent plants in US counties that attracted a large manufacturing plant. Our findings on spillovers represent an important contribution to this literature, demonstrating both the substantial spillovers generated by IAs, and the way in which these spillovers are constrained by regulations and the structure of the local economy.

Our results also speak to one of the most important themes in development economics: the relationship between the agricultural and manufacturing sectors. Since Lewis (1954), the absorption of (low-productivity) agricultural workers by (high-productivity) manufacturing firms has been viewed central to the development process (see Gollin, 2014 for an overview). Because the IAs generated exogenous variation in the presence of large manufacturing firms in rural areas, our findings shed light on the effects of industrial production on the structure of agrarian economies. This paper provides some of the first empirical evidence for the role of land rezoning in triggering the structural transformation of an agrarian economy and has important implications for the spatial distribution of economic activity in India (Desmet et al., 2015; Amirapu et al., 2019).

The remainder of the paper is organized as follows. In Section 2 we give background details on land-use regulations and IAs in Karnataka. Section 3 presents our data sources and empirical specification. Section 4 presents our results and we conclude in Section 5.

2 Background

In the last twenty years, industrial production in India has increasingly shifted from urban to rural areas, with a disproportionate share of this movement accounted for by firms in the formal sector (Ghani et al., 2012). This trend towards rural production has been impeded, however, by a variety of rules and regulations limiting the use of agricultural land for nonagricultural activities (Morris and Pandey, 2007).⁴ The IA policy represents one of several tools and approaches that state governments have employed for overcoming these barriers. We first provide information on land-use policies, and then discuss the industrial areas programs in more detail.

2.1 Land-use in Karnataka

Karnataka's land-use rules were laid out in the Karnataka Town and Country Planning Act (hereafter, KTCPA) of 1961. Though a variety of amendments have been made to the the Act, the principal rules persist with only minor modifications. Land-use rules can be summarized as follows.

First, the KTCPA invokes the national Land Acquisition Act to establish the power of the state to acquire land as deemed necessary for the purpose of planning and development. To ensure fairness for landowners, an amendment was made to this rule requiring that compensation for any acquired land be based on market value on the date of publication of improvement or development schemes. In addition, the government must provide a "grant of solatium", increasing the compensation by 15% in the light of the compulsory nature of acquisition.

Second, the KTCPA also references the national Land Revenue Act in stipulating that permission must be obtained from the Deputy Commissioner in order to use agricultural land for non-agricultural purposes, and defines the fees for land-use conversion. This act reflects the power of the state in determining if the change of land-use is to be granted. However, given the political economy of India, where agricultural interests are fiercely protected, such changes in land-use are difficult to achieve, even for large businesses.⁵ In addition, the associated fees and taxes can represent a substantial cost to small- and medium-size businesses, discouraging them from pursuing a change in land-use.

⁴The common All-India Law for Preservation of the Agricultural Lands, instituted at the time of independence (1947) and revised several times since, places numerous restrictions on the transfer of agricultural land to a non-agriculturist, where the latter is defined as an individual not involved in the cultivation of crops and lacking family ties to agriculture. However, the transfer of land and the changing of land usage is strictly under the jurisdiction of state governments, giving states significant power to acquire land but by compensating owners in a fair manner and using it for various non-agricultural projects.

⁵A recent, well-publicized example of these hurdles was the failure by Tata to secure land for a major production plant in the state of West Bengal.

Finally, the KTCPA states that there is no need for change of land-use if the new economic activity is undertaken by the current land owner, and the original economic activity also continues to occur. For example, if a farmer wants to establish a small mechanic shop on a share of his agricultural land, then this would be permitted. These rules, therefore, establish a land-use regime in which the greatest regulatory friction arises from the conversion of agricultural land to non-agricultural activities, with allowances made for small-scale, non-agricultural economic activities undertaken by farmers/dwellers. This feature of the land-use regulations will be important for interpreting the results presented later.

2.2 Industrial Programs and IAs in Karnataka

Since independence, the Indian government has played a large role in shaping the economy via various industrial policies. The main objective of these policies is to provide regulations and procedures for the development and management of industrial undertakings throughout the country, with close control over the respective roles of the public and private sectors. One approach to promoting industrialization has been through the creation of a variety of Industrial Estates (IE), a general label subsuming a number of place-based policies. Included in this are: IAs, export processing zones (EPZs), special economic zones (SEZs), and industrial parks and complexes. The various types of of IEs differ according to their economic objectives, the incentives offered, and the economic activities they promote.

These programs began in 1955 with the founding of the first IE in Rajkot, Gujarat,⁶ and soon spread to the other states of India. Competition between states has led to a broad convergence over time in industrial policy, with most states providing similar promotions and incentives.⁷ Despite the relative uniformity of industrial policy, however, the execution and implementation of policy has been far more uneven, and may have contributed to the extreme regional imbalances that characterize industrial production in India.

In this paper, we study the effects of IAs in Karnataka between the years 1991–2011. IAs represent one of the industrial policies pursued by the state, relying primarily on the operation of market forces, with mainly regulatory support from the state government via rezoning the land use from agriculture to non-agriculture activities. During 1991–2011, there are 47 IAs, and after our sample period until 2016, there are additional 18 IAs. The spatial distribution of IAs can be seen in Figure A1, as well as their relation to census towns, major

⁶Industrial Estates were not an Indian innovation, but were instead borrowed from the British, and had indeed long existed in various forms in the advanced, industrial economies. These would include such areas as IAs, parks, zones, districts, and so on, all of which refer to geographical units set aside for primarily industrial activity, though with significant variation in terms of incentives offered across various types of industrial estates as well as across countries.

⁷As noted by Saez (2002), the inter-jurisdictional competition between states of India is not only in terms of implementing industrial policies but is pervasive on various dimensions and primarily stemming from the economic liberalization policies of 1990s in India.

roads, and geographic features.

A central challenge in this program is to determine a suitable site for the IA, the responsibility for which lies with the Karnataka Industrial Areas Development Board (KIADB). Selection of the site is based on a few criteria that includes the presence of suitable infrastructure, proximity to towns, and the promotion of backward areas. Once a site has been selected, the government uses the Land-Acquisition Act to acquire land from the current owners and re-zone the area to allow industrial activities. The plot is then equipped with basic utilities and infrastructure, including power and recycling facilities; and then leased or sold to firm owners.

The principal benefit for firms is that the re-zoning of land by the state obviates the need for individual firms to engage in the costly and time-consuming efforts necessary for identifying a suitable plot of land, and securing the necessary approvals for converting it for non-agricultural activities.

3 Empirical Approach

We begin by describing the data used in this study (Section 3.1). We then present a semiparametric analysis, and discuss how this guides our empirical specification (Section 3.2). We provide evidence for the validity of our research design based on trends in baseline characteristics (Section 3.3); as well as through the use of an event study using light density (Section 3.4).

3.1 Data

Our analysis employs several sources of administrative data. The Karnataka Industrial Areas Development Board (KIADB) provides us with the year and location in which each IA was set up. We match the information on these IAs to the Economic and the Demographic Censuses at the village-level. The Economic Census of India is a complete enumeration of all economic establishments except those engaged in non-commercial crop production, and includes both formal and informal firms irrespective of firm size. The Economic Census provides us with village-level information on the number of firms, number of workers, social caste and gender of firm owners, and the industrial classification of firms. We use the Economic Censuses for the years 1990 and 2013. The Demographic Census provides us with village-level information on the shares of the population working in agricultural and non-agricultural sectors, literacy rates, and public goods (paved roads, banking facilities, etc.). We use the Demographic Censuses of 1991 and 2011. We also make use of night-time lights data at the village level. The satellite data on night-time lights are collected by the National Aeronautics and Space

Administration's (NASA) Defense Meteorological Satellite Programs Operational Linescan System (DMSP-OLS) via a set of military weather satellites that have been orbiting the earth since 1970. In the night-time lights data, each pixel is encoded with a measure of its annual average brightness on a 6-bit scale from 0 to 63. The night-time light data covers the years 1993–2013.

3.2 Empirical Specification

Our primary empirical strategy for identifying the direct effects and spillovers of the IAs is based on a difference-in-differences design. We first estimate the direct effects of IAs, and then estimate the associated spillovers. The unit of analysis is the village, denoted by v at time t, where $t \in \{1991, 2011\}$ for variables from the Demographic Census, and $t \in \{1990, 2013\}$ for those from the Economic Census. The regression is specified as:

$$y_{v,i,t} = \alpha + \beta (IA_v \times post_t) + (post_t \times X_v)\Gamma + \delta_i \times post_t + \eta_v + \varepsilon_{v,t}.$$
 (1)

The subscript *i* indicates the IA to which village *v* is closest. IA_v is a dummy variable indicating that village *v*'s boundaries overlap with those of an IA, and $post_t$ is a dummy taking a value of 1 for t = 2011. X_v is a vector of baseline controls, described below. η_v denotes village fixed effects. Our dependent variable, $y_{v,i,t}$, captures various economic outcomes at the village level, including firm and labor market activity and night-time light density. We also include time-interacted IA fixed effects ($\delta_i \times \text{post}_t$) for the IA to which each village is closest, so that identification is based on comparisons of growth in villages which are proximate to the same IA. Standard errors are clustered at the village level, in order to account for serial correlation in unobservables.

The location identifier in the economic census gives the village in which a firm is located, but does not indicate whether the firm is located within an IA. To identify firms located within the IAs and those located in nearby villages, we use maps which show the boundaries of each village and IA. Villages whose boundaries overlap those of an IA are assigned a value of 1 for the IA_v indicator (treatment village), and all other villages are assigned a value of 0. Since spillovers to nearby areas would contaminate our control group, we make use of the high spatial resolution of our data to identify economic spillovers to neighboring areas, and then exclude these villages from the control group.

We therefore estimate the difference-in-differences specification as above, but account for distance semi-parametrically through the inclusion of indicator variables denoting disaggregated distance intervals from the IA, each of which is interacted with the *post* indicator:

$$y_{v,i,t} = \alpha + \sum_{j=1}^{n} \beta_j (1[dist_v \in bin_j] \times post_t) + (post_t \times X_v)\Gamma + \delta_i \times post_t + \eta_v + \varepsilon_v.$$

$$(2)$$

We estimate and plot the β_j coefficients and 95% confidence intervals for the *distance* × *post* interaction terms from this exercise, with villages 15–20 kms from the IA as the omitted group. Figure 1 presents these coefficients.

