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PLACE-BASED POLICIES, STRUCTURAL CHANGE AND FEMALE LABOR: EVIDENCE FROM INDIA'S SPECIAL ECONOMIC ZONES

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Place-based policies, structural change and female labor: Evidence from India's Special Economic Zones *

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Abstract

This paper quantifies the local economic impact of Special Economic Zones (SEZs) that were established in India between 2005-2013. Based on a novel data set that combines census data on the universe of Indian firms with georeferenced data on SEZs, we find that SEZs increased manufacturing and service employment with positive spillover effects up to 10km. This employment gain was paralleled by a decline in local agricultural employment, in particular of women, suggesting that the policy contributed to structural change. We find no evidence for heterogeneous effects between privately and publicly run SEZs or zones with different industry denominations.

Keywords: Economic development, female labor, place-based policy, spillovers, structural change, Special Economic Zones
JEL: O23, O53, R12, R58

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1 Introduction

An increasing number of less-developed countries have implemented Special Economic Zones (SEZs) to foster economic development. According to UNCTAD's World Investment Report (UNCTAD, 2019), the total number of SEZs worldwide increased from 500 in 1995 to about 5,400 in 2018 - the vast majority of which are located in developing economies. While their specific design can differ and especially the institutional environment they are operating in, SEZs have in common that they are set up in a clearly defined geographic area where physically present firms have access to lower tax and tariff rates or cost-saving bureaucratic procedures (World Bank, 2008). Their establishment can thus be understood as a place-based policy.

The literature on place-based policies has primarily studied policy implications in developed economies (e.g. Neumark and Simpson, 2015; Criscuolo et al., 2019; Grant, 2020) while evidence on the effects of SEZs in developing or transitional countries is still scarce (e.g. Duranton and Venables, 2018).[1] However, experiences with place-based policies in developed countries can hardly be transferred to less-developed economies for various reasons. First, developing countries are characterized by significantly lower institutional quality than their developed country counterparts, which may limit the efficiency of local transfer programs and place-based policies (Becker et al., 2013; Farole and Moberg, 2014). Second, formal firms operating in developing countries often face substantially higher tax and bureaucratic burdens than firms in developed countries (Gordon and Li, 2009). Place-based policies that reduce administrative burdens and grant tax exemptions might hence create steeper location incentives. Finally, SEZs in developing countries also differ in purpose and structure from SEZs in the developed world. Among others, they often target exporting firms, for example by offering tariff exemptions for input goods – a feature that is hardly prevalent in developed economies.

This paper contributes to the growing literature on place-based policies by evaluating the economic and spatial effects of SEZs that were established after the Special Economic Zones Act in 2005 (SEZ Act, 2005) in India. The policy provided a uniform legal framework for developing and doing business in SEZs and granted firms within SEZs generous tax and tariff exemptions. India was ranked as one of the least business-friendly countries in the *Ease of Doing Business Index* (World Bank, 2005) at the time and the SEZ Act was initiated to improve this situation and create new economic activity. Using a newly compiled data set including the establishment of 147 SEZs between 2005-2013, we show that the SEZ Act led to a substantial increase in non-agricultural employment in SEZ-hosting municipalities.[2] The policy also induced positive employment effects in neighboring locations up to 10km. The rise in local manufacturing and service employment was mirrored by fewer jobs in agriculture, especially by women. We interpret this pattern as an indi-

[1] Other papers on place-based policies in developed countries include Gobillon et al. (2012), Busso et al. (2013), Kline and Moretti (2014) and Ehrlich and Seidel (2018).

[2] We use *municipality* as a collective term for villages and towns in India.

cation for local structural change from the primary sector towards better-paying jobs in non-agricultural industries. Additional analyses suggest that the establishment of SEZs led to a genuine increase in non-agricultural employment rather than a relocation of jobs in space.

Methodologically, we identify the effects of SEZs on local employment in a difference-in-differences (DiD) framework that compares changes in the economic outcomes in municipalities where SEZs were established with municipalities in the same region without SEZs. To this end, we define 5km-distance bins around each SEZ up to a radius of 50km to determine the spatial gradient of the SEZ effect without parametric restrictions. A main identification concern of this approach is that SEZs are not randomly allocated in space, but that their location systematically correlates with the economic trajectories before SEZ establishment. We address this concern in three ways. First, we run placebo tests based on years prior to the policy and document that economic development did not systematically differ between SEZ-hosting municipalities, their neighbors and municipalities in further distance prior to SEZ establishment. Second, we explore pre-treatment differences between treated and other municipalities. While such differences are absorbed in DiD designs if time-constant, we additionally allow outcome trajectories to differ in municipalities' pre-treatment characteristics. Finally, we run specifications, where we use matching techniques to reduce the imbalance in pre-treatment characteristics of treated and other municipalities in the estimation sample. All approaches yield very similar estimates.

Our empirical analysis builds on a novel data set that combines census data with georeferenced data on SEZs for the period 1998-2013. We identify the location of all SEZs, the date when they went into operation from newspaper articles, official statistics by the Ministry of Commerce and Industry as well as from minutes of the Central Board of Approval and match them with their hosting municipality using the India Village-Level Geospatial Socio-Economic Data Set (Meiyappan et al., 2018) based on the Population Census 2001. Having identified the SEZ-hosting municipality allows us to add rich granular administrative information like employment by sector and gender and the number of firms (Asher et al., 2021). These data come from both the Economic Census building on the universe of Indian firms and the Population Census. Our final sample includes almost 50K Indian municipalities with a total population of 146 million people in 2011.

Our baseline results uncover a sizable effect of SEZ establishments on local employment in manufacturing and services exceeding employment changes in the reference locations – defined as municipalities in the 20-25km distance bin – by 47 percentage points (*pp*). It is important to note in this context that India experienced high overall employment growth in this time period and municipalities are mostly small entities with average non-farm employment of 290 workers in our baseline sample (median of 41). Our findings indicate that the policy also contributed to local economic development beyond the boundaries of SEZ-hosting municipalities up to a distance of 10km. In the first distance bin around SEZs ($<$ 5km), non-agricultural employment growth is 21*pp* higher than in the reference location after SEZ establishment; the second distance bin (5-10km) still experienced 16*pp* higher employment. For municipalities 10-50km away from SEZs, we find no significant difference in employment trajectories relative to the reference locations.

Exploring potential underlying mechanisms, we document that the policy led to a decline in agricultural employment by 12.8*pp* and an increase in population, with the latter likely reflecting migration rather than fertility responses. In sum, this pattern suggests that the SEZ Act has contributed to a local transition from an agrarian-based towards an industrial and service economy which is widely considered to be one of countries' main development challenges (Sud, 2014). Taking into account that 50-60% of Indian workers are employed in agriculture but contribute only 18% to GDP (World Bank, 2023a,b), this shift in employment is associated with higher worker productivity and higher income. This finding connects well with previous research that has emphasized the importance of sectoral shifts from agriculture to more productive industries as a key driver of economic development (McMillan et al., 2014; Eichengreen and Gupta, 2011; Gollin et al., 2014).

When looking deeper into heterogeneous treatment effects, we find that the decline in agricultural employment was in particular driven by female workers while there was little response for men. In addition, female employment went up markedly by 67*pp* in manufacturing, but only marginally (and insignificantly) in services suggesting that the SEZ Act contributed to better employment opportunities for women. Male employment went up to a similar extent in manufacturing and also in services, but these effects did not correspond with lower employment in agriculture. One potential explanation for this pattern might be that male workers in the agricultural sector are less responsive to additional job opportunities as more than 85% of agricultural land is owned by men (Agarwal et al., 2021).

These novel findings on gender effects resonate well with a literature that was expecting SEZ policies to generate new and better jobs for women (World Bank, 2011; Bacchetta et al., 2009; Rama, 2003) and that has documented rising shares of female employment caused by free-trade policies in many countries (Ozler, 2000; Bussmann, 2009). Our results lend support to these expectations and are particularly relevant as women are considered a vulnerable group in the Indian labor market, gender discrimination is a prevalent and long-standing phenomenon, and unemployment rates among women are significantly larger than among men (Klasen and Pieters, 2015; Srivastava and Srivastava, 2015).

We present a number of further findings on the anatomy of the response. Among others, we show that a non-negligible part of the observed employment response takes place in small firms with a low degree of formality. In further analyses, we establish that zones of different types – privately vs. publicly run zones and zones with different industry specialization – exert broadly comparable effects on overall local employment. Finally, combining our estimates with official statistics on foregone tax revenues leads to the conclusion that the SEZ scheme supported job creation in a more cost-efficient manner than other Indian place-based policies. We calculate that one job amounted to

INR 363,612 – or USD 6,060 (PPP) in 2013 – in foregone taxes which is equivalent to a fifth of the rate at which jobs were created under a large-scale tax exemption program in India in the early 2000s (Chaurey, 2017), but substantially more than what Neumark and Kolko (2010) report for the enterprise zones program in California.

Beyond the referenced literature so far, our study relates in particular to research on spatial economic effects of place-based policies. Most existing work is set in developed countries (Neumark and Simpson, 2015) and findings on the effectiveness of these zones in fostering regional employment and economic activity tend to be mixed (Neumark and Kolko, 2010; Gobillon et al., 2012; Busso et al., 2013; Ehrlich and Seidel, 2018). Evidence on SEZs in less-developed countries is still scarce and mostly focused on China. For example, Wang (2013) and Lu et al. (2019) document that SEZs led to higher investments, employment and wages in SEZ-hosting jurisdictions, with limited spillover effects to surrounding areas. Koster et al. (2019) find 10-15% higher firm productivity following the opening of science parks in Shenzhen while Chen et al. (2019) document a decline in TFP by 6.5% due to closures of development zones. Jia et al. (2020) explore China's Great Western Development Programme finding no evidence for employment or wage effects, but higher local GDP through physical investment.

Some prior work on SEZs in India takes a descriptive perspective (Mukherjee et al., 2016) or relies on nightlights as broad proxies for economic activity (Hyun and Ravi, 2018). A recent paper by Görg and Mulyukova (2022) uses a sample of Indian firms to study the effect of SEZs on exporting behavior and factor productivity. Previous empirical work on the economic consequences of regional and local public policies in India, among others, studies state-level tax incentives (Chaurey, 2017; Shenoy, 2018), preferential tax policies for industrially backward districts (Hasan et al., 2021) and rural road construction programs (Asher and Novosad, 2020). To the best of our knowledge, our paper is the first to comprehensively assess the regional economic effects of SEZs in India based on detailed administrative data on employment and firm activity with a focus on sectoral employment shifts and implications for female workers.

We further add more specifically to the literature on structural change and economic growth (Kline and Moretti, 2014; McMillan et al., 2014; Gollin et al., 2014; Laitner, 2000). For India, Eichengreen and Gupta (2011) identify the sectoral shift from agriculture to services as a key driver of economic growth. In this regard, Blakeslee et al. (2022) study the effects of a land-rezoning program in Karnataka on local sectoral shifts. Previous work in other countries has mostly focused on the role of trade liberalization and international integration in the process of structural change, see e.g. Uy et al. (2013) for Korea and McCaig and Pavcnik (2013) for Vietnam. Our paper connects the literature on place-based policies with structural change in the context of a less-developed economy.

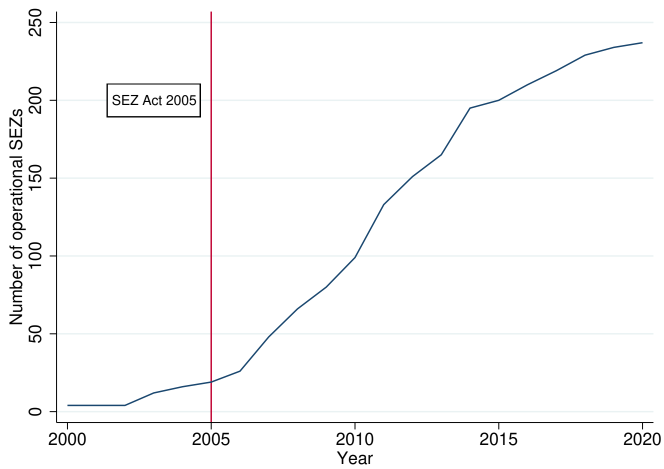
The results on changes in female employment in agriculture, manufacturing and services further inform the extensive literature that has documented the positive effects of female labor force participation (FLFP) and empowerment for economic development as summarized, for example, by Duflo (2012) and World Bank (2012) in general and by Das et al. (2015) for India in particular. According to statistics by the International Labour Organization, India is characterized by a comparably low FLFP rate of around 25% such that better labor market opportunities can be expected to have important implications. Our paper contributes to this line of research by connecting novel gender-specific labor market effects with the place-based policies literature.

The remainder of the paper is organized as follows. Section 2 describes the institutional background. In Section 3, we present the empirical methodology while Section 4 introduces the construction of our data set and descriptive statistics. We discuss our findings in Sections 5 and 6 and do a simple back-of-the-envelope calculation on the policy's efficiency in Section 7 before concluding.

2 Institutional background

In the 1960s, India became one of the first countries to establish export-processing zones (EPZ) which were later relabeled as SEZs in the early 2000s. But for long, SEZs were rare in the country. Between the 1960s and the 1990s, only seven SEZs were established by the central government. This changed drastically when the Indian government implemented the Special Economic Zones Act in 2005, allowing for private investments in SEZs and a much more flexible environment than the precedent EPZ framework in which all zones were owned and managed exclusively by the central government. Until 2020, the number of operational SEZs, i.e. zones with at least one active company, increased markedly to 240 of which more than 90% were established under the SEZ Act (see Figure 1).

Figure 1: Operational SEZs in India



Notes: This figure plots the cumulative sum of operational SEZs in India by year. SEZs are defined as being operational as soon as one firm commenced with its production. The individual SEZ data are obtained from the Indian Ministry of Commerce and Industry. The date of operation is sourced from newspaper articles and administrative records.