This figure gives important insights that guide our empirical estimation. First, there is a large and statistically significant increase in light density, as well as the (log) number of firms and workers within the IAs. We also observe that there are (monotonically declining) spillovers at distances up to 5 kms away for most of our outcome variables. We therefore use as the control sample villages located more than 5 kms from an IA, and include separate indicator variables for villages located (0-5] kms away from the IA in order to capture spillover effects. Our primary spillover specification includes indicator variables for villages whose boundaries overlap those of the IA ("within IA"), as well as for villages at distances of (0-1], (1-2], (2-3], (3-4], and (4-5] kms. In alternative specifications, we group together all villages within (0-5] kms using a single "spillover" indicator.

As noted above, we lack information on the precise location of firm activity, which leads us to attribute some of the spillovers induced by the IA in adjacent areas to the IA itself. This means that the indicator variable for distances of (0-1] kms will be an underestimate of the true magnitude of the immediate spillover from the IA. Once we have established the disaggregated spillovers over the distance bins, we present the remaining results aggregating the spillover villages into a single "spillover" variable.⁸

Table 1 presents summary statistics for village-level baseline characteristics of our sample, disaggregated by treatment status of the village. Column (1) gives the mean level of the indicated variable in control villages; and Column (2) gives the difference between treatment and control villages, estimated using a regression of the indicated variable on a dummy for IA villages. Column (3) includes IA fixed effects. The results show that the two samples are quite similar, with the exception of two variables (distance from nearest town and light

$$y_{v,t} = \alpha + \sum_{j=1}^{2} \beta_j (1[dist_v \in bin_j] \times post_t) + (post_t \times X_v)\Gamma + \delta_i \times post_t + \eta_v + \varepsilon_v.$$
(3)

⁸The aggregate spillover specification is simply a variation of specification 2 with 2 bins of 0 (j = 1), (0-5] (j = 2):

density), which are controlled for in all specifications in addition to other control variables.

All specifications include a battery of control variables and their interaction with time dummies. The list of control variables includes: IA site selection variables (paved roads, rail-way stations, post office or telephone, light density,⁹ the percentage of land that is forested, and quadratic terms in distance to the nearest town and distance to IAs established before the study period);¹⁰ and variables correlated with potential growth (log population, the presence of a primary school, the share of male workers employed in non-agricultural wage labor, and the share of the population that belong to the scheduled castes).

3.3 Parallel Trends

The study period covers the years 1991–2011. We lack data from the years prior to the study period (i.e., in the 1980s) at the village-level, preventing us from showing balance on trends. To more forcefully argue that IAs weren't simply being established in areas with higher levels of baseline growth, we test the parallel trends assumption for IAs established between 2001–2011, for which we are able to use data from the 1990s in order to generate pre-trends. The results of this exercise are shown in Table 2. In column (1) we report the mean of the trend in the control sample, which includes all the villages which are more than 5 kms from the nearest IA. In column (2) we present the difference in trends between control and treatment villages, estimated using a regression of the indicated variable on a dummy for IA villages, controlling for distance to 1991–2001 IAs. In column (3) we include IA fixed effects. The reported coefficients show that we are unable to reject equality of trends for most variables of interest, including the principal outcome variables (firms, enterprises, light density, and labor force composition). This substantially increases our confidence that IAs are not simply being established in areas with higher levels of pre-existing growth.

3.4 Event Study

An important limitation of our empirical approach is that the temporal resolution of the data is generally insufficiently fine-grained to demonstrate that the creation of the IA precedes the growth in economic activity observed at the end of the study period. To better establish that the treatment indeed precedes the economic effects of the intervention, we conduct an additional test for parallel trends using data for night-time light density, which is available for multiple years prior to the establishment of IAs, and which has been shown to be a useful

 $^{^{9}}$ We use light density rather than a binary grid connectivity variable, as virtually all villages were electrified at baseline. More importantly, we drop this variable from the list of controls while using nightlight density as a dependent variable.

¹⁰These control variables are guided by the factors mentioned in the KIADB manual for potential areas for establishing the IAs.

proxy for economic activity.¹¹ Specifically, we use an event study framework comparing trends in night-time light density across control and treatment villages before and after the establishment of IAs.

For this purpose, we run the following regression:

$$y_{v,z} = IA_v \left(\sum_{j=-8}^{-2} \beta_j \mathbf{1}[z=j] + \sum_{j=0}^{4} \beta_j \mathbf{1}[z=j]\right) + \left(\sum_{j=-8}^{-2} \lambda_j \mathbf{1}[z=j] + \sum_{j=0}^{4} \lambda_j \mathbf{1}[z=j]\right) +$$
(4)
$$\eta_v + \delta_t + \varepsilon_v,$$

where $y_{v,z}$ is the night-time light density in village v at time z, and z indicates the timing relative to the creation of the nearest IA. For each village, the time since the establishment of IA is based on the year in which the nearest IA was established. IA_v is a dummy indicating that a village overlaps the boundaries of the IA. Village fixed effects (η_v) and year fixed effects (γ_t) are included.

In Figure 2, night lights show no differential trends prior to the establishment of the IA, but then begin to grow rapidly within 1–2 years after the IA's establishment. Figure 3 conducts a similar exercise for the purpose of identifying "spillover" effects, with treatment villages defined as those located outside of, but less than 5 kms from the IA. The increase in light density again occurs only after the establishment of the IA, and is of far smaller magnitude. The light-density patterns clearly demonstrate that the creation of IAs occurs prior to the take-off of local growth, and that there are no differential trends prior to the policy intervention.

As an additional strategy for ruling out the possibility of IAs being sited in areas with higher underlying growth, we use villages where IAs were established in 2012–2015—i.e., *after* the study period—as a placebo treatment group, akin to the approach used in Busso et al. (2013). In Figure 4, we show the evolution in light density separately for villages in which the IA was established in 1991–2011 and 2012–2015, respectively, where the control group consists of other villages within the same district located more than 5 kms from an IA. As is apparent, the growth in light density occurs only for IAs established during the study period, 1991–2011. In Appendix Figure A3, we plot the difference between these two coefficients using a triple-differences regression, and disaggregate the treatment sample into IAs created earlier (1991–1997) and later (2005–2011) in the study period.¹² This exercise demonstrates clearly that the timing of the divergence in night-light trends corresponds to

¹¹Henderson et al. (2012), Hodler and Raschky (2014), Michalopoulos and Papaioannou (2013), and Storeygard (2016) use night-time lights data as a proxy for economic development in contexts where income data is unavailable or of low quality; and Pinkovskiy and Sala-i Martin (2016) show that night-time light density is a robust proxy of economic activity.

 $^{^{12}}$ We drop 1998–2005 IAs from Figure A3 because, as shown in Appendix Figure A2, the number of IAs established in this time period is very small, and do not provide enough data for this exercise.

the timing of the IAs' creation.

4 Results

To estimate the direct treatment and associated spillover effects of the IAs, we estimate difference-in-differences regressions using specifications 1 and 2. Based on the patterns observed in Figure 1, we henceforth use all villages more than 5 kms from the IA as the control group. In section 4.1 we present the treatment effect of the IA on the villages in which the IA is located (denoted by "within IA"); and in section 4.2 we present the results for both treatment and spillover effects, where spillovers are estimated at intervals of (0-5] kms from the IA boundary.

4.1 Impact within IAs

Our baseline results for the direct effects of IAs is presented in Table 3. The outcomes of interest are night-light density, the number of workers, and the number of firms. In addition, because the IA policy sought to attract large firms, we also estimate the effect of IAs on the number of firms by firm size, which is measured by the number of workers employed (columns (4)-(6)). Due to the high incidence of zeros for several of the outcomes of interest, particularly night-time light density and the number of medium and large firms, we present the results in both levels (panel A) and logs (panel B).¹³

The baseline regression shows that the IAs have been associated with an increase in light density, the number of workers employed by firms, and the number of firms in villages overlapping the IA. In particular, the results show a 47% percent increase in night-light density, 367 additional workers and approximately 13 additional firms (though it is imprecisely estimated) in villages that overlap the IA. The results are consistent when using levels and logs, though the use of logs generally yields more precisely estimated coefficients.¹⁴ We also find an increase in the number of firms employing more than 99 employees within the IA: for every three villages overlapping an IA, two villages will have a firm of such a size. There is also substantial growth for medium- and small-sized firms, though the latter is only statistically significant when measuring the outcome in logs.

The foregoing analysis makes use of time-interacted IA fixed effects. We also estimate alternative specifications including time-interacted district fixed effects: the results are given in column (2) and (6) of Appendix Table B1. In columns (3) and (7) we restrict the sample

 $^{^{13}}$ When the outcomes variables are logged, the variable is transformed to 1+variable so as to avoid omission of observations due to zeros.

¹⁴When using logs, it should be noted that the effect represented by the estimated β coefficient is more precisely interpreted as a exp^{β} % change.

to villages within 5–15 kms of the nearest IA; and in columns (4) and (8) we restrict the sample of both IAs and the control group to villages more than 10 kms from a large town. The results presented are largely unaffected by these alternative fixed effects and sampling strategies.¹⁵

Finally, in order to address the possibility that the results are driven by unobservables, we estimate a triple differences regression using IAs created after the study period (2012–2015) as a placebo treatment group. The results are given in Appendix Table B3. As with the results for light density (Figures 4 and A3), we find that the triple differences estimation yields results strikingly similar to those of our baseline specification, lending further support to the results shown previously. Due to the relatively small sample of post-2012 IAs, many of which were located proximate to 1991–2011 IAs, the results of this exercise can only be taken as suggestive, and we refrain from using this empirical strategy throughout the paper.

4.2 Local spillovers

In this section, we present the results for the spillover effects to the neighboring villages. To do so, we estimate specification 2 for each of our three outcome variables and present our results in Table 4 and 5.