Against the background of India's economy being highly regulated and poorly integrated into the global economy (Mukherjee et al., 2016; Aghion et al., 2008; World Bank, 2005), the main goals of the SEZ Act were to (i) generate additional economic activity, (ii) promote exports of goods and services, (iii) promote investment from domestic and foreign sources, (iv) create employment opportunities, and (v) develop local infrastructure facilities (SEZ Act, 2005). To achieve these goals, the SEZ Act provided a uniform legal framework for developing and doing business in these specially designated areas. Firms in SEZs, moreover, enjoyed various administrative and fiscal benefits. On the administrative side, there was so-called "single-window clearance", that is all approvals were issued by a single authority. Businesses in SEZs, moreover, received a 100% income-tax exemption on export income for the first five years of operation, which reduced to a 50% exemption for the following five years. Thereafter, SEZ firms received a tax benefit of 50% on reinvested profits for a final period of five years. SEZ business units were, furthermore, exempted from sales and service taxes and, until 2012, from the Minimum Alternate Tax (MAT), a minimum tax on profits of 18.5%. SEZ firms also benefited from duty-free imports and domestic procurement of goods and services. Note that SEZs were treated as being outside of the domestic tariff area (DTA), so that goods that were produced in the SEZ and sold into the DTA were considered as imports to the Indian market. In consequence, companies in the DTA had to pay import tariffs if they purchased goods from a SEZ company. In turn, goods and services supplied by DTA companies to SEZ units were considered as exports from the DTA and exempted from any taxes and tariffs. Hence, the flow of goods from DTA into SEZs was subject to no taxes or tariffs, but not vice versa.

Applications for establishing a Special Economic Zone were assessed by the Central Board of Approval. One of the main criteria for an approval by the board was that SEZ developers were in the rightful possession of sufficiently large parcels of land depending on the industry denomination. For example, multi-product zones required a minimum contiguous area of 10 square kilometers while sector-specific zones such as IT zones required only 0.1 square kilometers. After the formal approval by the board, the proposal to develop the SEZ was recommended for notification to the Ministry of Industry and Commerce, which officially declared the designated area as an SEZ area.

3 Empirical approach

To identify the causal economic impact of SEZs across space, we implement a difference-in-differences-style analysis comparing changes in outcome variables between municipalities that host an SEZ and municipalities in the same region without an SEZ before and after the treatment, i.e. the start of the SEZ Act in 2005. To this end, we group municipalities in 5km-distance rings around their closest SEZ up to 50km.[3] This allows us to non-

[3] In principle, municipalities can be in a 50km radius to zones established before the SEZ Act in 2005. Excluding them from our sample does not change the results.

parametrically study the spatial effects of the policy, that is to which extent the treatment affects neighbors of SEZ locations.

The main analysis relies on a model of the following form:

$$ln(y_{it}) = \sum_{d=0, d\neq 5}^{10} \beta_d D_{[d_i=d]} \times \gamma_t + \gamma_t + \alpha_i + \epsilon_{it}, \tag{1}$$

where y_{it} represents outcomes like employment or the number of firms in municipality i in year t. $D_{[d_i=d]}$ indicates whether a municipality i is in distance bin d to an operational SEZ in the post-treatment year. $d_i = 0$ indicates SEZ-hosting municipalities, $d_i = 1$ SEZ-neighboring municipalities within a 5km-distance to the SEZ, $d_i = 2$ municipalities in a 5-10km distance etc. up to 50km ($d_i = 10$ for municipalities in a 45-50km distance). Distance bin $d = 5$ (distance of 20-25km) is omitted and serves as the reference category. We interact the distance dummy with the post-reform dummy γ_t which serves as a time fixed-effect and is identified through municipalities in the reference category. We include municipality fixed-effects, α_i, to control for time-invariant heterogeneity across municipalities and ϵ_{it} is the error term. β_d is the parameter of interest capturing differences in outcomes in municipalities in distance bin d relative to municipalities in the reference category. In the baseline specification, we cluster standard errors at the district level to account for spatial correlation. In additional specifications, we cluster at the level of the "closest SEZ groups" comprising all municipalities whose d_i is determined by the same SEZ and apply Conley (1999) standard errors.

The main threat to our empirical identification strategy and to obtaining unbiased estimates for β_d is the violation of the conditional mean independence assumption: conditional on α_i and γ_t, the regressor of interest $D_{[d_i=d]} \times \gamma_t$ may be correlated with the error term ϵ_{it}. If SEZ developers systematically place SEZs in areas whose outcome trends differ from other municipalities, conditional mean independence is violated - or in the parlance of difference-in-differences design - there is a violation of the common-trend assumption. We address this concern in three ways.

(i) Placebo regressions. First, we run placebo regressions for the pre-treatment period. If running Eq. (1) on data prior to SEZ introduction reveals no differential effects between treated and control units, their outcome emerged in parallel prior to treatment, providing support for the common-trend assumption.

(ii) Conditioning on pre-treatment characteristics. In a second step, we explore differences in the pre-treatment characteristics of treated and other municipalities. If SEZ developers strategically locate SEZs in space, we expect that such differences exist. While they are absorbed by α_i if time-constant, one may be concerned that municipal baseline characteristics correlate with shocks that are contemporaneous to SEZ establishment and that would hence not show up in pre-trend differences in the outcomes of treated and other municipalities and might not be detected in (i).

We address this concern by augmenting our regression model by a vector of baseline characteristics interacted with the post-treatment dummy. The augmented model reads:

$$ln(y_{it}) = \sum_{d=0,d\neq 5}^{10} \beta_d D_{[d_i=d]} \times \gamma_t + \boldsymbol{\eta}' (\mathbf{X}_i \times \gamma_t) + \gamma_t + \alpha_i + \varepsilon_{it}, \tag{2}$$

where, in addition to Eq. (1), $\mathbf{X}_i \times \gamma_t$ (pre-treatment characteristics of municipality i interacted with post-treatment dummy) controls for location-specific trends. Obtaining similar results with this approach compared to those based on Eq. (1) mitigates the concern that locational differences cause a bias (Altonji et al., 2005).

(iii) Coarsened exact matching. Complementary, we turn to matching techniques to reduce imbalances in the characteristics of treated and other municipalities. We employ coarsened exact matching (CEM), that is we temporarily coarsen the data based on the observed $\mathbf{X}_i$ using automated binning strategies and define unique observations of the coarsened data, each of which is defined as a stratum. Treated and control municipalities are then exactly matched on these strata. Observations whose strata do not contain at least one treated and one control observation are dropped and weights are used to compensate for the different strata sizes (Iacus et al., 2012). Importantly, and contrary to many other matching strategies, coarsened exact matching does not only account for imbalances in means, but also for imbalances in higher moments and interactions (Iacus et al., 2012; Blackwell et al., 2009).

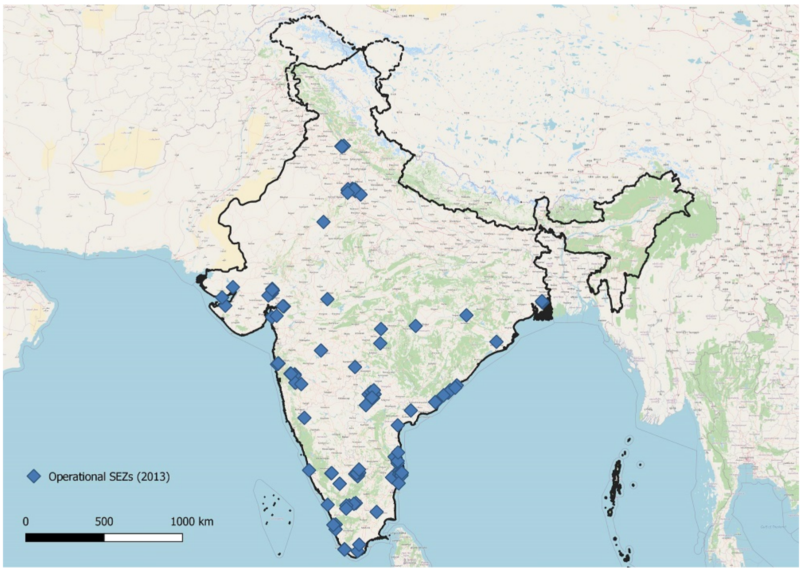
While SEZs were implemented in a staggered design, we use a classic two-by-two difference-in-differences approach for empirical identification. In the first sample year, none of the considered SEZs were in operation. In consequence, we do not have to assume homogeneous treatment effects for our estimator to be unbiased (DeChaisemartin and d'Haultfoeuille, 2020; Goodman-Bacon, 2021; Roth et al., 2022).

Finally, note that our concentric ring analysis allows us to capture the spatial effect of the policy. Municipalities in a distance of 20-25km to the SEZ serve as the reference category. The choice of reference category is arbitrary and anchors the interpretation of the coefficient estimates for β_d as the effect of the SEZ on the *relative* economic development of municipalities in radius d to the reference municipalities. Prior research has shown that the economic effects of place-based policies tend to be very local. We will below present evidence, which suggest that the same holds true for SEZs in India. If we were willing to assume that the reference municipalities in 20-25km distance are untreated, the β_ds can be interpreted as the effect of the SEZ policy on the treated municipalities.

4 Data

Data on SEZs. We compiled information on all 147 Indian SEZs that were established under the SEZ Act and became operational until 2013 from various sources. Data on the

Figure 2: Geographical distribution of operational SEZs



Notes: This figure plots the location of all SEZs in India that were established under the SEZ Act 2005 and became operational until 2013.

name of the SEZ, whether the SEZ was privately or publicly developed, its location, size, industry type and date of notification are readily available from the Ministry of Commerce and Industry.[4] We georeference each SEZ at the municipality-level or, if available, even at its exact location. We verify our strategy by comparing our SEZ coordinates with a subsample of officially georeferenced SEZs that is accessible at the development commissioner's website of the Visakhapatnam SEZ.[5]

A key variable for our empirical analysis, the start of operation of a zone, was not directly accessible and had to be hand-collected from newspaper articles, official statistics by the Ministry of Commerce and Industry as well as from minutes of the Central Board of Approval. We define the date of operation as the earliest date available, where we find at least one firm in the SEZ that went into operation. Figure 2 illustrates the geographical location of SEZs.

Link to municipal data. Using GIS techniques, we spatially join the georeferenced SEZ data with the India Village-Level Geospatial Socio-Economic Data Set (Meiyappan et al., 2018), which provides the administrative boundaries of every municipality in India based on the Population Census of 2001. To identify SEZ-hosting municipalities and municipalities in close proximity to SEZs, we approximate the area of the SEZ based on the geo-coordinates and information on the SEZ's area which by the SEZ Act is required to be contiguous (SEZ Act, 2005). As information on precise SEZ boundaries is unavailable, we assume SEZs to be circular. Based on the total area, we then calculate the radius

[4]http://sezindia.nic.in/index.php.
[5]http://vsez.gov.in/

of the zone and consider all municipalities that fall within this radius as SEZ-hosting municipalities (see Appendix A for details). The geo-referencing further allows us to compute distances from sea ports, airports, railway networks, highways, cities or power plants that we will use as control variables in the empirical analysis.

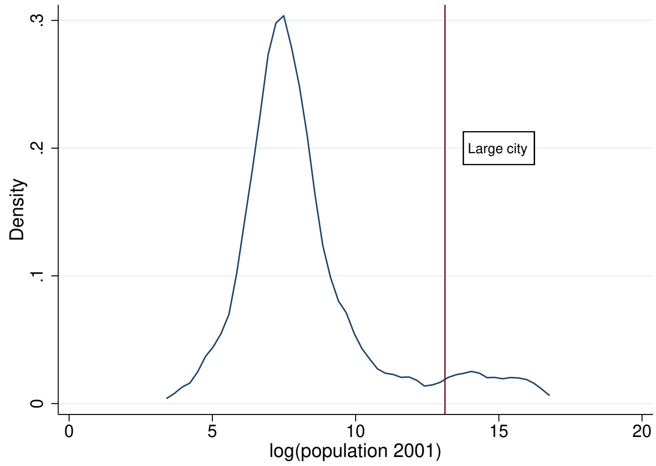
Economic and Population Census. Having information on the start of operation of each SEZ and knowing their hosting municipalities, we finally use both the *Economic Census* and the *Population Census* to add economic variables like employment, population or the number of firms. The *Economic Census* contains the population of all non-agricultural (i.e. manufacturing and service) firms in India including the informal sector. We can draw on three repeated cross-sections of data for the years 1998, 2005 and 2013. We link municipalities across the three Economic Census waves by using the time-consistent municipality identifiers provided by the Socioeconomic High-resolution Rural-Urban Geographic Platform for India (Asher et al., 2021, SHRUG). For every non-agricultural firm in India, the Economic Census contains information on employment (total and separate by gender), a firm's industry code and its host municipality. We disregard public administration employment and employment in international organizations. The Economic Census for 2013 lists 58.5 million firms employing 131.3 million workers. We collapse each Economic Census round to the municipality level and calculate the municipalities' number of firms, total employment, employment by gender and by industry as well as employment for small and large firms.[6] In the following analysis, we classify firms as small if they employ less than 10 workers. The rationale behind this distinction is that firms with less than 10 workers are labelled 'informal' as they are subject to a lighter regulatory burden under Indian law (NCEUS, 2009). For example, they do not need to register with official statistics, are exempted from social security taxes and subject to light bureaucratic procedures (Amirapu and Gechter, 2020; Mehrotra, 2019).