Table 4 presents the results for night-light density. In column (1) the outcome variable is light density measured in levels, and in column (2) in logs. For the log regressions, we take the log of 1 plus the light density in order to deal with the large number of observations taking a value of zero. There is a statistically significant increase in light density within the IAs, with a level increase of 11.5, and a log increase of 0.38. This increase in light density extends out for several kms from the IAs when measured in levels; but when measured in logs shows more ambiguous effects. In column (3), we limit the sample to observations that lacked light at the baseline, and take as the outcome an indicator taking a value of 1 for any light. In columns (4) and (5) we limit the sample to villages that had light at baseline, and measure the outcome in levels and logs. These specifications give us similar results to those including the full sample of villages.¹⁶

In Table 5, we estimate the spillover effects for workers and firms in columns (1) and (2), respectively. As before, we see substantial increases in the number of firms and workers within the IA. In addition, we find that there are spillovers in both variables up to a distance of 4 kms from the IA. The spillovers are smaller than the direct effect of the IA, and are declining with distance. In addition, it should be re-iterated that the closest spillover, (0-

¹⁵In Appendix Table B2 we undertake a similar exercise using as the outcome small (<10 workers), medium (10–99 workers), and large (>100 workers) firms.

¹⁶In results not shown, we also estimate specifications using the inverse hyperbolic sine transformation instead of log transformation, and find similar results.

1] kms, is likely an underestimate, as the within-IA effect is capturing economic activity occurring in villages overlapping the boundaries of the IA, and not within the IA itself.

In columns (3)–(5) we estimate the spillover effects for firms by the size of employment. The size distribution of newly created firms illustrates both the efficacy and limitations of the IA program. The vast majority of the employment generated within the IAs occurs within the largest firms, as intended by policy makers. Outside the IAs, however, all growth occurs for firms with a small number of employees, with little evidence of an increase in the number of firms employing more than 10 employees. The lack of growth in medium and large firms outside the IAs is consistent with the barriers to undertaking non-agricultural economic activity that motivated the creation of the IAs. Smaller firms, in contrast, are permitted to operate within homes and other small buildings, and are not required under the KTCPA act to secure alterations of land zoning as is necessary for larger enterprises.

In Appendix Table B4 we look at the number of workers in firms within each firm-size category. Within the IA, there is an increase of 238 workers per village in firms with more than 99 employees, 88 workers in firms with 10–99 workers, and 47 workers in firms with fewer than 10 workers, though the latter is statistically significant only when measured in logs. Outside the IAs, however, job growth is driven entirely by employment in small firms. Furthermore, as seen in Appendix Table B5, most of the new firms in this size category have just 1 or 2 employees.

We next explore the effects of the IA on labor markets. For this exercise, we use the demographic census, which gives the occupations of individuals living within villages. One key constraint in this analysis is that the 1991 and 2011 censuses have different disaggregation of occupations. While both include agricultural labor and cultivation, as well as household-based business, the 2011 census aggregates together all other non-agricultural occupations outside the household, which in the 1991 census are disaggregated into eight categories.¹⁷ We therefore aggregate all these occupations for the 1991 census, and label this as "non-agricultural wage labor," though it may include both salaried employment and forms of labor receiving in-kind compensation.

Table 6 gives the effects of the IAs on labor market outcomes, disaggregated by gender. The labor market variables are the share of workers in the agricultural and non-agricultural sectors (in columns (1)–(2) for men and columns (3)–(4) for women). The IAs are associated with a 13.8 percentage point increase in male non-agricultural wage labor, and a 15.1 percentage point decline in agricultural labor. There is also a 8 percentage point increase in men working as non-agricultural wage laborers just outside the IA, and 3–6 percentage increase at distances up to 5 kms. Appendix Figure A4 depicts these results using a semi-parametric

¹⁷These include: livestock, forestry, and fishing; mining and quarrying; manufacturing and processing; construction; trade and commerce; transportation, store, and communication; and other.

specification.

Female labor force participation was also affected, with a 12.9 percentage point increase in the share of female workers engaged in non-agricultural wage labor within the IA, and a 13.2 percentage point decline in those engaged in agriculture. There is also a spillover effect just outside the IA up to a distance of 1 km, but there are no spillovers at distances further away.

Interestingly, we see in Appendix Table B6 that the reduction in agricultural employment is driven primarily by a reduction in the share of workers cultivating land they own or rent (column 2), with only a small decline in the share of individuals working as agricultural wage laborers (column 3).

4.3 Heterogeneities

In order to shed light on the mechanisms driving the results, we next turn to a heterogeneity analysis based on firm and village characteristics. A substantial literature posits that spillovers of the type observed above may be driven by either agglomeration economies or demand-side factors. By examining the *types* of firms arising in areas outside the IA, we may shed light on whether demand- or supply-side factors are at play. Heterogeneities according to village characteristics—such as the education of the work force, infrastructure quality, and the availability of credit—may also help to shed light on the mechanisms driving spillovers. Finally, there may also be important social aspects to the spillovers, as disadvantaged segments of society may be be less able to take advantage of the new economic opportunities, or alternatively may benefit for disruptions to existing patterns of production. We explore these questions in detail in the following sections. It is important to note, however, that this analysis should be taken as only suggestive, due to the lack of exogeneous variation in the variables of interest.

4.3.1 Firm characteristics

Table 7 shows the effects of the IAs disaggregated by the sector of firms. Results are again given in both levels and logs. The outcome variables are the number of firms in manufacturing, commercial agriculture, retail, restaurants, transport, food processing, finance, and storage, respectively. Manufacturing shows large increases both within the IA and in nearby areas, of which approximately half are food processing firms. Commercial agriculture shows increases both within IA villages and in nearby villages, though the effect is statistically significant only when measured in logs. Retail, restaurants, and transport show increases in IA villages and in spillovers villages (though the within-IA effect is measured imprecisely when in levels). Finally, we see an increase in storage firms within IAs, but no change outside the IA. It is important to reiterate that the the "within IA" effects will conflate economic activity occurring within the IA and economic activity occurring in villages whose boundaries overlap those of the IA. This would imply, therefore, that the within-IA increase in service sector firms such as retail, restaurants, and transport are likely due to firms being established adjacent to the IAs.

The small size of the firms being created outside the IAs (Tables 5 and B5), and the preponderance of agricultural and service sector firms, suggests that the spillovers are not being driven by agglomeration economies. The growth in retail, restaurants, and transport is better accounted for by the increase in demand for such services from the workforce employed within the IAs. The growth in agricultural and small manufacturing (i.e., food processing) firms is more ambiguous. One plausible explanation is that these results are being driven by the relaxation of local credit constraints. More specifically, given pervasive credit constraints in rural India, the income earned by workers in IAs may enable previously credit-constrained households to open firms. To make further progress in understanding the mechansisms driving these spillovers, we next look at the mediating effect of characteristics of the local economy.

4.3.2 Village characteristics

In Table 8, we explore the effect of baseline village characteristics on the effects of IAs on firms and workers in the local economy. Here we focus on three factors: literacy, presence of banks, and paved roads. Literacy is measured using an indicator taking the value of 1 where literacy rates are above the median at baseline, while banks and paved roads are captured with indicator variables taking a value of 1 when these are present in the village at baseline. Each of these is interacted with the distance indicators and the post variable, as well the interaction of the post and distance indicators (*post* × *distance*). To control for correlations between the variables, we include all the interacted terms in a single regression.¹⁸ In columns (1)–(3) the outcome is the log number of workers, in columns (4)–(6) the log number of firms, and in column (7)–(9) the share of male workers in non-agricultural employment. The results for individual regressions are displayed across three columns, with each column giving the coefficients from the interaction of the *post* × *distance*). For example, columns (1)–(3) come from a single regression with log firms as the outcome, and the three columns give the coefficients of the *post* × *distance* terms interacted with literacy, banks, and paved roads, respectively.

Literacy rates above the median are associated with a higher rate of firm creation in

¹⁸Because each of these variables might be correlated with the population size, we always include interactions of the latter (logged) with the treatment variables and time dummies (i.e. post \times distance \times log(population)).

spillover villages, consistent with models stressing the correlation of human capital and entrepreneurship (Lucas Jr, 1978; Moretti, 2004). We also find that the presence of banks at baseline is associated with a smaller spillover effect. This is consistent with a credit channel, whereby previously credit-constrained households are now able to use the income from factory jobs to finance the creation of new businesses. Finally, we find that the presence of paved roads is associated with higher employment growth in spillover villages. In contrast, there is little evidence that village characteristics play an important role in mediating the labor market effects of the IAs.

4.3.3 Financing

To shed further light on the role of credit access in driving the effects of the IA, we next explore the sources of financing for newly created firms. The vast majority of firms in Karnataka rely upon self-financing (69 percent), with only 3 percent receiving bank financing, and 17 percent government financing.¹⁹ Because the increase in firms was larger where banks were absent, we would expect that the increase in firms would consist primarily of self-financed firms. However, the government may have provided additional support to local firms in order to strengthen the efficacy of the IAs, or private lenders may have become more active in areas with IAs.²⁰

To assess the relative importance of these various sources of finance, we again estimate specification 2, using as the outcome the (level and log) number of firms using different sources of credit.²¹ These results are given in Table 9. We find that the vast majority of newly created firms are self-financed, with some evidence for bank-financing in firms located within IAs.²²

These findings are consistent with the thesis advanced previously, that the growth in firms is driven in part by the relaxation of credit constraints due to additional income from new employment opportunities within the IAs. It is likely that demand channels also contribute to the increase in firms—particularly for firms in retail and restaurant—as the higher incomes from manufacturing employment are used for the consumption of locally produced goods and services.

¹⁹Authors' calculations, using the Economic Census data.

 $^{^{20}}$ Most commercial banks in India are owned by the government, which supply most of the credit in the country.

 $^{^{21}}$ Because we do not have information on the source of firm financing for 1990 census, we use the 1998 measures for the baseline.

 $^{^{22}}$ In results not shown, we find that it is the largest firms that receive bank financing, with smaller firms being generally self-financed.

4.3.4 Social ownership

We next examine whether the economic effects documented in this paper have been socially inclusive. In India, many state programs include explicit policies to encourage the participation of minority groups and vulnerable populations, lest existing social exclusions be perpetuated in the program's implementation. Because the IA program lacked any such targeting for marginalized groups, it is interesting to know whether members of these communities benefited. We therefore examine the effect of the IA program on two particularly salient marginalized communities: women and scheduled castes (SC). The results are given in Table 10.

Panel A shows the results for female-owned firms. In columns (1) and (2), the outcome variable is the number of firms owned by women and the number of employees working for firms owned by women, respectively; while in columns (3) and (4) these variables are taken in logs. We find that there is a substantial increase in female-owned firms and employment in such firms, both within IAs (41% and 57%, respectively) and in spillover villages (24% for both variables).²³ However, the coefficients for within-IA effects are only marginally significant; and the within-IA and spillover effects for employment in female-owned firms is always insignificant when measured in levels.

Panel B shows the estimated effects of IAs on SC-owned firms and employment. SC firm ownership increased by 4 firms within the IA (58%), and by approximately 1.3 firms per village up to 5 kms away (23%). The increase in the number of workers at SC-owned firms is approximately 8 per village within the IA (71%), and 3 workers per village up to distances of 5 kms (26%).

5 Discussion and Conclusion

Our findings indicate that the IA program has been remarkably effective. Despite the overwhelmingly agricultural structure of the economy, low levels of human capital, and the relatively modest policies included in the program, IAs led to large increases in the manufacturing work force. In addition, the program triggered a broader restructuring of the local economy, with workers up to 4 kms away shifting from agricultural to non-agricultural employment, and agriculture itself being increasingly commercialized. A back-of-the-envelope calculation suggests that each IA was responsible for the creation of approximately 1000 jobs

 $^{^{23}}$ The 1990 economic census excluded information on female firm ownership, preventing the use of the difference-in-difference estimator with 1990 as the baseline. We therefore estimate a difference-in-differences using 1998 and 2013 as the two time periods. In an alternative specification not presented, we also simply use the cross-section of 2013. In both exercises the estimated coefficients are relatively consistent.

in the villages overlapping the IA, and another 635 jobs in the villages near the IA.²⁴ It also led to 685 local workers leaving agriculture employment and entering the manufacturing and service sectors.

To contextualize these effects one would require data on wages and output, which is unavailable at the village level. However, night-time light illumination serves as a useful proxy for aggregate village-level income, allowing us to provide a rough estimate of the aggregate increase in economic activity caused by the IAs.²⁵ In the spirit of this observation, we estimate a back-of-the-envelope calculation of the effects of IAs on GDP using the percentage change in light coverage. We first note that the mean increase in light density in the control villages during the years 1993–2013 was 5.4. If we assume a linear relationship between light density and GDP growth, this would imply that growth within the IAs was approximately two times higher than it would have been absent the IAs (i.e., 11.55/5.4); and was approximately 18.5% higher in areas affected by spillovers from the IAs (i.e., 1/5.4).²⁶

The increase in income is accompanied by an accumulation of assets. In Appendix Table B7 we find evidence for an increase in television, scooter, and bicycle ownership up to 5 kms from the IA, suggesting that households have used the additional income to purchase consumer durable goods.²⁷

We also shed light on some of the heterogeneities at play in the pace of structural transformation. Most conspicuously, we find that the absence of banks is associated with the largest increase in entrepreneurship in areas surrounding the IAs, suggesting that credit constraints had previously played a role in suppressing entrepreneurship. In addition, we find that firm creation is largest in villages with higher literacy rates, pointing to the importance of education for entrepreneurship. Interestingly, there is no evidence that baseline literacy rates were important for labor force outcomes. Finally, the shift to commercial agriculture despite a decline in the agricultural labor force highlights the role of industrialization in triggering the modernization of the agricultural sector, as long posited by development economists and economic historians.

One important criticism of such land acquisition policies is that they entail the forced displacement of agricultural labor, which may be counter to the interests of the local community. In results not shown, we find some validation for these concerns, with villages overlapping the IA experiencing an 18 percent decline in cultivated land. However, a significant share of

 $^{^{24}}$ This calculation is based on our estimated coefficients for the within-IA and the disaggregated distance bins (in Table 5) multiplied by the average number of villages in each of the specified distance bins.

²⁵ Pinkovskiy and Sala-i Martin (2016) note the close correspondence between the percentage increase in GDP and the percentage increase in light density in India.

²⁶For these calculations, we employ our estimated coefficients for light density in Table 4, and the number of villages in each of the specified spatial bins, while omitting the last bin of 4–5 kms.

²⁷These estimates are based on a single cross-sectional regression using data from the 2011 Economic Census, as these variables were not collected in earlier years of the census.

this decline is likely due to a voluntary shift out of agriculture, as villages close to the IA, and not subject to any acquisition from the state, also experience 7-9 percent declines in cultivated land.²⁸

Though the IA program has proven successful, there are two findings that point to some of the limitations of conducting industrial policy in rural areas, at least in the short run. First, the number of individuals employed by firms within the IAs exceeds the number of workers from nearby villages reported in the Demographic Census as being employed at such firms. This means that the new firms are drawing a large share of their employment from outside the local labor markets. Though this may indicate that the local population lacks the skills necessary for such employment, it is equally plausible that the new manufacturing jobs simply offer an insufficient wage premium for drawing more workers out of agriculture.²⁹

Second, it is striking that the growth of medium- and large-sized firms is limited to the IA itself. Outside the IAs, firm growth occurs only for firms with small labor forces (generally 1 or 2 workers), which are able to operate even under existing land-use regulations.³⁰ This suggests that the continuing presence of land-use regulations outside the IAs has prevented the IA program from creating the agglomeration economies that might catalyze a more thoroughgoing transformation of the local economy.

The success of the IA program suggests that the extensive agricultural zoning found throughout India, though ostensibly protecting the interests of agriculturalists, ultimately comes at the expense of economic development. This program should be seen as complementary to more traditional policies facilitating the movement of labor to economic opportunities in urban areas (Kline and Moretti, 2014b), such as road construction (Asher and Novosad, 2019), investments in human capital, and improved urban governance. Given India's substantial frictions in labor mobility (Topalova, 2010; Munshi and Rosenzweig, 2016), however, and the relatively slow pace of urbanization, the IA program represents an attractive approach to achieving the structural transformation of the economy.

 $^{^{28}}$ These numbers come from specification (2) with acres of cultivated land (from the Demographic Census) as the outcome variable.

²⁹See Blattman and Dercon (2017) on the inadequacy of the manufacturing wage premium to offset the disamenities of manufacturing employment for a substantial share of workers in the informal sector.

³⁰As mentioned previously, agricultural households are free to engage in non-agricultural activities on a share of their land, so long the primary use of the land remains agricultural.

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Figure 1: Effects of IAs on Firms and Workers

1.3: Workers

Notes: Figure 1 plots the coefficients of the distance-post interaction terms $(\beta_{1,j}(1[dist_v \in bin_j] \times post_t \text{ where } j \text{ is each distance bin})$ from the difference-in-differences regression given in Specification (2). In Figure 1.1 the outcome is the level of light density, in Figure 1.2 the outcome variable is (log) number of firms, and in Figure 1.3 (log) number of workers. The x-axis measures the distance (in kms) of the village from the IA, where "0" refers to villages whose boundaries overlap those of the IA, and the omitted category is villages 15–20 kms from the IA. The dashed lines indicate the 95% confidence interval.



Figure 2: Event study using Light Density: Within IA

Notes: Figure 2 plots the coefficients for the interaction terms of the time indicators and indicators for areas that are within the IA. Dashed lines indicate 95% confidence intervals. Village and year fixed effects are included. The control group includes villages more than 5 kms from an IA. Error terms are clustered at the village level.



Figure 3: Event study using Light Density: Spillovers

Notes: Figure 3 plots the coefficients for the interaction terms of the time indicators and indicators for areas that are within 5 kms of the IA ("spillovers"). Dashed lines indicate 95% confidence intervals. Village and year fixed effects are included. The control group includes villages more than 5 kms from an IA. Error terms are clustered at the village level.





Notes: Figure 4 plots the coefficients for the interaction terms of the time indicators and indicators for areas that are within the IA in 1991–2011 (circles) and 2012–2015 (diamonds), respectively. The omitted year is 1993. Dashed lines indicate 95% confidence intervals. Village and year fixed effects are included. The control group includes villages more than 5 kms from an IA. Error terms are clustered at the village level.

| | $\operatorname{control}$ | | |
|--|--------------------------|---------------------|---------------|
| | mean | treatment | - control |
| | (1) | (2) | (3) |
| demographics | 0.410 | 0.100 | 0.050 |
| log population | 6.410 | -0.166 | 0.058 |
| | 0 109 | (0.133) | (0.125) |
| pct population Scheduled Caste | 0.193 | 0.052^{**} | 0.037 |
| | 0.497 | (0.025) | (0.023) |
| pct male literacy | 0.487 | (0.011) | -0.009 |
| not mole menlione non om | 0.020 | (0.023) | (0.010) |
| pet male workers, non-agr | 0.020 | (0.013) | (0.012) |
| pet male workers agr | 0.807 | (0.007) | (0.007) |
| pet male workers, agi | 0.807 | (0.012) | (0.012) |
| infrastructure (unrelated to IA sites) | | (0.021) | (0.025) |
| primary school present | 0.860 | -0.027 | 0.022 |
| primary school present | 0.000 | (0.033) | (0.022) |
| middle/high school present | 0.395 | -0.061 | -0.007 |
| inidale/ ingli seneor present | 0.000 | (0.037) | (0.034) |
| bus stand present | 0.670 | -0.087*** | 0.007 |
| bab biana probeni | 0.010 | (0.030) | (0.030) |
| communication facility | 0.672 | -0.085*** | 0.009 |
| | 0.01- | (0.030) | (0.030) |
| post office | 0.317 | -0.099*** | -0.030 |
| F | | (0.027) | (0.021) |
| telephone | 0.168 | -0.073*** | -0.015 |
| · · · · P · · · · · | 0.200 | (0.019) | (0.016) |
| economic indicators | | () | () |
| log employment | 3.573 | -0.239 | 0.141 |
| | | (0.198) | (0.133) |
| log firms | 2.965 | -0.217 | 0.126 |
| | | (0.163) | (0.098) |
| any enterprise >99 workers | 0.011 | -0.002 | 0.001 |
| | 0.051 | (0.005) | (0.005) |
| any enterprise 10–99 workers | 0.251 | -0.011 | 0.044 |
| | | (0.037) | (0.034) |
| and use | 0.120 | 0.002 | 0.004 |
| pet fand uncuntivated | 0.150 | (0.003) | (0.004) |
| net land waste | 0.115 | 0.010 | (0.007) |
| pet faile waste | 0.110 | (0.016) | (0.012) |
| pet cultivated land irrigated | 0 191 | 0.017 | (0.012) |
| por cultivator land imgator | 0.101 | (0.034) | (0.032) |
| pct land forest | 0.098 | -0.071*** | -0.029** |
| pet land lerest | 0.000 | (0.019) | (0.012) |
| infrastructure (related to IA sites) | | (0.010) | (0.0) |
| distance from town (kms) | 15.839 | -3.674^{**} | -4.433*** |
| () | | (1.478) | (1.264) |
| paved road | 0.645 | -0.076 [*] | -0.026 |
| - | | (0.039) | (0.034) |
| railroad | 0.008 | 0.007 | 0.007 |
| | | (0.007) | (0.006) |
| tap water | 0.179 | -0.016 | 0.036 |
| | | (0.026) | (0.027) |
| light density | 1.787 | 2.233^{***} | 1.578^{***} |
| | | (0.506) | (0.466) |
| IA F.E.s | | | Yes |