We further complement the data with three waves of the *Population Census* containing a repeated cross-section of data for the years 1991, 2001 and 2011. The data contain information on the total population, literacy and infrastructure facilities such as number of schools, road access or electricity for every municipality in India. Most importantly, the Population Census contains information on persons working as cultivators or agricultural laborers, which are not covered by the Economic Census. As the last wave of the Population Census was 2011, we restrict the sample to municipalities in 50km radii of SEZs which became operational up to 2011 for analyses based on Population Census variables.

Descriptive statistics. To gain a better understanding for the size of municipalities

[6] We use the concordance tables provided by the Ministry of Statistics and Programme Implementation to harmonize industry codes across time. While the Economic Census of 2013 uses the National Industry Classification (NIC) of 2008, the Economic Censuses of 2005 and 1998 use the NIC codes of 2004 and 1987, respectively. We match the three-digit NIC-04 Codes to three-digit NIC-08 codes and aggregate them to one digit NIC-08 codes for our analysis. In cases of industry splits across industries, we assign the industry code, that has a higher employment share according to the Economic Census of 2013. Hence, one caveat is that the harmonization of industry codes is not entirely time consistent. However, most of the industry splits between NIC-04 and NIC-08 are within the same one-digit industry. Hence, only splits across different one-digit industries might bias the results.

Figure 3: Size distribution of SEZ-municipalities



Notes: Large cities are defined as $> 500K$ population.

that host SEZs, Figure 3 illustrates that the majority of these municipalities are well below a threshold of 500K inhabitants in 2001. As it will be difficult to observe an overall response of employment or other outcomes in the few large SEZ hosting municipalities, we take these out of our baseline analysis.[7]

The final sample comprises 49,669 municipalities with a total population of 146 million people according to the latest Population Census in 2011. As shown in Appendix A.2, the average municipality employs 290 non-agricultural employees with a median of 41 workers and accommodates 3,061 residents. On average, there are 70 female and 220 male non-agricultural workers per municipality. The ratio in agriculture amounts to 189 women versus 330 men. Small (informal) firms with less than 10 workers account for about two thirds of average employment.

With respect to ownership, 77% of the SEZs in our 2005-2013 sample were developed by private companies versus 23% by public bodies. In terms of industry denomination, 57% were IT zones, followed by engineering (12%), pharmaceutical (9%) and multi-product zones (9%). The average SEZ covers 1.76 square kilometers, but the size varies systematically by industry denomination. IT-zones, on average, cover 0.25 square kilometers, multi-product SEZs 14.02 square kilometers.

As we compare municipalities across space, Table 1 provides an overview of locational characteristics by distance bin, mostly in logs as they enter our estimation. SEZ-hosting municipalities, shown in column (1), are similarly close to ports, cities and power plants, but better connected to railways or highways compared to reference locations shown in column (6). Further, municipalities with a SEZ tend to be larger in terms of both population and employment and are characterized by a higher formal employment share. Notice, how-

[7]We show in Appendix B that the effects are negligible and insignificant for municipalities above the threshold and that including them in the sample is innocent for our results.

Table 1: Pre-treatment location characteristics

	Mean values and standard deviations (in brackets)										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	0km	0-5km	5-10km	10-15km	15-20km	20-25km	25-30km	30-35km	35-40km	40-45km	45-50km
log distance to city (km)	3.808	3.645	3.712	3.658	3.749	3.806	3.861	3.952	4.035	4.108	4.159
	(1.011)	(0.909)	(0.874)	(0.808)	(0.838)	(0.763)	(0.699)	(0.651)	(0.594)	(0.549)	(0.536)
log distance to port (km)	4.459	4.756	4.842	4.753	5.046	4.960	5.025	5.102	5.087	5.143	5.126
	(1.327)	(1.345)	(1.273)	(1.277)	(1.175)	(1.132)	(1.138)	(1.117)	(1.080)	(1.094)	(1.058)
log distance to power plant (km)	3.718	3.652	3.699	3.531	3.733	3.753	3.816	3.896	3.925	3.929	3.939
	(0.750)	(0.774)	(0.784)	(0.851)	(0.769)	(0.798)	(0.767)	(0.752)	(0.753)	(0.776)	(0.765)
log distance to railway (km)	1.735	2.002	2.073	2.020	2.112	2.156	2.220	2.316	2.382	2.461	2.467
	(1.153)	(1.153)	(1.085)	(1.054)	(1.068)	(1.084)	(1.116)	(1.116)	(1.092)	(1.114)	(1.148)
log distance to highway (km)	1.941	2.151	2.312	2.419	2.553	2.618	2.733	2.863	2.954	3.014	3.063
	(1.290)	(1.228)	(1.150)	(1.062)	(1.118)	(1.112)	(1.116)	(1.062)	(1.047)	(1.040)	(1.055)
log distance to airport (km)	4.519	4.395	4.431	4.370	4.607	4.618	4.701	4.783	4.796	4.825	4.855
	(1.350)	(1.264)	(1.193)	(1.052)	(1.053)	(1.016)	(0.970)	(0.917)	(0.881)	(0.838)	(0.810)
log population in 2001	7.643	7.428	7.204	7.257	7.115	7.092	7.088	7.044	6.997	6.980	6.949
	(1.432)	(1.220)	(1.098)	(1.063)	(1.098)	(1.071)	(1.034)	(1.049)	(1.079)	(1.080)	(1.079)
log employment in 2005	4.962	4.500	4.160	4.226	3.984	3.952	3.945	3.872	3.838	3.780	3.743
	(2.080)	(1.790)	(1.661)	(1.602)	(1.593)	(1.583)	(1.535)	(1.543)	(1.577)	(1.540)	(1.537)
Formal employment share in 2005	0.222	0.135	0.110	0.102	0.105	0.0995	0.0873	0.0745	0.0735	0.0715	0.0687
	(0.310)	(0.235)	(0.214)	(0.204)	(0.215)	(0.211)	(0.192)	(0.178)	(0.176)	(0.174)	(0.167)

Notes: This table reports the mean values and their standard deviations for municipalities in the respective distance bins relative to SEZs. *Distance* measures the distance in kilometers to the closest respective amenity. *City* denotes municipalities with a population of more than 500K. *Formal employment share in 2005* denotes the share of of formal employment (i.e. in firms with more than 10 employees) relative total municipal employment. Standard deviations in brackets.

ever, that the mean values are not statistically different from each other. We nevertheless ensure that these differences in locational characteristics are not driving our estimation results by interacting these covariates with the time fixed effect according to Eq. (2).

5 Baseline results

In this section, we present evidence that SEZs have increased local manufacturing and service employment (Section 5.1).[8] We further explore the scope of potential relocation in Section 5.2 and study underlying mechanisms like structural change or regional migration in Section 5.3.

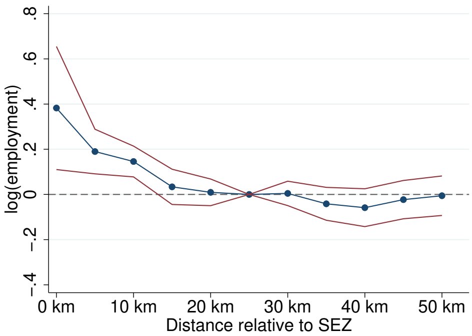
5.1 Employment effects

Using the log of municipalities' manufacturing and service employment as the dependent variable, Figure 4 summarizes all results from the three respective approaches by plotting the coefficients $\hat{\beta}_d$ with the corresponding 95%-confidence intervals for all distance bins. Panel (a) is based on our main specification Eq. (1). We find a sharp difference in the employment growth of SEZ-hosting municipalities and reference locations between 2005 (the year of the SEZ Act) and 2013. SEZ-hosting municipalities and direct neighbors significantly gained employment relative to municipalities in further distance to the SEZ, suggesting that SEZs had a strong impact on local economic activity. Quantitatively, the point estimate suggests that employment in SEZ-hosting municipalities increased by 47pp $(= (e^{0.383} - 1) \times 100)$ relative to the reference municipalities. Employment in municipalities

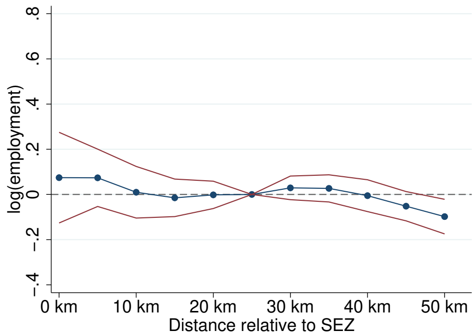
[8] We relegate results on other outcomes like public infrastructure or firm entry into the appendix.

Figure 4: SEZ effect on non-agricultural employment

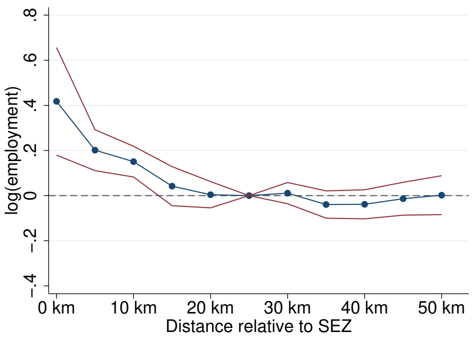
(a) Treatment (baseline)



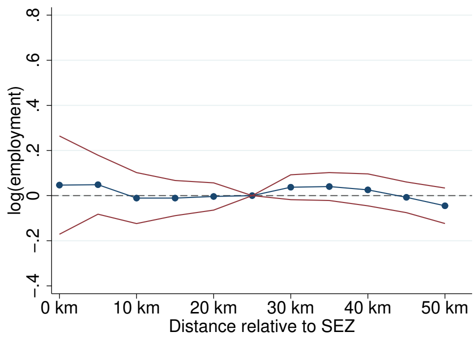
(b) Placebo (baseline)



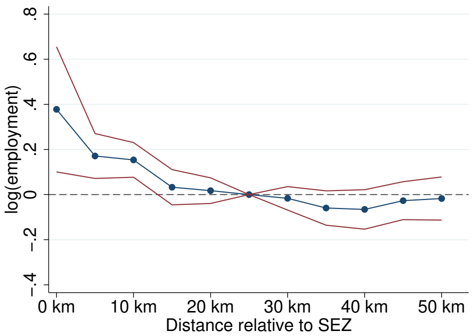
(c) Treatment (control variables)



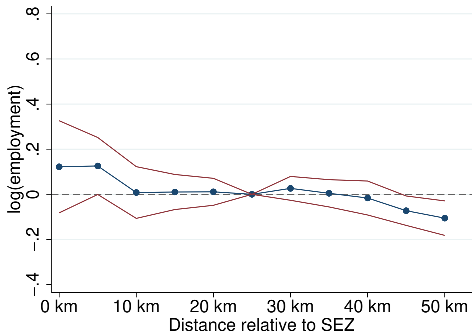
(d) Placebo (control variables)



(e) Treatment (CEM)



(f) Placebo (CEM)



Notes: The dots indicate the estimated parameters $\hat{\beta}_d$. Each subscript d refers to a distance on the horizontal axis, e.g. the coefficient at 0km refers to $d = 0$. Red lines indicate 95%-confidence intervals. Panel (a) refers to specification Eq. (1), panel (c) includes control variables and panel (e) is based on coarsened exact matching (CEM). The panels in the right column depict the respective placebo regressions where γ_{2013} is substituted with γ_{2005}. Standard errors are clustered at the district level. Regressions include municipality and year fixed effects. Employment data based on the Economic Census for 1998, 2005 and 2013.

in the <5km distance bin and the 5-10km distance bin increased by 21*pp* and 16*pp*, respectively, indicating substantial positive spillovers to adjacent regions. For more distant municipalities, the estimates for β_d turn out to be small and statistically insignificant, suggesting that employment changes between municipalities in further distance to the SEZ did not differ systematically. The magnitude of the estimated employment response is fairly large, but not implausible given the relatively small size of our sample jurisdictions. The average SEZ municipality in the sample hosts only 3,139 non-agricultural employees prior to treatment so the estimated relative effect translates into moderate absolute values.

The two remaining panels of the first column in Figure 4 report the corresponding findings for the additional approaches sketched in Section 3. Specifically, we augment the baseline model by pre-treatment locational characteristics interacted with the time fixed effect, panel (c), and apply coarsened exact matching based on employment and formal employment share to reduce the balance between treated and other municipalities, panel (e). The patterns of point estimates and confidence intervals look remarkably similar to our baseline approach establishing further confidence in the results. Moreover, the three plots in the second column of Figure 4, panels (b), (d) and (f), show the results of corresponding placebo tests based on our three estimation approaches and using the pre-treatment period 1998-2005. Evidently, all estimated coefficients are close to zero and statistically insignificant which provides direct evidence in support of the common-trends assumption. We further show in Appendix B.1 that our results are robust to using alternative distance bin classifications, alternative standard error clustering, including municipalities up to a distance of 200km and including large cities in the sample, respectively.

5.2 Job relocation or genuinely new employment?

An important aspect to understand is the degree of relocation between treated and control units to assess the extent to which the policy has generated *new* economic activity (Kline and Moretti, 2014; Criscuolo et al., 2019; Ehrlich and Seidel, 2018). Relocation can, in principle, be the only driver behind the estimated employment effects. To rebut this concern, we suggest two pieces of evidence.

First, our baseline estimates show a stark picture in the sense that employment growth differs strongly between SEZ-hosting municipalities and their neighbors in distance circles up to 10km, while there is no significant difference between the employment growth of municipalities in further distance from the SEZ (10-50km). For this pattern to be consistent with relocation of economic activity, relocation costs must be invariant in space, i.e. additional employment must have been sourced from municipalities in distance radii of 10-50km at about equal rates, irrespective of their precise distance to the SEZ. This is at odds with existing empirical evidence, which shows a rather stable inverse relation between geographic distance and relocation costs (Bodemann and Axhausen, 2012; Rossi and Dej, 2020). Note that extending the distance radius to 200km from SEZs does not change this pattern (see Appendix B.1). Our reasoning is in line with prior evidence suggesting that relocation - if present at all - is a local phenomenon and limited to small geographic areas (Neumark and Simpson, 2015).