Table 1: Summary Statistics

Note: Column (1) gives the mean value of the indicated variable for control villages. Control villages are all villages more than 5 kms from the nearest Industrial Area (IA); treatment villages are those villages whose boundaries overlap those of the IA. The coefficients in column (2) come from a regression of the indicated variable on the treatment indicator. Column (3) includes industrial area fixed effects. *** p<0.01, ** p<0.05, and * p<0.1.

| | 2 2 | 2001–2011 IA | s |
|---|------------|--------------|--------------|
| | control | | |
| | mean | treatment | – control |
| | (1) | (2) | (3) |
| demographics (1991–2001) | . , | | |
| $\Delta \log population$ | 0.120 | 0.055 | 0.069 |
| | | (0.073) | (0.074) |
| Δpct population Scheduled Caste | 0.001 | -0.003 | -0.007 |
| | | (0.009) | (0.010) |
| Δpct male population literate | 0.118 | 0.039** | 0.031^{*} |
| | | (0.016) | (0.018) |
| Δpct male workers non-agr | 0.056 | 0.006 | 0.007 |
| | | (0.035) | (0.034) |
| Δpct male workers agr | -0.078 | -0.029 | -0.029 |
| | | (0.025) | (0.023) |
| infrastructure (unrelated to IA | sites) (19 | 991 - 2001) | |
| Δ primary school present | -0.027 | -0.137 | -0.125^{*} |
| | | (0.092) | (0.068) |
| Δ middle/high school present | 0.154 | -0.064 | -0.045 |
| | | (0.045) | (0.048) |
| Δ bus stand present | 0.055 | 0.071 | 0.016 |
| | | (0.067) | (0.071) |
| $\Delta \text{post office}$ | 0.014 | -0.008 | -0.016 |
| | | (0.043) | (0.045) |
| Δ telephone | 0.413 | 0.052 | 0.055 |
| | | (0.068) | (0.073) |
| economic indicators (1990–1998 |) | | |
| $\Delta \log employment$ | 0.030 | 0.075 | -0.036 |
| | | (0.170) | (0.145) |
| $\Delta \log \text{ firms}$ | -0.136 | 0.118 | 0.107 |
| | | (0.179) | (0.174) |
| Δ any enterprise >99 workers | -0.005 | -0.011 | -0.013 |
| | | (0.051) | (0.051) |
| Δ any enterprise 10–99 workers | -0.041 | 0.030 | 0.008 |
| | | (0.095) | (0.092) |
| land use (1991–2001) | | | |
| Δpct land uncultivable | 0.001 | -0.004 | 0.001 |
| | | (0.023) | (0.024) |
| Δpct land cultivable waste | -0.003 | -0.017 | -0.013 |
| | | (0.027) | (0.029) |
| Δpct cultivated land irrigated | 0.067 | 0.084 | 0.087 |
| | | (0.053) | (0.051) |
| Δpct land forest | 0.001 | 0.009 | 0.004 |
| | | (0.007) | (0.008) |
| infrastructure (related to IA sit | es) (1991 | .–2001) | |
| Δ paved road | 0.054 | -0.020 | -0.067 |
| | | (0.067) | (0.072) |
| Δ railroad | 0.003 | 0.024 | 0.024 |
| | | (0.019) | (0.020) |
| Δtap water | 0.349 | -0.102 | -0.109 |
| | | (0.100) | (0.110) |
| Δ light density | 2.220 | 0.379 | 0.262 |
| | | (0.657) | (0.688) |
| IA F.E.s | | | Yes |

Table 2: Balance on Trends

Note: Column (1) gives the mean values of the indicated variables for control villages. Control villages are all villages more than 5 kms from the nearest Industrial Area (IA); treatment villages are those villages whose boundaries overlap those of the IA. The coefficients in column (2) come from a regression of the indicated variable on the treatment indicator. Column (3) includes industrial area fixed effects. *** p<0.01, ** p<0.05, and * p<0.1.

| | | | | | firms | |
|-----------------|----------------|----------------|---------------|---------------|-------------|---------------|
| | light | | | numb | per of wo | rkers: |
| | density | workers | firms | > 99 | 10 - 99 | <10 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel A: Levels | | | | | | |
| within IA | 11.407^{***} | 367.298^{**} | 13.706 | 0.670^{***} | 2.935^{*} | 10.011 |
| | (1.239) | (144.146) | (13.478) | (0.255) | (1.681) | (11.955) |
| | | | | | | |
| R-squared | 0.887 | 0.529 | 0.846 | 0.584 | 0.674 | 0.843 |
| Ν | 44210 | 35886 | 35886 | 35886 | 35886 | 35886 |
| Panel B: Logs | | | | | | |
| within IA | 0.472^{***} | 1.029^{***} | 0.677^{***} | 0.254^{***} | 0.321^{*} | 0.578^{***} |
| | (0.072) | (0.271) | (0.175) | (0.084) | (0.164) | (0.155) |
| R-squared | 0.897 | 0.819 | 0.839 | 0.614 | 0.717 | 0.843 |
| N | 44210 | 35886 | 35886 | 35886 | 35886 | 35886 |

Table 3: Effect of IAs on Outcomes

Note: Regression results are coefficients of the distance \times post interaction terms from the difference-in-differences regression given in Specification (1). Panel A takes the outcome variables in levels, and Panel B in logs. A vector of timeinteracted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included, as well as nearest-IA fixed effects interacted with time dummies. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

| | full sa | mple | 0-light | > 0 1 | ight |
|---------------------|----------------|---------------|---------------|----------------|---------------|
| | level | log | any | level | log |
| | (1) | (2) | (3) | (4) | (5) |
| | | | | | |
| within IA | 11.553^{***} | 0.387^{***} | 0.017 | 11.241^{***} | 0.514^{***} |
| | (1.952) | (0.094) | (0.092) | (2.077) | (0.082) |
| $0–1 \rm \ kms$ | 2.589^{***} | 0.003 | 0.162^{***} | 2.739^{***} | 0.068 |
| | (0.621) | (0.048) | (0.033) | (0.784) | (0.045) |
| $1–2 \rm \ kms$ | 1.042^{***} | -0.091** | 0.069^{**} | 1.147^{**} | -0.009 |
| | (0.365) | (0.039) | (0.034) | (0.484) | (0.048) |
| 23 kms | 0.503 | -0.076** | -0.031 | 0.510 | -0.061 |
| | (0.311) | (0.035) | (0.027) | (0.438) | (0.039) |
| $3-4 \mathrm{~kms}$ | 0.781^{**} | 0.071^{**} | 0.045^{***} | 1.171^{**} | 0.047 |
| | (0.340) | (0.031) | (0.017) | (0.526) | (0.045) |
| $4–5 \rm \ kms$ | 0.964^{***} | 0.043 | 0.042^{***} | 1.421^{***} | 0.005 |
| | (0.314) | (0.030) | (0.015) | (0.486) | (0.040) |
| | | | | | |
| R-squared | 0.899 | 0.903 | 0.904 | 0.892 | 0.901 |
| Ν | 38270 | 38270 | 18302 | 19968 | 19838 |

Table 4: Effect of IAs on Night Lights, Spillovers

Note: Regression results are coefficients of the distance \times post interaction terms $(\beta_{1,j}(1[dist_v \in bin_j] \times post_t \text{ where } j \text{ is each distance bin})$ from the difference-in-differences regression given in Specification (2). The outcome variables are nighttime light density, measured in levels, logs, and as an indicator for access. A vector of time-interacted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included, as well as nearest-IA fixed effects interacted with time dummies. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

| | | | | firms | |
|---------------------|-----------------|----------------|---------------|---------------|----------------|
| | | | num | ber of wor | kers: |
| | workers | firms | > 99 | 10 - 99 | < 10 |
| | (1) | (2) | (3) | (4) | (5) |
| Panel A: Levels | | | | | |
| within IA | 369.718^{***} | 17.977 | 0.663^{***} | 2.970^{*} | 14.230 |
| | (141.461) | (12.854) | (0.251) | (1.644) | (11.341) |
| 0-1 kms | 57.292 | 13.817^{**} | -0.014 | 0.506^{*} | 13.262^{**} |
| | (35.313) | (6.122) | (0.037) | (0.282) | (6.082) |
| 12 kms | 68.831^{**} | 16.414^{***} | -0.011 | 0.290 | 16.134^{***} |
| | (33.551) | (5.039) | (0.017) | (0.251) | (4.972) |
| 23 kms | 3.339 | 6.305^{**} | -0.039*** | 0.017 | 6.332^{**} |
| | (14.235) | (3.056) | (0.011) | (0.142) | (3.056) |
| 3-4 kms | 11.608 | 3.090 | -0.017 | 0.108 | 2.973 |
| | (12.898) | (3.759) | (0.015) | (0.115) | (3.735) |
| 4-5 kms | 6.025 | 5.205 | -0.029 | 0.220 | 5.013 |
| | (10.894) | (3.445) | (0.021) | (0.138) | (3.441) |
| | | | | | |
| R-squared | 0.530 | 0.844 | 0.583 | 0.674 | 0.841 |
| Ν | 38630 | 38630 | 38630 | 38630 | 38630 |
| Panel B: Logs | | | | | |
| within IA | 1.012^{***} | 0.689^{***} | 0.254^{***} | 0.335^{**} | 0.593^{***} |
| | (0.261) | (0.169) | (0.083) | (0.155) | (0.150) |
| 0-1 kms | 0.374^{***} | 0.262^{**} | -0.004 | 0.176^{***} | 0.235^{**} |
| | (0.129) | (0.106) | (0.019) | (0.062) | (0.096) |
| 12 kms | 0.581^{***} | 0.527^{***} | -0.002 | 0.085^{**} | 0.474^{***} |
| | (0.096) | (0.081) | (0.011) | (0.041) | (0.074) |
| 23 kms | 0.188^{**} | 0.267^{***} | -0.022*** | 0.020 | 0.247^{***} |
| | (0.073) | (0.062) | (0.006) | (0.041) | (0.056) |
| 3-4 kms | 0.275^{***} | 0.309^{***} | -0.008 | 0.023 | 0.279^{***} |
| | (0.076) | (0.067) | (0.009) | (0.032) | (0.062) |
| $4-5 \mathrm{~kms}$ | 0.085 | 0.073 | -0.011 | 0.046 | 0.064 |
| | (0.071) | (0.060) | (0.009) | (0.035) | (0.055) |
| | | | | | |
| R-squared | 0.817 | 0.837 | 0.612 | 0.649 | 0.840 |
| Ν | 38630 | 38630 | 38630 | 36350 | 38630 |

Table 5: Effect of IAs on Firm Outcomes, Spillovers

Note: Regression results are coefficients of the distance \times post interaction terms $(\beta_{1,j}(1|dist_v \in bin_j| \times post_t \text{ where } j \text{ is each distance bin})$ from the difference-in-differences regression given in Specification (2). The direct effect "within IA" is associated with distance bin j = 1 and spillover effects are associated with distance bins j = 2, 3, 4, 5 associated with the distances (0,1], (1,2] (2,3] and (3,4], respectively. The outcome variables are number of firms and number of workers (in levels and logs). A vector of time-interacted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included, as well as nearest-IA fixed effects interacted with time dummies. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

| | m | nen | WO | women | | | |
|---------------------|---------------|-----------|---------------|-----------|--|--|--|
| | per | cent | per | cent | | | |
| | Non-Agr | Agr | Non-Agr | Agr | | | |
| | (1) | (2) | (3) | (4) | | | |
| | | | | | | | |
| within IA | 0.138^{***} | -0.151*** | 0.129^{***} | -0.132** | | | |
| | (0.030) | (0.030) | (0.040) | (0.066) | | | |
| $0-1 \mathrm{~kms}$ | 0.079^{***} | -0.082*** | 0.063^{**} | -0.095*** | | | |
| | (0.016) | (0.017) | (0.030) | (0.037) | | | |
| $1–2 \rm \ kms$ | 0.061^{***} | -0.064*** | 0.029 | -0.023 | | | |
| | (0.013) | (0.013) | (0.021) | (0.029) | | | |
| 23 kms | 0.045*** | -0.048*** | 0.006 | -0.001 | | | |
| | (0.009) | (0.009) | (0.014) | (0.023) | | | |
| $3-4 \mathrm{kms}$ | 0.035*** | -0.032*** | 0.010 | -0.020 | | | |
| | (0.009) | (0.009) | (0.014) | (0.021) | | | |
| 4–5 kms | 0.029*** | -0.024*** | 0.010 | 0.014 | | | |
| | (0.009) | (0.009) | (0.013) | (0.022) | | | |
| | | | | | | | |
| R-squared | 0.830 | 0.811 | 0.764 | 0.642 | | | |
| Ν | 38464 | 38464 | 37854 | 37854 | | | |

Table 6: Effect of IAs on Labor Force

Note: Regression results are coefficients of the $distance \times post$ interaction terms $(\beta_{1,j}(1|dist_v \in bin_j) \times$ $post_t$ where j is each distance bin) from the differencein-differences regression given in Specification (2). The direct effect "within IA" is associated with distance bin j = 1 and spillover effects are associated with distance bins j = 2, 3, 4, 5 associated with the distances (0,1], (1,2] (2,3] and (3,4], respectively. The outcome variables are (log) number and share of workers in agricultural and non-agricultural employment, disaggregated by gender. A vector of time-interacted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included, as well as nearest-IA fixed effects interacted with time dummies. Robust standard errors (clustered at village level) are shown in parentheses. *** p < 0.01, ** p < 0.05, and * p < 0.1.

| | manufacturing | commercial agriculture | retail | restaurant | transport | food process | banking | construction | storage |
|---|--|--|--|---|--|---|---|--|---|
| | (1) | (2) | (3) | (4) | (2) | (9) | (2) | (8) | (6) |
| Panel A: Level Firms | | | | | | | | | |
| Within IA | 12.051^{**} | -1.748 | -0.392 | 1.782 | 3.077 | 6.861^{**} | -0.143 | 0.102 | 0.547^{**} |
| | (5.012) | (4.255) | (3.258) | (1.149) | (1.997) | (3.026) | (0.239) | (0.587) | (0.228) |
| Spillovers | 2.575^{***} | 1.635 | 1.313^{***} | 0.579^{***} | 0.469^{**} | 1.264^{*} | 0.004 | -0.030 | 0.043 |
| | (0.835) | (1.230) | (0.488) | (0.132) | (0.211) | (0.703) | (0.045) | (0.087) | (0.027) |
| R-squared | 0.795 | 0.709 | 0.873 | 0.861 | 0.670 | 0.785 | 0.632 | 0.569 | 0.541 |
| Ν | 38630 | 38970 | 38630 | 38630 | 38630 | 38970 | 38970 | 38970 | 38970 |
| Panel B: Log Firms | | | | | | | | | |
| Within IA | 0.445^{**} | 0.524^{**} | 0.343^{**} | 0.379^{***} | 0.308^{*} | 0.274^{*} | -0.002 | 0.082 | 0.203^{***} |
| | (0.177) | (0.244) | (0.152) | (0.139) | (0.162) | (0.151) | (0.062) | (0.121) | (0.077) |
| Spillovers | 0.157^{***} | 0.328^{***} | 0.118^{***} | 0.122^{***} | 0.071^{**} | 0.053^{**} | 0.016 | 0.007 | 0.004 |
| | (0.033) | (0.049) | (0.027) | (0.021) | (0.029) | (0.024) | (0.012) | (0.019) | (0.008) |
| R-squared | 0.817 | 0.760 | 0.872 | 0.864 | 0.719 | 0.814 | 0.752 | 0.601 | 0.559 |
| Ν | 38630 | 38970 | 38630 | 38630 | 38630 | 38970 | 38970 | 38970 | 38970 |
| Note: Regression resu distance of 0 and denc differences regression g and levels. A vector o | tts are coefficients ted as "within I/ given in Specifica f time-interacted | s of the distance-post in Λ^{n} and $j = 2$ correspond tion (3). The outcome controls is included for | teraction ls to the variables character | terms $(\beta_{1,j})$ distance bin are the nun istics detern | $(1[dist \in b]$ (0-5] and (0-5] and (10-5] and (10-5) and | $in_j] \times post_t$ w denoted as "s in the indi selection or of Dobuot etc. | where $j =$ spillover") icated sect correlated | 1 correspond from the dif tors, given in with potenti | s to the a erence-in- both logs al growth. |
| level) are shown in par | entheses. *** p< | 0.01, ** p<0.05, and *] | p<0.1. | TA TAT M DOGO | | one version . ec | TTA NTONTO | nataania) ara | an vinues |

Table 7: Effect of IAs by Firm Sector

| | | Log Work | .ers | | Log Firn | us | Percei | nt Non-A | .gr Labor |
|----------------------|---------------|-----------------------|------------------------------------|---------------|-----------------------|-------------------|-------------------------------------|-----------------------------|---------------------------------|
| | In | iteraction 7 | Cerms: | In | teraction 7 | lerms: | Inte | eraction | Terms: |
| | Literacy | Bank | Paved Road | Literacy | Bank | Paved Road | Literacy | Bank | Paved Road |
| | (1) | (2) | (3) | (4) | (5) | (9) | (2) | (8) | (6) |
| Interactions Term X | | | | | | | | | |
| within IA | 0.135 | -0.015 | -0.804 | -0.186 | -0.293 | -0.648 | -0.049 | 0.134 | 0.047 |
| | (0.509) | (0.565) | (0.683) | (0.326) | (0.295) | (0.409) | (0.070) | (0.180) | (0.077) |
| Spillovers | 0.149^{**} | -0.440^{***} | 0.194^{**} | 0.172^{***} | -0.438^{***} | 0.119 | -0.000 | -0.014 | -0.018^{*} |
| | (0.075) | (0.116) | (0.087) | (0.064) | (0.089) | (0.073) | (0.00) | (0.022) | (0.011) |
| Motor Docusion | 11000 | Configuration for | to the distance | too soot int | + | (1] 7] 7] 7] 7] | | +0000 | |
| corresponds to the | a distance di | of 0 and de | s of the unstate noted as "with | in IA" and | j = 2 correction | esponds to the e | $s_{l} \in vuu_{j}$ distance bin | $\times post$ n (0-5] ai | where $j = 1$ and denoted as |
| "spillover") from th | he differenc€ | ⊱in-differer | ices regression | given in Spe | cification (| (3). The outcon | ne variables | s are the | log number of |
| workers, the log nu | mber of firn | ns, and the | share of male | workers in n | on-agricul | tural wage labo | r. Coefficie | nts in co | $(1)^{-(3)}$ |
| come from a single | regression | , as do the | se of column | (4)-(6), and | those in | (7)-(9). A vec | tor of time | ⊦interact | ed controls is |
| included for charac | teristics de | termining s | site selection or | correlated | with poter. | itial growth. Tl | he interacti | on of (lo | g) population |
| with the post-inter | action term | is also inc. | luded. Village | fixed effects | are incluc | led, as well as r | nearest-IA f | fixed effe | cts interacted |
| with time dummies | . Robust st | andard err | ors (clustered a | at village le | vel) are she | own in parenthe | eses. *** p. | <0.01, *> | * p<0.05, and |
| * p<0.1. | | | | | | | | | |

| Characteristics | |
|-----------------|--|
| Village | |
| þ | |
| Effects | |
| Heterogeneous | |
| $\ddot{\infty}$ | |
| Table | |

| | | levels | | | logs | |
|-----------|---------------|----------|---------|---------------|----------|---------|
| | firms | financeo | l by | firms | financed | l by |
| | self | govt | bank | self | govt | bank |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | | | | | | |
| within IA | 14.638^{**} | -3.187 | 4.302 | 0.598^{***} | -0.066 | 0.263 |
| | (6.773) | (5.455) | (4.091) | (0.195) | (0.198) | (0.175) |
| Spillover | 4.714** | -0.139 | -0.518* | 0.328^{***} | 0.005 | 0.015 |
| | (2.145) | (0.378) | (0.276) | (0.043) | (0.031) | (0.028) |
| | | | | | | |
| R-squared | 0.807 | 0.651 | 0.638 | 0.803 | 0.784 | 0.648 |
| Ν | 37934 | 37934 | 37934 | 37934 | 37934 | 37934 |