Second, we explore whether the additional employment or the number of firms in SEZ municipalities and their direct neighboring jurisdictions in distance bands of up to 10km

Table 2: Outcome changes in SEZs vs distant municipalities

	Distance to SEZ							
	10-15km	15-20km	20-25km	25-30km	30-35km	35-40km	40-45km	45-50km
Employment ($\leq$ 10km)	-0.021	-0.031	-0.023	-0.027	-0.000	0.057	0.009	0.019
	(0.047)	(0.039)	(0.048)	(0.029)	(0.046)	(0.038)	(0.043)	(0.046)
Firms ($\leq$ 10km)	0.008	-0.039	-0.039	-0.030	-0.009	0.034	-0.015	-0.011
	(0.055)	(0.039)	(0.038)	(0.030)	(0.044)	(0.036)	(0.042)	(0.041)
Observations	6,940	7,864	9,070	10,556	11,656	12,334	13,054	13,534
District fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results from Eq. (3). The upper panel depicts the effects of employment within a 10km radius around a SEZ on employment in municipalities in further distance bins. The lower panel reruns this specification using the number of firms as the dependent variable. Standard errors are clustered at the district level. Years included: 2005 and 2013. *** p<0.01, ** p<0.05, * p<0.1.

systematically correlate with changes in employment or the number of firms in municipalities in further distance. If the strong relative increase in SEZ-hosting municipalities and their jurisdictions in less than 10km distance reflects relocation, we expect that larger employment increases in SEZ municipalities and surroundings are associated with stronger employment declines in jurisdictions in further distance (> 10km). We run a regression model of the following form:

$$ln(y_{i,t}) = \beta_0 + \beta_1 ln(y_{i,t}^{0-10}) + \alpha_i + \gamma_t + \epsilon_{it}, \tag{3}$$

where $y_{i,t}$ measures non-agricultural employment or the number of firms in municipalities in a distance of more than 10km to their closest SEZ while $y_{i,t}^{0-10}$ depicts either variable in SEZ-municipalities and its neighbors up to 10km. We run this regression separately for each distance bin $> 10km$.

The estimates for β_1 on employment are reported in the upper panel of Table 2. The columns reflect specifications for neighboring municipalities in different distance bins (specification (1) comprises municipalities in a distance between 10-15km from a SEZ; specification (2) municipalities in a distance between 15-20km etc.). Throughout all specifications the β_1-estimate turns out small and statistically insignificant, corroborating the notion that the observed baseline findings reflect a genuine increase in local non-agricultural economic activity rather than relocation of economic activity in space. Similar results emerge if we use the number of firms as the measure of economic activity (see lower panel of Table 2).[9]

In Appendix B.2, we also show in a back-of-the-envelope calculation that, even if we take the negative (and statistically insignificant) coefficient estimates for some distance bins as depicted in Table 2 at face value, the estimates suggest that only around 1% of the

[9]Note that the number of municipalities per bin increases mechanically with distance to SEZs. Thus, the number of sourcing municipalities becomes larger relative to the number of potentially receiving municipalities (municipalities in <10km from an SEZ). Nevertheless, relocation would still imply that the estimated coefficients β_d decline in distance d.

observed employment gain in SEZs and neighboring jurisdictions up to 10km relates to relocation from municipalities in further distance. While similar to the existing literature (Ehrlich and Seidel, 2018; Criscuolo et al., 2019), the evidence presented in this subsection is only suggestive in nature, but it points to genuine increases in aggregate economic activity through SEZ establishment.

5.3 Structural change and migration

If genuinely new jobs were created, then a natural follow-up question is who took up these jobs? We explore two channels: structural change and regional migration.

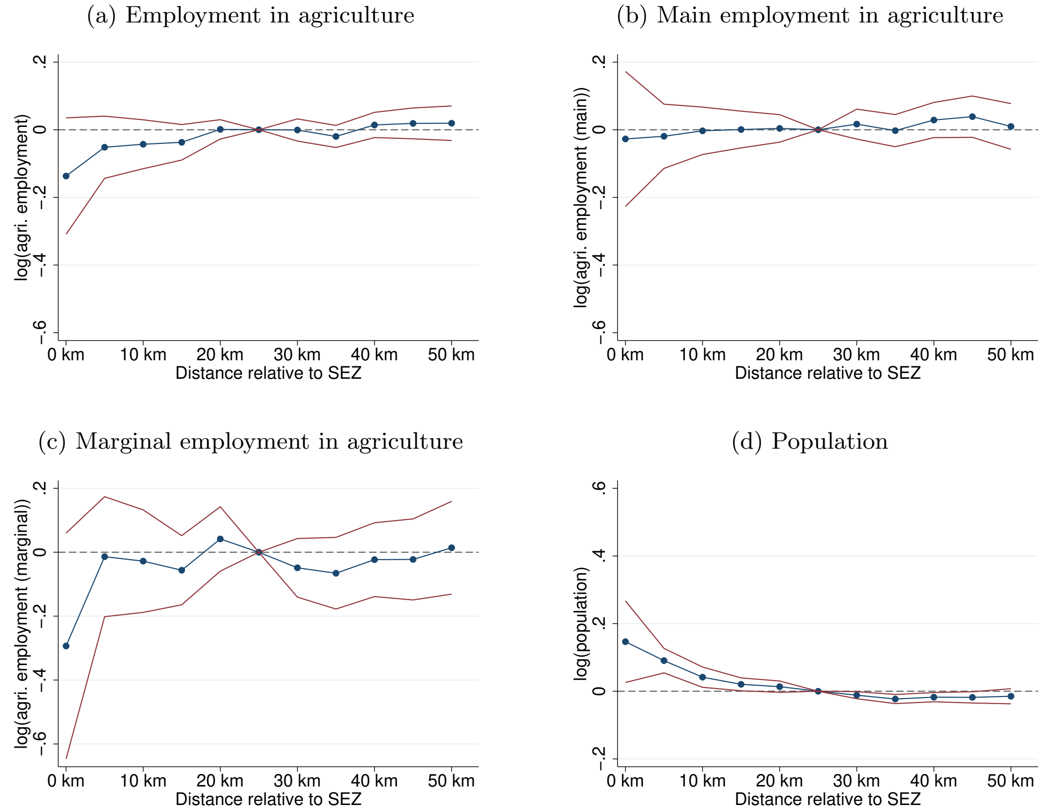
India is characterized by a large agricultural sector that accommodates about half of the working population, mostly in low-productivity jobs and in marginal employment relationships (International Labour Organization, 2013). Managing the transition from an agricultural to a manufacturing and service economy is widely believed to be one of the country's top challenges (Binswanger-Mkhize, 2013) and a promising avenue for higher-paid jobs and economic growth (McMillan et al., 2014; Eichengreen and Gupta, 2011; Gollin et al., 2014). We test whether SEZs contributed to this transition.

Specifically, we ask whether the documented increase in local non-agricultural employment in SEZ-areas is paralleled by a decline in agricultural employment. Based on the population census, we assign agricultural employment to municipalities following the procedure outlined in Section 4 and then rerun our baseline model in Eq. (1) using the log of the number of agricultural workers as the dependent variable. Panel (a) of Figure 5 indicates that the number of workers in the primary sector declined in SEZ municipalities after SEZ establishment. Quantitatively, the drop amounts to 12.8*pp* and just fails to gain statistical significance at conventional significance levels (p-value of 0.11). Neighboring municipalities up to 10km also experience a negative, but smaller effect.

We can go one step further and split up the overall reduction of agricultural jobs into main and marginal employment. As shown in panels (b) and (c) of Figure 5, SEZs have in particular led to a reduction in marginal agricultural employment - i.e. workers that are employed for less than 183 days per year. Quantitatively, their number declined by 25*pp* in SEZ-municipalities (p-value of 0.103) relative to municipalities in the reference category, whereas the point estimates for the response of the number of main agricultural workers is close to zero. Although we cannot follow individual workers across space and jobs, our results provide novel evidence that the SEZ-policy has led to a transition from agricultural to manufacturing and service employment.

Turning to the second channel, workers may be sourced from outside the SEZ-municipality. While we have shown above that there is little evidence for net job relocation over a distance of 50km, it is possible that SEZ-municipalities experienced higher population growth due to regional migration. The pronounced population growth in India provided an ideal environment for such an effect. In our sample, the population increased from 127M to

Figure 5: Sources for local non-agricultural employment growth



Notes: The dots indicate the estimated parameters $\hat{\beta}_d$ according to Eq. (1). Each d refers to a distance on the horizontal axis, e.g. the coefficient at 0km refers to $d = 0$. Panel (a) depicts results for agricultural employment. Panels (b) and (c) show results for main and marginal agricultural employment, respectively. Panel (d) depicts results for total municipal population. Red lines indicate 95%-confidence intervals. Standard errors are clustered at the district level. Regressions include municipality and year fixed effects. All panels are based on the Population Census for the years 2001 and 2011.

146M between 2001 and 2011. Panel (d) of Figure 5 shows that population growth in SEZ areas was systematically higher than in control jurisdictions and there is indication of SEZ-induced population gains in neighboring areas. In principle, the difference in population growth might also reflect differences in fertility rates (e.g. triggered by higher income opportunities in SEZ areas). Given the rather short time frame of our sample, we consider this explanation to be of second-order importance.

A third potential channel that we cannot exploit due to data limitations would be commuting from neighboring locations to SEZ areas. Commuting is rather uncommon in India as public transport networks are not well developed and services tend to be infrequent. Census data for 2011 suggests that only around 18% of the Indian workforce travels more than 10km to work.[10] We therefore regard structural change and regional migration as the more important explanations.

Finally, employment growth in manufacturing and services could be associated with

[10] Own calculation based on the Population Census 2011.

higher labor-force participation or lower unemployment. As these data are unavailable at the municipality level, we can neither explore this mechanism empirically.

6 Heterogeneous effects

In this section, we shed light on heterogeneous treatment effects by gender (6.1), firm size (6.2) and zone characteristics (6.3) to explore the anatomy of the employment response.

6.1 Employment effects by gender

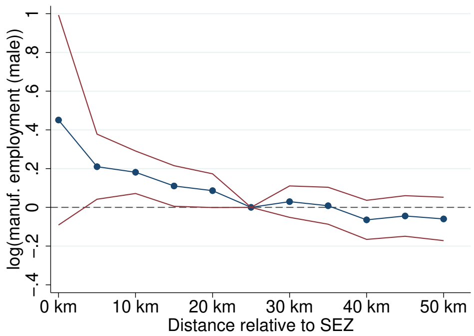
Female workers are a particularly vulnerable group in the Indian labor market as unemployment rates among women tend to be high and discrimination is a long-standing phenomenon (Klasen and Pieters, 2015; Srivastava and Srivastava, 2015). Against this background, providing better income opportunities to women by integrating them into the formal labor market would be an important effect of the policy. One presumption proponents of the SEZ-policy have expressed is that additional jobs in manufacturing or services would be sourced from the unused female workforce or from women being employed marginally in the agricultural sector and that women might be the main beneficiaries of such policies (e.g. Bacchetta et al., 2009; Rama, 2003; Brussevich and Dabla-Norris, 2020). These hopes were further spurred by rising female employment shares in export-oriented industries in many less-developed countries (Ozler, 2000; Bussmann, 2009).

Our data allow us to split up employment effects by sector and gender. Although we cannot track individuals, panels (e) and (f) in Figure 6 reveal that in particular female employment declined in the agricultural sector ($-28.8pp$) relative to reference municipalities while the effect on men was closer to zero and statistically insignificant. An explanation of this gender effect might be that only about 15% of agricultural businesses are owned by women rendering them more responsive to new job opportunities in manufacturing (Agarwal et al., 2021). Moreover, our data reveal that female workers account for 59% of marginally employed agricultural workers such that non-agricultural jobs might offer an appealing alternative for many. The decline of female employment in agriculture corresponds to a pronounced increase of female workers in manufacturing by $66pp$ (p-value: 0.081, panel (b)), but no significant effect in services. Male employment, in contrast, rises in both manufacturing ($57pp$, p-value: 0.102) and services ($40.4pp$, p-value: 0.002) as can be seen from panels (a) and (c). As high-skill-intensive IT-zones play a quantitatively important role within the service industry in our sample, it is not implausible that additional employment does not seem to be lured away from the predominantly low-skilled agricultural sector. A potential source of skilled-workers could be regional migration (see panel (d) of Figure 5).

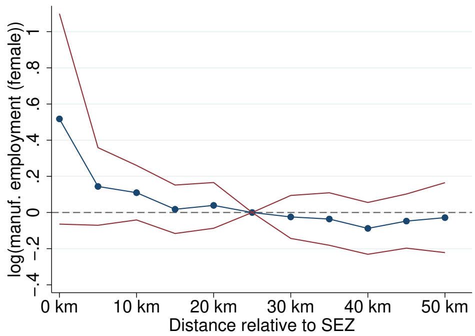
In sum, we can conclude that both men and women have contributed to the overall increase in manufacturing employment in SEZ-municipalities while the positive effect in

Figure 6: Employment effects by gender

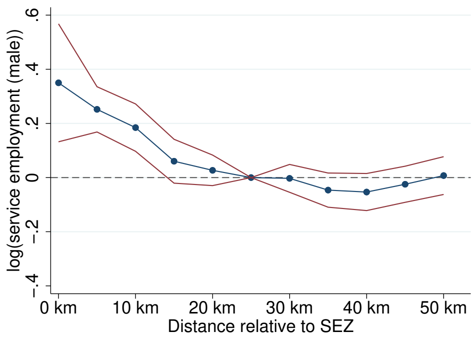
(a) Manufacturing: Male



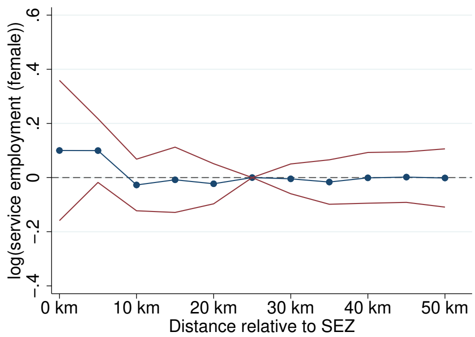
(b) Manufacturing: Female



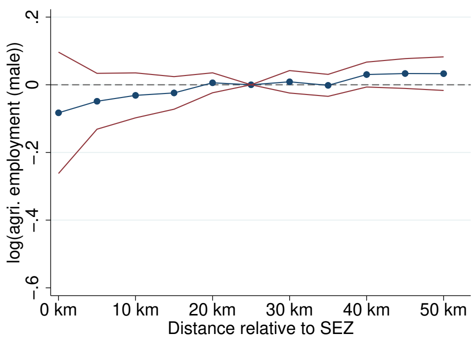
(c) Services: Male



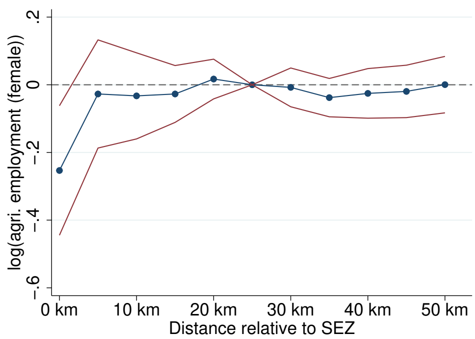
(d) Services: Female



(e) Agricultural: Male



(f) Agricultural: Female



Notes: The dots indicate the estimated parameter $\hat{\beta}_d$ according to Eq. (1). Each d refers to a distance on the horizontal axis e.g. the coefficient at 0km refers to $d = 0$. Red lines indicate 95% confidence intervals. Standard errors are clustered at the district level. Regressions include municipality and year fixed effects. Panels (a)-(d) are based on the Economic Census for the years 2005 and 2013. Panels (e)-(f) are based on the Population Census for the years 2001 and 2011.

services was only driven by male employment. As female employment declines substantially in agriculture in SEZ-municipalities, our results suggest that the sectoral change outlined in Section 5.3 is primarily centered around female employment.

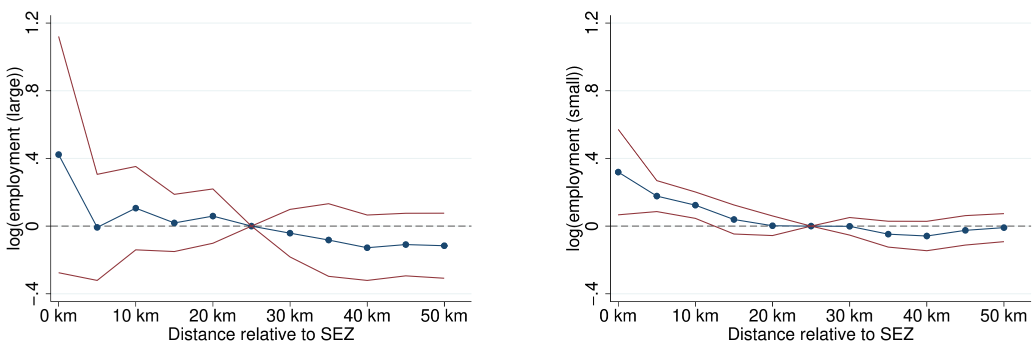
6.2 Employment effects by firm size

Our data further allow us to decompose the overall employment effect by firm size. While some elements of the SEZ-policy mainly target large firms, others - e.g. the corporate tax holidays provided - are equally attractive for smaller entities. Smaller firms may also find it attractive to co-locate in or close to SEZs if they are connected to other (exporting) firms through input-output links. Understanding whether small or large entities accommodate the lion's share of new employment is important for a number of reasons: First, prior evidence shows that firm size strongly correlates with worker productivity and workers' wages (Idson and Oi, 1999; Oi and Idson, 1999). This said, note that productivity in the manufacturing and service sector tends to be higher than in agriculture, especially in comparison with marginal agricultural work. Second, small firms are more likely to be informal. In India, firms with less than 10 workers are, by official statistics, tabbed as 'informal' (Mehrotra, 2019; NCEUS, 2009). Informality can offer benefits to firms, but likely lowers job-related amenities for workers. There are, finally, also fiscal implications. The tax and tariff cuts of SEZs imply direct revenue losses for governments, that may partly be compensated by revenue collections from SEZ-induced new activity, but the latter revenue gains are arguably smaller if the employment is created by small firms, which are exempt from certain insurance and social security tax payments and, in general, show weaker tax compliance behavior than larger entities (LaPorta and Shleifer, 2014; McCaig and Pavcnik, 2021).

Panels (a) and (b) of Figure 7 report employment responses separately for large (more than 10 workers) and small firms (up to 10 workers), respectively. We find a strong, but insignificant effect for large firms of 53*pp* and a somewhat smaller, but significant employment gain of 38*pp* for small firms. The insignificant estimate for large firms likely

Figure 7: Employment by firm size

(a) Large firms (b) Small firms



Notes: A firm classifies as small if it employs not more than 10 workers. The dots indicate the estimated parameters $\hat{\beta}_d$ according to Eq. (1). Each d refers to a distance on the horizontal axis, e.g. the coefficient at 0km refers to $d = 0$. Red lines indicate 95%-confidence intervals. Standard errors are clustered at the district level. Regressions include municipality and year fixed effects. All panels are based on the Economic Census for the years 2005 and 2013.

reflects the few observations per municipality. We further show in Appendix B.3, that the SEZ-policy has stimulated entry of small firms, especially in areas outside SEZs.

6.3 Zone characteristics

One striking feature of the small existing literature on the spatial effects of SEZs is that studies largely assume SEZs to be homogeneous entities (e.g. Wang, 2013; Lu et al., 2019). That is at odds with real-world settings (World Bank, 2008). Zones in India differ in two key dimensions: First, there is heterogeneity in zones' main industry denomination. There are IT, pharma, engineering, apparel or manufacturing zones (the latter are tabbed 'multiproduct zones'). Zones further differ in whether they are developed and run by a private or a public body. In this section, we assess how these characteristics shape the impact of SEZs on local economic activity.

Public vs. private SEZs. As depicted in panel (a) of Figure 8, more than two thirds of the zones that went into operation during our sample period were developed and run by a private entity. While privately developed zones do not systematically differ from their publicly developed counterparts in terms of area size (see panel (b)), they tend to be located in larger and more prosperous areas (as determined by host municipalities' employment and nightlight intensity, see panels (c) and (d)).[11] This is consistent with public developers putting a stronger emphasis on creating new employment in less prosperous regions compared to private developers, who primarily seek to maximize profits.

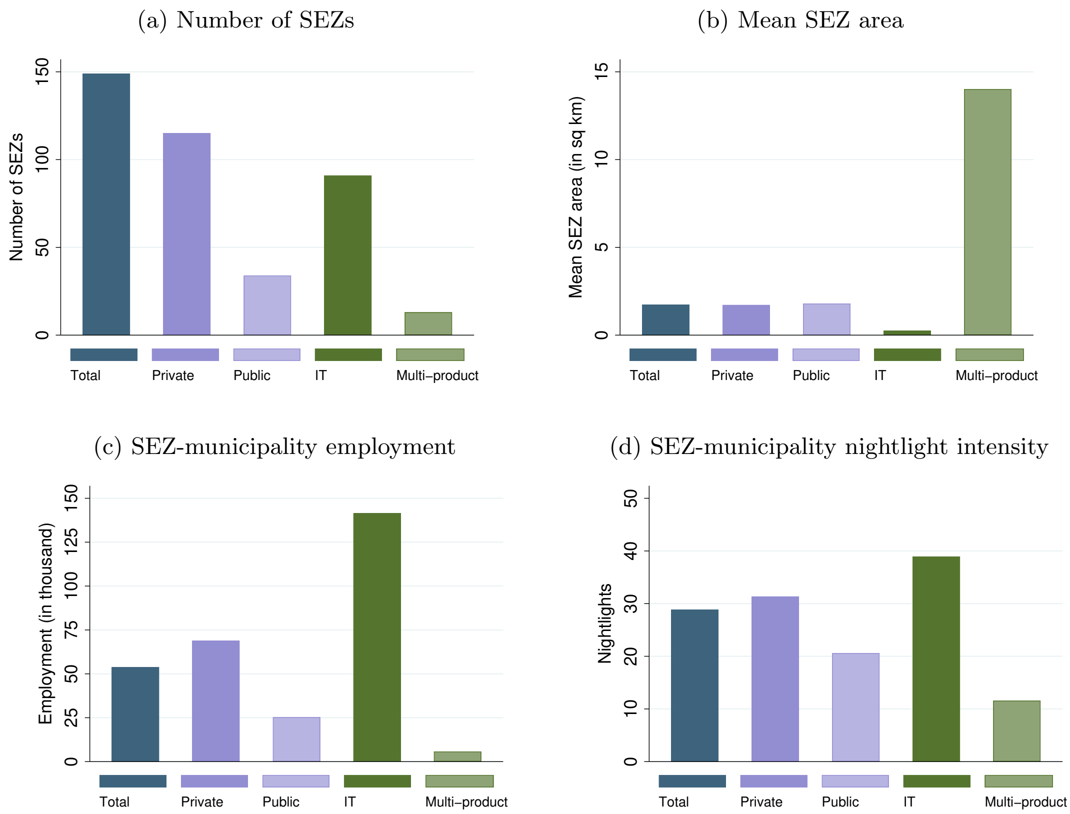
There are also reasons to believe that the local employment impact of public and private SEZs may differ. On the one hand, public bodies have less incentives to run projects efficiently (see e.g. Megginson and Netter, 2001) and the optimal size of publicly developed zones may therefore, ceteris paribus, be smaller than the optimal size of private zones. On the other hand, public zones may exert stronger local employment effects as public developers plausibly pursue employment goals when designing SEZs, while private developers first and foremost aim for profit maximization. To test for effect heterogeneity along these lines, we estimate a model of the following form:

$$\begin{aligned} ln(y_{it}) = &\sum_{d=0, d\neq 5}^{10} \beta_d D_{[d_i=d]} \times \gamma_t + \sum_{d=0, d\neq 5}^{10} \theta_d D_{[d_i=d]} \times \gamma_t \times priv.developer_i \\ &+ \gamma_t \times priv.developer_i + \gamma_t + \alpha_i + \epsilon_{it}, \end{aligned} \tag{4}$$

where the variable definitions correspond to Eq. (1) and $priv.developer_i$ is a dummy variable indicating that the closest SEZ to municipality i is developed by a private developer. One challenge when estimating Eq. (4) is that SEZs do not only differ in their status of being developed by a private or public body, but also in their industry denomination.

[11] Consistent GDP data are, unfortunately, not available at the level of Indian municipalities. Henderson et al. (2012) show that nightlights are a reasonable proxy for economic development and income growth at subnational levels.

Figure 8: SEZ characteristics by industry and ownership



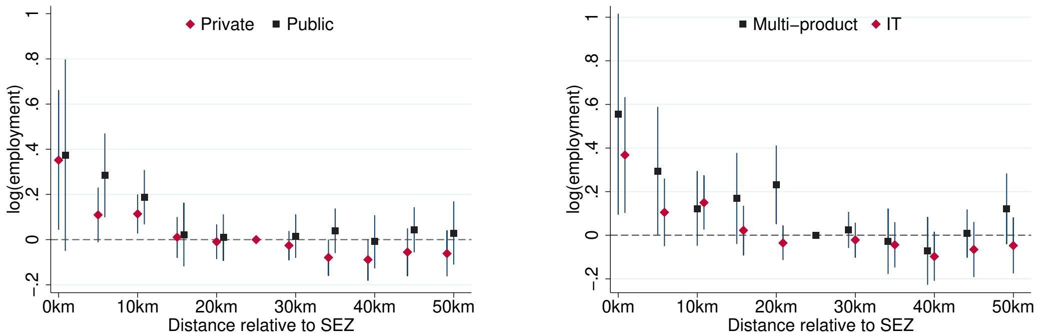
Notes: SEZ-municipality characteristics are based on the year 2005. Authors' own calculations based on SEZ information from the Ministry of Industry and Commerce, the Economic Census and DMSP-OLS Nighttime Lights Time Series provided by the National Oceanic and Atmosphere Administration (NOAA).

If the industry denomination correlates systematically with private and public development status and with SEZs' local employment impact, estimates of θ_d may be confounded. Descriptive statistics indeed suggest that the fraction of IT zones is, for example, larger among private than among public SEZs, so we draw on *coarsened exact matching* (CEM) to address this concern (Iacus et al., 2012; Blackwell et al., 2009). In the base analysis, we match observations according to the industry class of the closest SEZ located in distance d_i from municipality i to balance differences in industry denomination across SEZs developed and run by private and public entities.