Table 9: Effect of IAs on Firms by Finance Type

Note: Regression results are coefficients of the distance \times post interaction terms $(\beta_{1,j}(1[dist \in bin_j] \times post_t \text{ where } j = 1 \text{ corresponds}$ to the a distance of 0 and denoted as "within IA" and j = 2 corresponds to the distance bin (0-5] and denoted as "spillover") from the difference-in-differences regression given in Specification (3). The outcome variables the number of firms receiving finance from the sources indicated in the column head, in logs and levels. A vector of time-interacted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included, as well as nearest-IA fixed effects interacted with time dummies. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

| | lev | els | lo | gs |
|-----------------------------|---------------|-------------|---------------|---------------|
| | firms | workers | firms | workers |
| | (1) | (2) | (3) | (4) |
| Panel A: Female-Owned Firms | | | | |
| within IA | 6.424^{*} | 61.074 | 0.411^{*} | 0.569^{*} |
| | (3.630) | (54.637) | (0.242) | (0.311) |
| Spillovers | 1.999^{***} | 0.973 | 0.236^{***} | 0.242^{***} |
| | (0.735) | (1.294) | (0.043) | (0.050) |
| R-squared | 0.812 | 0.668 | 0.743 | 0.725 |
| N | 33840 | 33840 | 33840 | 33840 |
| Panel A: SC-Owned Firms | | | | |
| within IA | 3.766 | 7.523 | 0.585^{***} | 0.708^{***} |
| | (2.587) | (5.230) | (0.217) | (0.269) |
| Spillovers | 1.298^{***} | 2.816^{*} | 0.227*** | 0.261^{***} |
| | (0.308) | (1.556) | (0.040) | (0.048) |
| R-squared | 0.660 | 0.501 | 0.696 | 0.686 |
| N | 34314 | 34314 | 34314 | 34314 |

Table 10: Effect of IAs on Female- and SC-owned firms

Note: Regression results are coefficients of the distance-post interaction terms $(\beta_{1,j}(1[dist \in bin_j] \times post_t)$ from the difference-in-differences regression given in Specification (3). The direct effect ("within IA") is associated with distance bin j = 1 and the spillover effect corresponds to distances of (0-5] kms and is denoted by the distance bin j = 2. The outcome variables the number of firms owned by women (SCs) and the number of employees at these firms, in logs and levels. A vector of time-interacted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included, as well as nearest-IA fixed effects interacted with time dummies. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

Appendix A: For Online-Publication

This Appendix briefly explains how the IA sites are selected and provides the spatial distribution of Industrial areas (IAs) throughout the state of Karnataka.

Figure A1 provides the spatial distribution of IAs in Karnataka, as well as their relation to census towns and geographic features. All of the IAs used in this study are established between 1991–2015 (with no IAs being established during the period 2000-2004) as shown in Figure A2 and have been active since inception.

Figure A1: Spatial Distribution of Industrial Areas and Census Towns in Karnataka



Note: This figure shows the spatial distribution of Industrial Areas as in our sample along with the census town . Source: http://kiadb.in/industrial-areas/





Notes: Figure A2 shows the number of IAs established in each year.



Figure A3: Effects of IAs using Post-2012 IAs as Placebo

A3.2: 2005-2011 Industrial Areas

Notes: Figure A3 plots the β_j coefficients from a triple-differences regression:

$$\begin{split} y_{v,i,t} &= \alpha + \sum_{j=1}^{20} \beta_j I A_v^{1991-2011} \times 1 [year = j + 1993] + \sum_{j=1}^{20} \gamma_j I A_v^{1991-2015} \times 1 [year = j + 1993] + \\ &\sum_{j=1}^{20} \delta_{d,j} \times 1 [year = j + 1993] + \eta_v + \varepsilon_{v,t}. \end{split}$$

The variables are as before, but now we include an indicator variable for an IA having been established either during or after the study period $(IA_v^{1991-2015})$ and include time-interacted district fixed effects $(\delta_{d,j} \times 1[year = j + 1992])$. In Figure A3.1 the treatment group is limited to villages receiving an IA between 1991–1997, and in Figure A3.2 the treatment group is limited to villages receiving an IA between 2005–2011. The dashed lines indicate the 95% confidence interval.



Figure A4: Effects of IAs on Workers by Sector

A4.2: Workers (Male) Agriculture

Notes: Figure A4 plots the coefficients of the distance-post interaction terms $(\beta_{1,j}(1[dist \in bin_j] \times post_t \text{ where } j \text{ is each distance bin})$ from the difference-in-differences regression given in Specification (2). In Figure A4.1 the outcome variable is the percent of male workers in non-agricultural wage labor, and in Figure A4.2 the percent of male workers in agriculture. The x-axis measures the distance (in kms) of the village from the IA, where "0" refers to villages whose boundaries overlap those of the IA, and the omitted category is villages 15–20 kms from the IA. The dashed lines indicate the 95% confidence interval.

Appendix B

| | | Levels | | | Logs | |
|---------------------|-----------------|-----------------|----------------|---------------|---------------|---------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel A Light Den | sity | | | | | |
| within IA | 12.664^{***} | 10.655^{***} | 13.055^{***} | 0.399^{***} | 0.407^{***} | 0.519^{***} |
| | (1.179) | (1.240) | (1.873) | (0.065) | (0.071) | (0.084) |
| R-squared | 0.800 | 0.905 | 0.800 | 0.895 | 0.018 | 0.887 |
| N | 0.899 | 12056 | 0.890 | 0.895 | 12056 | 0.001 |
| | 44210 | 12950 | 21094 | 44210 | 12930 | 21094 |
| Panel B: Firms | | | | | | |
| within IA | 361.511^{***} | 380.298^{***} | 550.307^{**} | 0.923^{***} | 0.827^{***} | 1.701^{***} |
| | (137.547) | (145.040) | (251.861) | (0.252) | (0.274) | (0.426) |
| | | | | | | |
| R-squared | 0.529 | 0.539 | 0.530 | 0.821 | 0.822 | 0.829 |
| Ν | 35886 | 10486 | 23938 | 35886 | 10486 | 23938 |
| Panel C: Workers | | | | | | |
| within IA | 16.428 | 8.372 | 27.609 | 0.566^{***} | 0.521^{***} | 0.960*** |
| | (12.587) | (13.419) | (22.251) | (0.170) | (0.182) | (0.275) |
| | | | | | | |
| R-squared | 0.852 | 0.854 | 0.860 | 0.844 | 0.847 | 0.846 |
| Ν | 35886 | 10486 | 23938 | 35886 | 10486 | 23938 |
| IA F.E.s | | Yes | Yes | | Yes | Yes |
| District F.E.s | Yes | | | Yes | | |
| $<\!15$ kms from IA | | Yes | | | Yes | |
| >10 kms from town | | | Yes | | | Yes |

Table B1: Effect of IAs on Firm Outcomes, Alternative Specifications

Note: Regression results are coefficients of the *distance* × *post* interaction terms from the difference-in-differences regression given in Specification (1). The outcome variables are taken in levels and logs. Columns (1) and (4) include district fixed effects. Columns (2) and (5) restrict the sample of control villages to within 5-15 kms of an IA; and Columns (3) and (6) to villages more than 10 kms from the nearest town. A vector of time-interacted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included, as well as nearest-IA fixed effects interacted with time dummies. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

| | | levels | | | logs | |
|---------------------------|--------------|-----------------------------|--------------|---------------|---------------|---------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel A: Number | of Firms | >99 worl | kers | | | |
| within IA | 0.656^{**} | 0.693^{**} | 0.971^{**} | 0.244^{***} | 0.255^{***} | 0.347^{**} |
| | (0.273) | (0.275) | (0.449) | (0.089) | (0.089) | (0.138) |
| | | | | | | |
| R-squared | 0.558 | 0.567 | 0.547 | 0.571 | 0.582 | 0.557 |
| Ν | 34314 | 11554 | 22656 | 34314 | 11554 | 22656 |
| Panel B: Number of | of Firms | 10–99 wc | orkers | | | |
| within IA | 2.598 | 2.397 | 4.164 | 0.334^{**} | 0.261^{*} | 0.444^{*} |
| | (1.608) | (1.637) | (2.966) | (0.152) | (0.155) | (0.266) |
| | | | | | | |
| R-squared | 0.603 | 0.602 | 0.595 | 0.651 | 0.658 | 0.653 |
| Ν | 34314 | 11554 | 22656 | 34314 | 11554 | 22656 |
| Panel C: Number of | of Firms | $< 10 \operatorname{worl}$ | kers | | | |
| within IA | 15.880 | 14.384 | 32.930* | 0.470^{***} | 0.433^{**} | 0.893^{***} |
| | (11.137) | (11.474) | (19.186) | (0.165) | (0.171) | (0.235) |
| | | | | | | |
| R-squared | 0.790 | 0.796 | 0.802 | 0.817 | 0.821 | 0.819 |
| Ν | 34314 | 11554 | 22656 | 34314 | 11554 | 22656 |
| IA F.E.s | | Yes | Yes | | Yes | Yes |
| District F.E.s | Yes | | | Yes | | |
| ${<}15~{\rm kms}$ from IA | | Yes | | | Yes | |
| >10 kms from town | | | Yes | | | Yes |

Table B2: Alternative Specifications

Note: Regression results are coefficients of the distance-post interaction terms from the difference-in-differences regression given in Specification (1). The outcome variables are the number of firms in each firm size category, given in both logs and levels. A vector of time-interacted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included, as well as nearest-IA fixed effects interacted with time dummies. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

| | Lev | vels | Lo | ogs |
|----------------------------|----------------|---------------|---------------|---------------|
| | (1) | (2) | (3) | (4) |
| Panel A: Light Density | | | | |
| within IA | 8.188*** | 7.640^{***} | 0.340^{**} | 0.336^{**} |
| | (2.135) | (2.155) | (0.142) | (0.136) |
| | | | (0.104) | (0.090) |
| R-squared | 0.899 | 0.905 | 0.894 | 0.910 |
| Ν | 42524 | 17132 | 42524 | 17132 |
| Panel B: Workers | | | | |
| within IA | 443.059^{**} | 445.313** | 1.176^{***} | 1.047^{***} |
| | (210.744) | (210.806) | (0.362) | (0.352) |
| | | | | |
| R-squared | 0.529 | 0.537 | 0.827 | 0.815 |
| Ν | 34604 | 14054 | 34604 | 14054 |
| Panel C: Firms | | | | |
| within IA | 55.294 | 50.845 | 0.763^{***} | 0.651^{**} |
| | (49.138) | (49.207) | (0.278) | (0.267) |
| | | | | |
| R-squared | 0.853 | 0.850 | 0.850 | 0.844 |
| Ν | 34604 | 14054 | 34604 | 14054 |
| District X Year F.E.s | Yes | Yes | Yes | Yes |
| Village < 15 kms from IA | | Yes | | Yes |

Table B3: Robustness Check, post-2012 as Placebo

Regression results are the β coefficients from a triple-differences regression:

$$y_{v,i,t} = \alpha + \beta I A_v^{1991-2011} \times post + t + \gamma I A_v^{1991-2015} \times post + t + (post_t \times X_v)\Gamma + \delta_d \times post + \eta_v + \varepsilon_{v,t}.$$

The variables are as before, but now we include an indicator variable for an IA having been established either during or after the study period $(IA_v^{1991-2015})$ and include time-interacted district fixed effects (δ_d). The outcomes are taken in levels and logs. Columns (2) and (4) restrict the sample to villages within 15 kms of an IA created between 1991– 2015. A vector of time-interacted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

| | | levels | | logs | | | |
|------------|-----------------|-----------|----------------|---------------|--------------|---------------|--|
| | | firm size | | | firm size | | |
| | > 99 | 10 - 99 | <10 | >99 | 10 - 99 | <10 | |
| | (1) | (2) | (3) | (4) | (5) | (6) | |
| | | | | | | | |
| within IA | 238.407^{***} | 88.521* | 47.189 | 1.238^{***} | 0.728^{**} | 0.661^{***} | |
| | (85.137) | (49.791) | (30.304) | (0.376) | (0.371) | (0.172) | |
| Spillovers | 9.615 | 0.603 | 11.727^{***} | -0.059** | 0.115^{**} | 0.255^{***} | |
| | (10.059) | (1.899) | (4.000) | (0.030) | (0.056) | (0.036) | |
| | | | | | | | |
| R-squared | 0.503 | 0.676 | 0.813 | 0.595 | 0.704 | 0.827 | |
| Ν | 38630 | 38630 | 38630 | 38630 | 38630 | 38630 | |

Table B4: Effect of IAs on Number of Workers by Firm Size

Note: Regression results are coefficients of the distance-post interaction terms $(\beta_{1,j}(1|dist \in bin_j] \times post_t)$ from the difference-in-differences regression given in Specification (3). The direct effect ("within IA") is associated with distance bin j = 1 and the spillover effect corresponds to distances of (0-5] kms and is denoted by the distance bin j = 2. The outcome variable is (log) number of workers. Village fixed effects are included, as well as nearest-IA fixed effects interacted with time dummies. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

| Size |
|---------|
| Firm |
| by |
| IAs |
| of |
| Effects |
| B5: |
| Table |

| | | | | INU | mber of f | irms wit. | h: | | | |
|---------------------------|---------------|---------------|-------------|-----------------------|-------------|-------------|--------------|-----------------|-----------------|---------------------|
| | 1 wrkrs | 2 wrkrs | 3 wrkrs | 4 wrkrs | 5 wrkrs | 6 wrkrs | 7 wrkrs | 8 wrkrs | 9 wrkrs | 10 wrkrs |
| | (1) | (2) | (3) | (4) | (5) | (9) | (2) | (8) | (6) | (10) |
| within IA | 7.758 | 5.202 | 2.312^{*} | 1.114 | 1.063^{*} | 0.590 | 0.754 | -0.069 | 0.179 | 0.399^{**} |
| | (6.875) | (3.602) | (1.290) | (0.829) | (0.599) | (0.621) | (0.695) | (0.199) | (0.253) | (0.166) |
| Spillovers | 3.835^{***} | 2.637^{***} | 0.155 | -0.197 | 0.032 | 0.001 | 0.301^{*} | 0.028 | 0.033 | 0.089^{***} |
| | (1.225) | (0.843) | (0.215) | (0.178) | (0.149) | (0.124) | (0.175) | (0.037) | (0.026) | (0.026) |
| | | | | | | | | | | |
| R-squared | 0.761 | 0.659 | 0.637 | 0.611 | 0.577 | 0.563 | 0.545 | 0.562 | 0.544 | 0.545 |
| Ν | 34314 | 34314 | 34314 | 34314 | 34314 | 34314 | 34314 | 34314 | 34314 | 34314 |
| Note: Re | gression re | esults are | coefficien | ts of the | distance | +post int | eraction | terms (β | $_{1,i}(1]dist$ | $\in bin_i] \times$ |
| $post_t$) frc | m the diffe | erence-in-d | lifferences | s regressi | on given | in Specifi | cation (3) |). The di | rect effec | t ("within |
| IA") is a | ssociated . | with dista | nce bin j | = 1 and | I the spi | llover effe | ect corres | sponds to |) distance | es of $(0-5]$ |
| kms and | is denote | d by the | distance | bin $j =$ | 2. The | outcome | e variable | es are th | e numbe | r of firms |
| $\operatorname{employin}$ | ig the num | ber of wor | kers indi | cated in ¹ | the colun | nn head. | A vector | · of time- | interacte | d controls |
| is include | ed for char | acteristics | determin | ning site | selection | or corre | lated wit | h potent | ial growt | h. Village |
| fixed effe | cts are incl | luded. Rol | oust stane | dard erro | rs (cluste) | ered at vi | llage leve | d) are sho | wn in pa | rentheses. |
| *** p<0. | .01, ** p< | 0.05, and | * p<0.1. | | | | | | | |

| | percent agriculture | | | | | |
|---------------------|---------------------|----------------|----------|-----------|------------|----------|
| | | male | | | female | |
| | any ag | cultivator | ag labor | any ag | cultivator | ag labor |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | | | | | | |
| within IA | -0.151*** | -0.125^{***} | -0.026 | -0.132** | -0.110** | -0.022 |
| | (0.030) | (0.035) | (0.031) | (0.066) | (0.048) | (0.054) |
| $0–1 \rm \ kms$ | -0.082*** | -0.069*** | -0.013 | -0.095*** | -0.044 | -0.051* |
| | (0.017) | (0.018) | (0.017) | (0.037) | (0.032) | (0.030) |
| 1–2 kms | -0.064*** | -0.059*** | -0.005 | -0.023 | 0.006 | -0.029 |
| | (0.013) | (0.016) | (0.015) | (0.029) | (0.026) | (0.026) |
| 23 kms | -0.048*** | -0.023* | -0.025** | -0.001 | 0.019 | -0.020 |
| | (0.009) | (0.012) | (0.010) | (0.023) | (0.021) | (0.021) |
| $3-4 \mathrm{~kms}$ | -0.032*** | -0.031** | -0.001 | -0.020 | -0.031 | 0.011 |
| | (0.009) | (0.013) | (0.012) | (0.021) | (0.021) | (0.020) |
| 45 kms | -0.024*** | -0.027** | 0.003 | 0.014 | 0.006 | 0.008 |
| | (0.009) | (0.012) | (0.010) | (0.022) | (0.020) | (0.020) |
| R-squared | 0.811 | 0.778 | 0.681 | 0.642 | 0.623 | 0.661 |
| Ν | 38464 | 38464 | 38464 | 37854 | 37854 | 37854 |

Table B6: Effect of IAs on Labor by Agricultural Occupation

Note: Regression results are coefficients of the distance-post interaction terms $(\beta_{1,j}(1[dist \in bin_j] \times post_t \text{ where } j \text{ is each distance bin})$ from the differencein-differences regression given in Specification (2). The outcome variables are the percent of workers in different types of agricultural employment, disaggregated by gender. A vector of time-interacted controls is included for characteristics determining site selection or correlated with potential growth. Village fixed effects are included. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.

| | sł | nare of h | ouseholds o | owning ass | et |
|------------|---------------------|-------------|--------------|---------------|---------------|
| | tv | radio | scooter | bicycle | mobile |
| | (1) | (2) | (3) | (4) | (5) |
| | | | | | |
| within IA | 9.810*** | -2.735 | 3.620^{**} | 3.493 | 7.702^{**} |
| | (2.370) | (1.881) | (1.570) | (2.201) | (3.408) |
| Spillovers | 5.482^{***} | 0.975^{*} | 1.729*** | 2.340^{***} | 2.351^{***} |
| - | (0.462) | (0.502) | (0.320) | (0.490) | (0.609) |
| R-squared | 0.453 | 0.252 | 0.306 | 0.258 | 0.158 |
| Ν | 19345 | 19345 | 19345 | 19345 | 19345 |

Table B7: Effect of IAs on Assets

Note: Regression results are coefficients of the distance terms $(\beta_{1,j}(1[dist \in bin_j]))$ from a cross-sectional regression, and omitting time interactions. The direct effect ("within IA") is associated with distance bin j = 1 and the spillover effect corresponds to distances of (0-5] kms and is denoted by the distance bin j = 2. The outcome variables are the percentage of households owning the assets indicated in the column head. A vector of controls is included for characteristics determining site selection or correlated with potential growth. District fixed effects are included. Robust standard errors (clustered at village level) are shown in parentheses. *** p<0.01, ** p<0.05, and * p<0.1.