Panel (a) of Figure 9 plots the effects of SEZs on local employment conditional on industry denomination and separately for public and private SEZs (β_d and $\beta_d + \theta_d$ in Eq. (4)). It is evident that the effects do not differ systematically between publicly and privately developed SEZs. If anything, employment effects are larger in publicly developed zones, but the effects are not statistically different from each other. In Appendix B.1, we report additional results where we re-estimate Eq. (4), first, without matching and, second, conditional on SEZ's industry denomination *and* the area size of the SEZ relative to the area of its hosting municipality based on the default autocut algorithm as in Blackwell et

Figure 9: Employment effects by zone type (CEM)

(a) Public vs. private SEZs (b) IT- vs. multi-product SEZs



Notes: The plotted coefficients are estimated according to Eq. (4). In panel (a) (panel (b)), black squares depict the effects of public (multi-product) SEZs on employment in the respective distance bins ($\hat{\beta}_d$). Red diamonds show the effects for private (IT) SEZs ($\hat{\beta}_d + \hat{\theta}_d$). Each d refers to a distance on the horizontal axis, e.g. the coefficient at 0km refers to $d = 0$. Black lines indicate 95%-confidence intervals. Standard errors are clustered at the district level. Regressions include municipality and year fixed effects. Observations are re-weighted using coarsened exact matching over designated industry (ownership-type) and with *private* (*IT*) as the treatment category. For the purpose of giving a comprehensive picture of the full set of SEZ location choices the IT-sample includes also large municipalities. Employment data are based on the Economic Census for the years 2005 and 2013.

al. (2009). All specifications yield similar results.

Sector-specific effects. The impact of SEZs on local economic activity may also hinge on SEZs' industry denomination. Testing for effect heterogeneity in this dimension again comes with the challenge that industry denomination might correlate with other zone characteristics like the type of developer and zone size. Our data indeed suggest that IT-zones tend to be hosted by systematically larger jurisdictions than multi-product zones. This is intuitive since IT-firms demand high-skilled labor, which can be found predominantly in big cities.[12] Furthermore, the minimum area size requirement for IT-zones is substantially smaller than for other zone types, facilitating the establishment of IT-SEZs in areas where land is costly. Multi-product SEZs are, in turn, observed to be located in smaller municipalities at the coast, reflecting their need for proximity to physical infrastructure such as ports for exporting manufactured goods.

We apply coarsened exact matching to account for these features by estimating a model similar to Eq. (4) where we replace $priv.developer_i$ by an industry identifier $industry_i$. In our baseline results presented in panel (b) of Figure 9, we account for whether a zone was developed by a private or public body and explore employment effects between multi-product and IT-zones. Point estimates are somewhat higher for multi-product zones in some distance bins, but never statistically different from IT-zones. These conclusions remain the same for other industries (pharma, engineering, apparel) and are robust to matching on zone size and industry (see Appendix B.1).

[12] Note that we include municipalities with more than 500K inhabitants when studying heterogeneous effects across industries since a significant share of IT-SEZs is located in large cities.

7 Was the SEZ policy efficient?

We finally turn to ask the question of whether the SEZ-policy was efficient. Data limitations preclude a comprehensive cost-benefit analysis, but we are able to suggest a back-of-the-envelope calculation on foregone public revenue which allows us to compare the SEZ-policy to other place-based policies that have been studied in the literature.

In most cases, it is challenging to derive a concise number about foregone revenues and many previous studies therefore relied on broad estimations (Chaurey, 2017; Shenoy, 2018). In our case, the Indian Ministry of Finance monitored the SEZ-policy better than other policies by collecting and publishing an estimate on foregone revenues which is essentially the total amount of income tax concessions claimed by SEZ-firms and SEZ-developers (Ministry of Finance, 2015). Over the years 2006-2013 these amounted to INR 596.2 billion, equivalent to USD 9.9 billion based on 2013 purchasing power parity (PPP) exchange rates.[13]

Dividing the total foregone revenues by the 1.64 million jobs that were created over this period (see Appendix B.2), we conclude that the government lost about INR 363,612 (USD 6,060, PPP) in revenues per job created through the SEZ-policy. This has to be regarded as an upper bound because it assumes that all these taxes would have been paid if it was not for the SEZs. Nevertheless, the measure allows for a reasonable comparison with other policies. Chaurey (2017) states that the tax concessions granted to firms in the new states of Uttrakhand and Himachal Pradesh yielded an upper bound on foregone revenue of INR 66 billion while creating 33,000 jobs implying a ratio of about INR 2 million. Thus, the SEZ-policy created jobs at less than a fifth of these costs.[14]

We can also compare our measure to place-based policies outside of India. Neumark and Kolko (2010) report for the enterprise zones program in California that the foregone revenue per job created was about USD 240 (about USD 400 in 2013 PPP) which makes this policy much more efficient than both Indian policies. While this speaks for the relative inefficiency of place-based policies in India, another reason driving this large discrepancy is likely to be a mechanical one: The corporate income tax rate in India in 2005, for instance, has been much higher than in California in the 1990s (about 33% vs. roughly 9% (LAO, 1995)).

[13]For the year 2006, official statistics only reveal the value of aggregate income tax concessions for all incentive programs combined. We thus approximate the foregone revenue due to SEZs in 2006 by applying the share of SEZs in total deductions for the year 2007 (where the deductions were split up by incentive programs) to the aggregate figure from 2006.

[14]When also including direct investments into the cost figure of Chaurey (2017) the SEZ-policy appears even more efficient.

8 Conclusion

This paper evaluates the economic consequences of the rising number of Special Economic Zones in India after the SEZ Act in 2005 and thereby contributes to an emerging literature on place-based policies in less-developed countries.

We compile a new granular data set merging rich administrative census information on local economic activity with hand-collected data on the location and characteristics of SEZs to show that the SEZ Act 2005 has stimulated quantitatively important non-agricultural employment growth in SEZ-hosting municipalities and their close neighbors up to a distance of 10km. These positive effects correspond with a decline in local agricultural employment suggesting that the SEZ Act stimulated a sectoral transition from the primary sector to manufacturing and services. This shift was driven in particular by local female employment speaking to a large body of research on gender-related labor market effects and the empowerment of women.

Additional results suggest that the SEZ-induced employment growth accrues to a significant extent in small firms with a low level of formality and appears strikingly homogeneous across different industry (IT vs multi-product) and ownership (public vs private) types of SEZs. A back-of-the-envelope calculation reveals that the SEZ Act in 2005 was more efficient with regard to foregone tax revenues per job created compared to an alternative tax-incentive program in India, but more costly than the enterprise zone program in California.

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Appendix

A Data

This appendix complements Section 4 in the main paper providing more information on the data compilation process (Section A.1), descriptive statistics (Section A.2) and the geographic location of SEZs by industry (Section A.3).

A.1 Data compilation procedure

Figure A1 illustrates each individual step implemented in QGIS 3.10. to arrive at the municipality sample.

Figure A1: Automated workflow in QGIS 3.10 to obtain final municipality sample

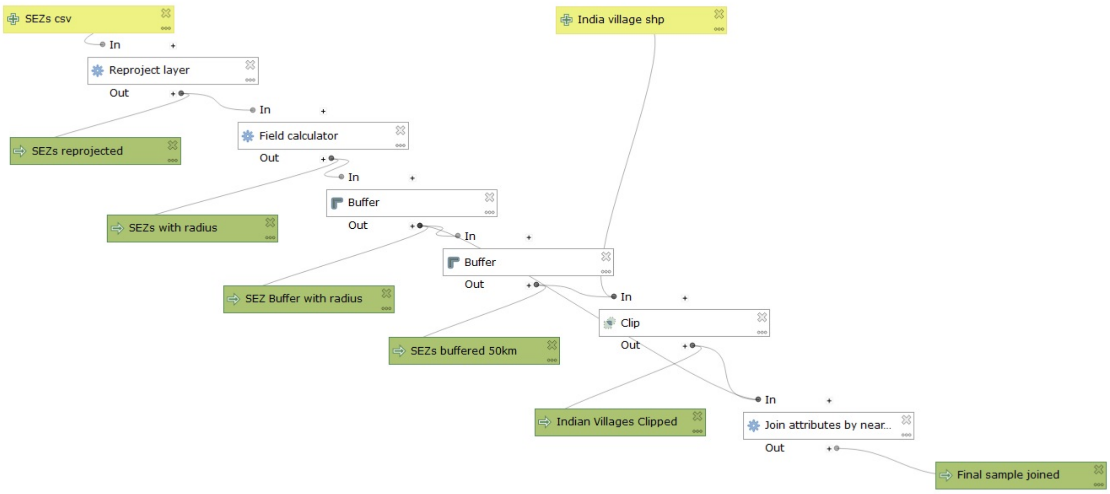
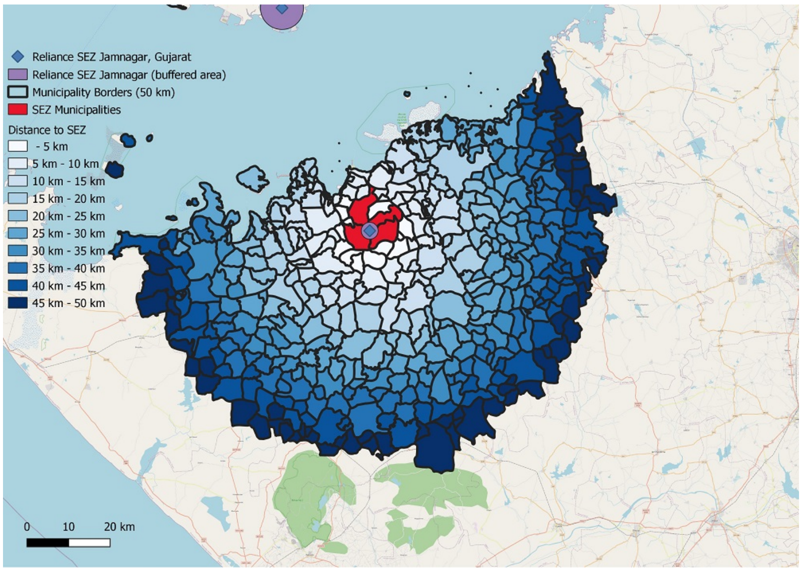


Figure A2: Mapping municipalities into distance bins around SEZs



Notes: This figure illustrates the procedure of mapping municipalities into distance bins using the"Reliance SEZ" in Jamnagar (Gujarat) as an example.

Figure A2 illustrates the procedure for the Reliance SEZ in Jamnagar, where the red-colored polygons correspond to municipalities, whose administrative borders intersect with the SEZ-area. We consider these municipalities as municipalities that contain a SEZ. The blue-shaded polygons illustrate neighboring municipalities, classified by their distance to their closest SEZ ("Reliance SEZ" in the example above). The light blue color indicates municipalities which are within a 5km distance to their closest SEZ; darker blue colors indicate municipalities in a distance of 5-10km, 10-15km etc. to the closest SEZ (up to 50km).

A.2 Descriptive statistics

Table A1 summarizes the baseline sample, i.e. excluding large cities with a population larger than 500K.

Table A1: Descriptive statistics

	Mean	*SD*	*Median*	*N*
Economic Census				
- Non-agricultural employment	290.0	2,457	41	140,386
- Male non-agricultural employment	220.2	1,967	30	140,386
- Female non-agricultural employment	69.77	573.2	8	140,386
- Non-agricultural employment (large firms)	87.68	1,518	0	140,386
- Non-agricultural employment (small firms)	202.3	1,337	36	140,386
- Manufacturing employment	113.0	1,307	7	96,186
- Service employment	211.3	1,637	34	96,186
- Number of firms	115.6	692.1	23	140,386
Population Census				
- Agricultural employment	520.1	793.4	303	127,868
- Male agricultural employment	330.6	501.2	194	127,868
- Female agricultural employment	189.5	333.5	93	127,868
- Main agricultural employment	433.9	706.7	240	85,308
- Marginal agricultural employment	117.9	223.8	42	85,308
- Population	3,061	15,224	1,043	127,868

Notes: Small and large firms are classified according to the 10-worker rule. Marginal workers (as opposed to main workers) work less than 183 days a year. Information on main and marginal workers is only available for the years 2001 and 2011. Information on sector employment (Manufacturing, Services) is only available for the years 2005 and 2013. The sample consists of all municipalities which are observed at least two consecutive rounds in the EC. Municipalities with more than 500K inhabitants are excluded.

Table A2 summarizes additional information on SEZs.

Table A2: Descriptive statistics SEZ-level data

	Mean	*SD*	*Median*	*N*
- Year of notification	2007	1.17	2007	147
- Year of operation	2010	2.07	2010	147
- Developing time (in years)	2.67	1.76	3	147
- Area sq. km	1.76	7.40	0.27	147
- Private SEZ	0.77	0.42	1	147
- Public SEZ	0.23	0.42	1	147
- IT SEZ	0.57	0.50	1	147
- Multiproduct SEZ	0.09	0.29	1	147
- Pharma SEZ	0.09	0.29	0	147
- Engineering SEZ	0.12	0.32	0	147
- Apparel SEZ	0.05	0.23	0	147

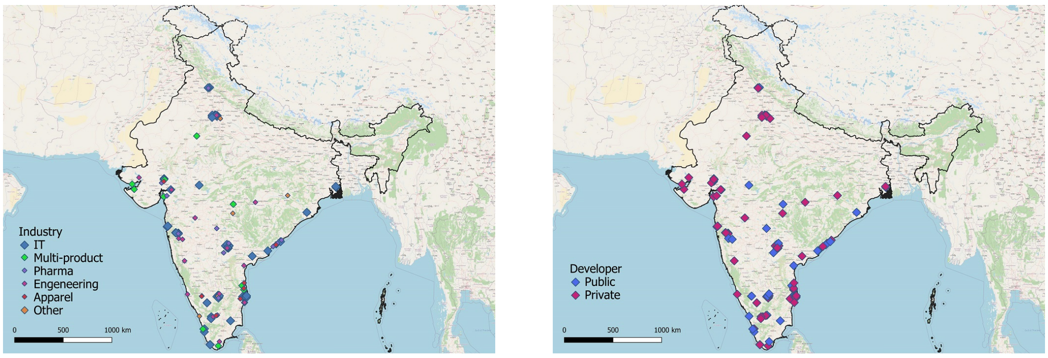
Notes: Authors' own calculations based on sources described in the main text. Private implies that the SEZ was established by a private body. Year of operation denotes the year in which the SEZ initialized its operation. Sample includes all SEZ that became operational until 2013.

A.3 Geographical location of SEZs by industry and developer

The maps in Figure A3 show the geographic distribution of different types of SEZs (IT, multi-product and public/private, respectively) across India.

Figure A3: Geographical location of SEZs by industry and developer

(a) SEZs by industry (b) SEZs by developer



Notes: Panel (a) plots the location of all SEZs in India that were established under the SEZ Act 2005 and became operational until 2013 by their industry designation. Panel (b) plots the location of all SEZs in India that were established under the SEZ Act 2005 and became operational until 2013 by their type of developer.

B Results

This appendix complements Sections 5 of the main paper. We present additional robustness checks for our baseline results (Section B.1), provide further details on our relocation analysis (Section B.2) and present additional results for outcomes like infrastructure (Section B.3)

B.1 Robustness of baseline results

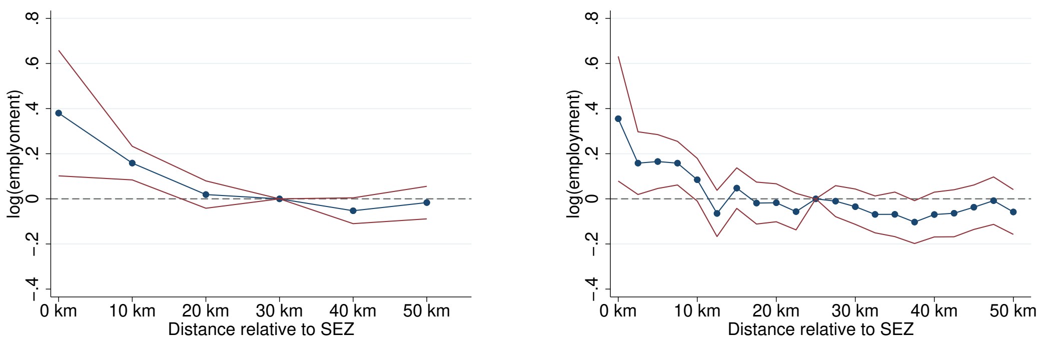
This appendix provides several robustness checks for both baseline results and heterogeneous treatment effects.

Baseline results. We check the robustness of our baseline results with regard to alternative distance bin classifications (Figure A4), alternative standard error clustering (Figure A5), including municipalities up to a distance of 200km (Figure A6), and including large cities (Figure A7). We find that none of these modifications alters our conclusions derived in Section 5.

Figure A4: SEZ effect on employment (10km and 2.5km distance bins)

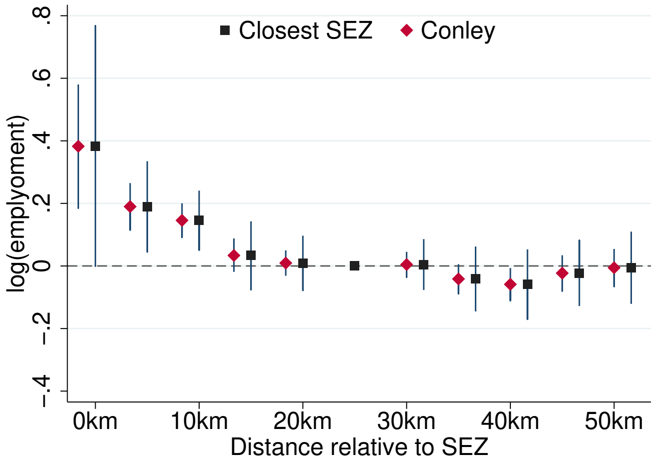
(a) 10km distance bins

(b) 2.5km distance bins



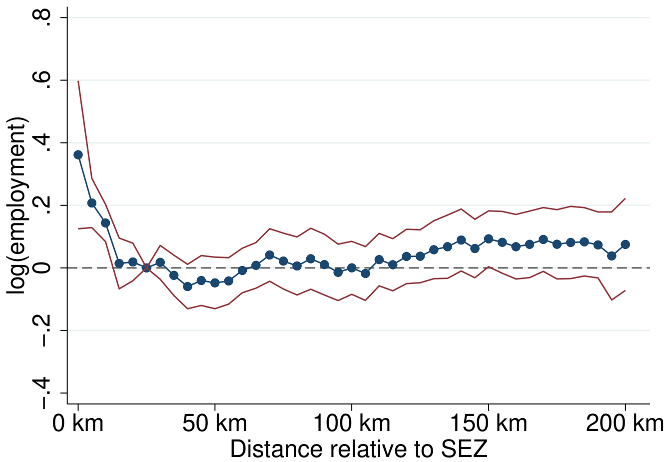
Notes: In this figure, distance bins are redefined as spreading 10km (panel (a)) and 2.5km (panel (b)). The dots indicate the estimates for $\hat{\beta}_d$'s as estimated by Eq. (1). Red lines indicate 95%-confidence intervals. Standard errors are clustered at the district level. Regressions include municipality and year fixed effects. Employment data are based on the Economic Census for the years 2005 and 2013.

Figure A5: SEZ effect on employment (SE clustered by closest SEZ and Conley)



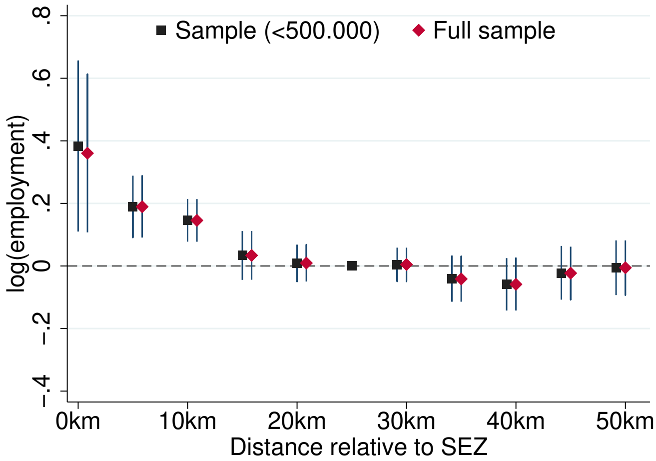
Notes: The plotted coefficients refer to the $\hat{\beta}_d$'s as estimated by Eq. (1). Each d refers to a distance on the horizontal axis e.g. the coefficient at 0km refers to $d = 0$. Red diamonds show the effects for when using Conley standard errors (Conley, 1999) with a distance cut-off at 30km. Black squares depict the results when clustering by closest SEZ. Red lines indicate 95%-confidence intervals. Regressions include municipality and year fixed effects. Employment data are based on the Economic Census for the years 2005 and 2013.

Figure A6: SEZ effect on employment with 200km radius



Notes: The dots indicate the estimates for $\hat{\beta}_d$'s as estimated by Eq. (1). In this figure, the radius drawn around SEZs has been increased from 50km to 200km. Note that the coefficients up to 50km remain identical to the baseline. Red lines indicate 95%-confidence intervals. The standard errors are clustered at the district level. Regressions include municipality and year fixed effects. Employment data are based on the Economic Census for the years 2005 and 2013.

Figure A7: SEZ effect on employment with and without large cities



Notes: The plotted coefficients are estimated according to Eq. (1). Black squares depict the effects of SEZs on employment in small municipalities (baseline), i.e. $\leq$ 500K ($\hat{\beta}_d$). Red diamonds show the effects including large municipalities, i.e. $> 500K$ ($\hat{\beta}_d + \hat{\theta}_d$). Each subscript d refers to a distance on the horizontal axis, e.g. the coefficient at 0km refers to $d = 0$. Black lines indicate 95%-confidence intervals. Standard errors are clustered at the district level. Regressions include municipality and year fixed effects. Employment data are based on the Economic Census for the years 2005 and 2013.

Heterogeneous zone characteristics. In this part, we provide additional results on heterogeneous effects with regard to the type of developer, i.e. public vs. private, and a zone's industry denomination.

Table A3 shows regression results on *heterogeneous effects by the type of developer* based on Eq. (4) with and without matching. The results are similar to the baseline findings in Section 6.3. If anything, employment effects are more pronounced for publicly developed zones, but the effects are not statistically different from each other.

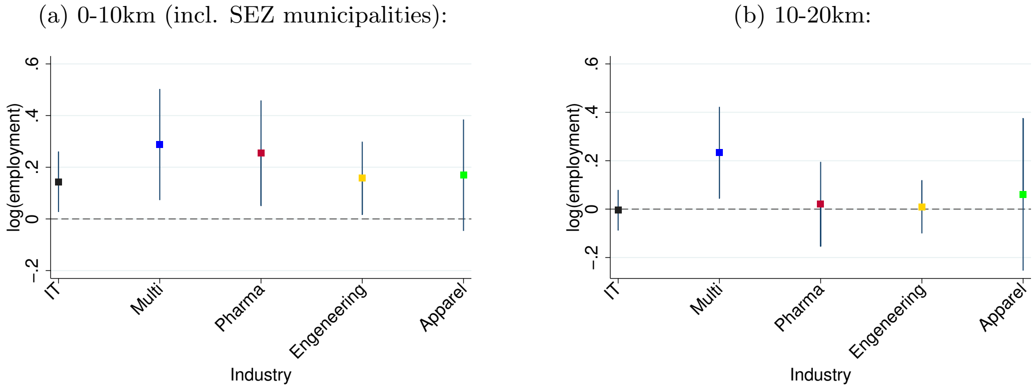
Table A3: Employment effects by developer

	(1)	(2)	(3)	(4)	(5)	(6)
			Employment			
Matching	None		Industry		Industry & size	
Distance bins	*Private*	*Public*	*Private*	*Public*	Private	*Public*
0km	**0.261**	**0.563****	**0.352****	**0.374***	**0.332****	**0.406***
	(0.175)	(0.243)	(0.156)	(0.215)	(0.158)	(0.205)
0-5km	**0.109***	**0.359*****	**0.109***	**0.285*****	**0.103**	**0.282*****
	(0.061)	(0.077)	(0.061)	(0.094)	(0.062)	(0.092)
5-10km	**0.114****	**0.202*****	**0.114****	**0.188*****	**0.113****	**0.199*** ***
	(0.044)	(0.053)	(0.044)	(0.061)	(0.045)	(0.061)
10-15km	**0.011**	**0.070**	**0.011**	**0.022**	**0.009**	**0.015**
	(0.045)	(0.064)	(0.045)	(0.071)	(0.047)	(0.069)
15-20km	**-0.009**	**0.044**	**-0.009**	**0.010**	**-0.017**	**0.011**
	(0.039)	(0.048)	(0.039)	(0.052)	(0.042)	(0.051)
20-25km	–	–	–	–	–	–
25-30km	**-0.026**	**0.058**	**-0.026**	**0.015**	**-0.031**	**0.015**
	(0.032)	(0.050)	(0.032)	(0.048)	(0.032)	(0.048)
30-35km	**-0.079***	**0.025**	**-0.079***	**0.038**	**-0.076***	**0.042**
	(0.040)	(0.076)	(0.040)	(0.049)	(0.041)	(0.049)
35-40km	**-0.089***	**-0.006**	**-0.089***	**-0.009**	**-0.092***	**-0.006**
	(0.046)	(0.081)	(0.046)	(0.059)	(0.047)	(0.060)
40-45km	**-0.055**	**0.033**	**-0.055**	**0.043**	**-0.057**	**0.031**
	(0.053)	(0.059)	(0.053)	(0.051)	(0.055)	(0.052)
45-50km	**-0.061**	**0.090**	**-0.061**	**0.028**	**-0.067**	**0.036**
	(0.051)	(0.059)	(0.051)	(0.070)	(0.052)	(0.068)
Observations	93,080	93,080	93,054	93,054	92,042	92,042
R-squared	0.890	0.890	0.912	0.912	0.912	0.912
Municipality fixed effects	✓	✓	✓	✓	✓	✓
Year fixed effecs	✓	✓	✓	✓	✓	✓

Notes: Regression results based on Eq. (4) contrasting employment effects of public and private SEZs. Columns (1)-(2) report results without matching. In columns (3)-(4), we match on industries as in Figure 9. Columns (5)-(6) show results when municipalities are matched according to SEZ-industry and SEZ-area relative to municipality area. Employment data are based on the Economic Census for the years 2005 and 2013. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1.

Next, we provide more results on *heterogeneous effects by industry.* Figure A8 and Table A4 confirm the conclusions derived in the main part of the paper. Multi-product zones reveal the highest effects, but we cannot rule out statistically that they are different from employment effects of SEZs with other industry denominations.

Figure A8: Employment effects by SEZ industry



Notes: The plotted coefficients refer to $\hat{\beta}_d + \theta_d$ based on a variant of Eq.(4) as explained in section 6.3. Panel (a) depicts results for municipalities up to 10km away from their closest SEZ (incl. SEZ-municipalities). Panel (b) illustrates results for municipalities that are 10-20km away from their closest SEZ. Straight lines indicate 95%-confidence intervals. Standard errors are clustered at the district level. Regressions include municipality and year fixed effects. For the purpose of giving a comprehensive picture of the full set of SEZ location choices across industries the industry sample includes all municipalities. Employment data are based on the Economic Census for the years 2005 and 2013.

Table A4: Employment effects by SEZ industry

	(1)	(2)	(3)	(4)	(5)	(6)
			Employment			
Matching	None		Developer		Developer & size	
Distance bins	*Multi*	*IT*	*Multi*	*IT*	Multi	*IT*
0km	**0.692*****	**0.368*****	**0.556****	**0.368*****	**0.684***	**0.368*****
	(0.215)	(0.134)	(0.232)	(0.134)	(0.358)	(0.134)
0-5km	**0.370****	**0.105**	**0.294****	**0.105**	**0.247***	**0.099**
	(0.143)	(0.078)	(0.149)	(0.078)	(0.129)	(0.081)
5-10km	**0.167***	**0.150****	**0.122**	**0.150****	**0.075**	**0.150****
	(0.087)	(0.062)	(0.086)	(0.062)	(0.094)	(0.062)
10-15km	**0.242***	**0.022**	**0.169**	**0.022**	**0.088**	**0.017**
	(0.136)	(0.057)	(0.106)	(0.057)	(0.092)	(0.059)
15-20km	**0.225****	**-0.035**	**0.232****	**-0.035**	**0.134***	**-0.035**
	(0.088)	(0.040)	(0.091)	(0.040)	(0.073)	(0.040)
20-25km	–	–	–	–	–	–
25-30km	**0.018**	**-0.022**	**0.024**	**-0.022**	**-0.024**	**-0.020**
	(0.048)	(0.040)	(0.042)	(0.040)	(0.042)	(0.040)
30-35km	**-0.001**	**-0.044**	**-0.029**	**-0.044**	**-0.017**	**-0.044**
	(0.066)	(0.052)	(0.075)	(0.052)	(0.070)	(0.052)
35-40km	**-0.025**	**-0.098***	**-0.073**	**-0.098***	**-0.126****	**-0.098***
	(0.065)	(0.056)	(0.078)	(0.056)	(0.062)	(0.056)
40-45km	**0.050**	**-0.065**	**0.009**	**-0.065**	**-0.057**	**-0.067**
	(0.061)	(0.064)	(0.055)	(0.064)	(0.070)	(0.064)
45-50km	**0.166****	**-0.047**	**0.122**	**-0.047**	**0.078**	**-0.045**
	(0.077)	(0.064)	(0.081)	(0.064)	(0.076)	(0.064)
Observations	51,254	51,254	51,254	51,254	50,464	50,464
R-squared	0.886	0.886	0.886	0.886	0.886	0.886
Municipality fixed effects	✓	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓	✓	✓

Notes: Regression results based on Eq. (4) with $industry_i$ instead of $priv.developer_i$ as an identifier. CEM is applied with IT being the treatment category. Columns (1)-(2) report the results without matching. Columns (3)-(4) show results when municipalities are matched according to SEZ developer (public or private) as in Figure 9. Columns (5)-(6) report results when municipalities are matched according to SEZ-developer and SEZ-area relative to municipality area. The sample includes all municipalities. Employment data are based on the Economic Census for the years 2005 and 2013. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1.

B.2 Relocation

This appendix complements Section 5.2 in the main paper by presenting a back-of-the-envelope calculation on relocation. The idea is to get a rough idea about the magnitude of effects. Our calculations should be taken with a grain of salt for several reasons. First, we need to accept that our thought experiment is largely based on insignificant estimates. And, second, we assume that there is no effect, for example through general equilibrium, on the reference (control) municipalities so we can interpret the estimates as percentage changes instead of percentage point changes. As we show below, even under these restrictive conditions, our results point to only tiny quantitative relocation.

In a first step, we ask how many jobs were established by SEZs in total within our sample frame. To answer this question, we draw on our baseline estimates in panel (a) of

Figure 4. The estimates suggest that within municipalities with a population of less than 500K employment increased by 47%, 21%, and 16%, respectively, in SEZ-municipalities and those in distance bins of 0-5km and 5-10km. Taking into consideration the average pre-treatment employment levels in SEZ-municipalities with less than 500K inhabitants (3,139) and the two closest distance bins (574 and 439, respectively) and the total number of such municipalities per distance bin (152; 1,264 and 2,390), the aggregate effect of SEZs on municipalities within a 10km radius amounts to 544,486 additional workers ($= 0.47 \times 3,139 \times 152 + 0.21 \times 574 \times 1,264 + 0.16 \times 439 \times 2,390$).

We augment this number by accounting for the effects of SEZs on municipalities with a population of more than 500K, which are excluded from our baseline sample.[15] For these municipalities the estimated effect of SEZs on employment is much lower at 11% within SEZ-municipalities, 2% in municipalities in 0-5km distance and 8% in municipalities in 5-10km distance from SEZs. Again, considering the average pre-treatment employment levels in SEZ-municipalities with more than 500K inhabitants (666,796), the two closest distance bins (1,233,342 and 280,455, respectively) and the total number of such municipalities per distance bin (12; 4; 7) the aggregate effect of SEZs on municipalities within a 10km radius amounts to 1,101,014 additional workers.

Thus, overall employment in 10km radii around SEZs increased by about 1.64 million, which implies an increase of about 9.5% relative to the pre-treatment year 2005. Note that official statistics quantify the increase of employment within SEZs at 1.14 million over our period of study 2005-2013. Taken at face value, this suggests that 2/3 of the estimated net employment increase accrues within-SEZs and 1/3 of it reflects spillovers to surrounding regions (including SEZ municipalities themselves).[16]

In a second step, we use a back-of-the-envelope calculation to strengthen our argument in the main text that the observed estimates plausibly reflect the creation of new economic activity rather than job relocation in space. The results in Table 2 of the main text do not show any indication that the expansion of employment in SEZ areas correlates with employment paths in neighboring municipalities in further distance ($>$ 10km, which would serve as 'source jurisdictions' in case of job relocation). The point estimates are small and statistically insignificant.

For distance rings smaller than 30km, the coefficient estimates nevertheless turn our negative. To obtain a notion of the quantitative relevance of these point estimates, we take the estimated 9.5% employment increase within a 10km-radius (see above), and calculate the aggregate employment decrease across municipalities within 10-30km distance rings from SEZs as implied by the point estimates in the first row of Table 2. We again evaluate the estimated coefficients at the average pre-treatment employment (624; 370; 310 and 226) and account for the number of municipalities (4,178; 4,334; 4,788 and 5,524) for the

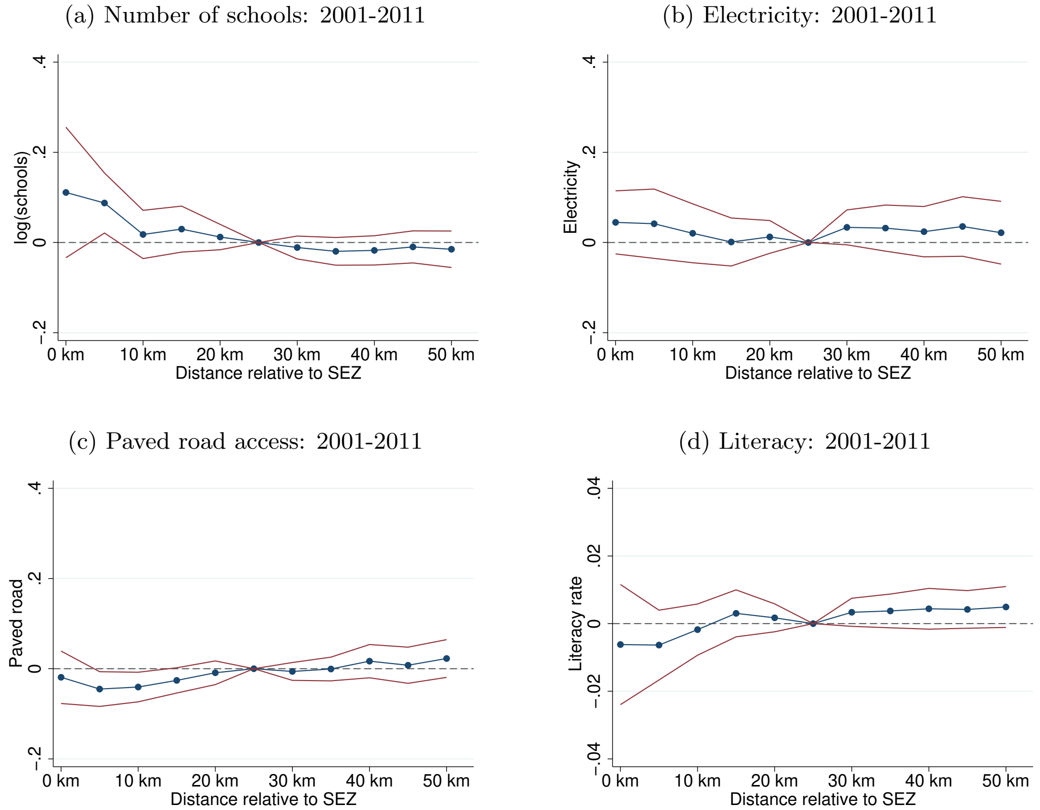
[15] We estimate the separate effect for large municipalities using interaction terms in a variant of Eq. (4).
[16] Figures are accessible via the Indian Export Promotion council: https://www.epces.in/facts-and-figures.php#hpgallery-6. Last accessed: January 25th, 2022

10-15km, 15-20km, 20-25km and 25-30km distance bin, respectively. The total job loss calculated for these jurisdictions is 16,524 jobs, which is thus minuscule relative to the aggregate employment gain in SEZ areas of 1.64 million workers.

B.3 Additional outcomes

Local public goods. In this section, we explore whether the SEZ Act led to higher provision of local public goods, e.g. streets or electricity infrastructure, that benefited local residents. The population census allows us to shed some light on local public good provision. We observe the number of schools in each municipality and whether a municipality had access to any kind of electricity or to a paved road, respectively. Re-estimating Eq. 1 with these different dependent variables does not point to any SEZ-induced improvements in electricity and road access. The number of schools slightly increased in treated municipalities after SEZ establishment (relative to municipalities in further distance). This positive effect vanishes, however, when we normalize the number of schools on population size. Finally, we find no on local literacy rates, panel (d).

Figure A9: SEZ effect on local infrastructure and literacy



Notes: The dots indicate the estimates for $\hat{\beta}_d$ as estimated according to Eq. (1). Each d refers to a distance on the horizontal axis e.g. the coefficient at 0km refers to $d = 0$. Panel (a) depicts results for the number of schools. Panel (b) depicts results for electricity access. Panel (c) depicts results for paved road access. Panel (d) depicts the results for the literacy rate. Red lines indicate 95% confidence intervals. The standard errors are clustered at the district level. Regressions include municipality and year fixed effects. Data are based on the Population Census for the years 2001 and 2011. Hence, only municipalities that are within 50km of SEZs that became operational until 2011 are included.

Firm entry. We have shown in the main part of the paper that the SEZ Act led to more employment in SEZ-hosting and neighboring municipalities. This part complements these insights by exploring the extensive margin, that is the change in the number of firms through entry or exit. We show in colum (1) of Table A5 that the policy led to strong positive response at the extensive margin in SEZ-hosting municipalities and their neighbors up to 10km. The placebo regressions in column (2) point to no differences in pre-treatment trends. We further document in columns (3)-(6) that the increase in the number of firms was primarily driven by male firm ownership and by small firms.

Table A5: SEZ effect on firm entry

Distance bins	(1) *Total*	(2) *Placebo*	(3) *Male*	(4) *Female*	(5) *Large*	(6) *Small*
0km	**0.300****	**-0.054**	**0.407*****	**0.161**	**0.114**	**0.321****
	(0.120)	(0.102)	(0.120)	(0.147)	(0.212)	(0.124)
0-5km	**0.208*****	**0.052**	**0.266*****	**0.144**	**-0.138**	**0.214*****
	(0.046)	(0.064)	(0.058)	(0.094)	(0.100)	(0.047)
5-10km	**0.144*****	**-0.003**	**0.181*****	**0.093**	**-0.058**	**0.147*****
	(0.036)	(0.062)	(0.046)	(0.079)	(0.122)	(0.038)
10-15km	**0.057**	**0.016**	**0.079**	**0.028**	**-0.155***	**0.060**
	(0.049)	(0.042)	(0.051)	(0.055)	(0.089)	(0.050)
15-20km	**-0.006**	**-0.006**	**0.034**	**-0.012**	**-0.028**	**-0.007**
	(0.027)	(0.028)	(0.031)	(0.045)	(0.059)	(0.028)
20-25km	–	–	–	–	–	–
25-30km	**-0.013**	**0.016**	**-0.006**	**-0.068**	**-0.118***	**-0.015**
	(0.027)	(0.028)	(0.035)	(0.042)	(0.061)	(0.027)
30-35km	**-0.062***	**0.030**	**-0.065**	**-0.047**	**-0.105**	**-0.065***
	(0.037)	(0.033)	(0.041)	(0.052)	(0.094)	(0.038)
35-40km	**-0.071***	**0.000**	**-0.080***	**-0.056**	**-0.153**	**-0.073***
	(0.039)	(0.035)	(0.045)	(0.055)	(0.093)	(0.040)
40-45km	**-0.032**	**-0.038**	**-0.039**	**-0.032**	**-0.129**	**-0.031**
	(0.038)	(0.030)	(0.046)	(0.060)	(0.083)	(0.039)
45-50km	**-0.013**	**-0.085****	**-0.020**	**-0.026**	**-0.191****	**-0.014**
	(0.038)	(0.037)	(0.044)	(0.065)	(0.091)	(0.038)
Observations	93,026	84,772	85,288	36,914	16,726	92,922
R-squared	0.901	0.899	0.878	0.832	0.837	0.900
Municipality fixed effects	✓	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓	✓	✓

Notes: Regression results from Eq. (1) with the number of different types of firms as the dependent variable. Column (1) reports the estimated effects on total firm count. Column (2) reports the placebo results. Columns (3)-(6) report the results for male owned-, female owned-, large- and small firm count. Data are based on the Economic Census for the years 1998, 2005 and 2013. Standard errors are clustered at the district level. *** p<0.01, ** p<0.05, * p<0.1.