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The Revealed Preference of the Chinese Communist Party Leadership: Investing in Local Economic Development versus Rewarding Social Connections
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ABSTRACT

Over the last 30 years, the Chinese government has invested in new industrial parks with the intent of stimulating urban economic growth. The central government delegates the site selection decision to provincial leaders. A principal-agent issue arises because the central government prioritizes efficiency and equity criteria while the provincial leader may allocate such place based investments to reward socially connected mayors. We present a revealed preference test of industrial park site selection and document the willingness of China's provincial leaders to sacrifice economic development in order to reward social connections. We examine the causes and consequences of this misallocation of capital.

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Introduction

Since 1982, the Chinese Central Government has built thousands of industrial parks.[1] Although these parks only occupy 0.1% of China's total land area, they contain 40% of the nation's manufacturing jobs, and contribute 10% of China's GDP and 33% of foreign direct investment (Zheng et. al., 2017). Each park is a multi-billion dollar investment that requires acquiring a large parcel of land, upgrading this land to improve sewer, utility and transport infrastructure, building the capital stock for housing new firms, and offering economic incentives such as tax reductions and subsidies for land rent and energy in order to attract productive firms and stimulate local agglomeration economies (Wang, 2013). Alder et. al. (2016) use data from a panel of Chinese cities to find that the establishment of a state-level industrial park is associated with an increase in the level of GDP of about 20% ten years after the opening of the park.. Lu et. al. (2016) find that two years after the opening of a park that the physical area features 47.1 percent greater employment, 55.3 percent higher output than the non-park control areas.

Prominent examples of these parks include Beijing's Zhongguancun Science Park and the Shenzhen High Tech Industrial Park. While these parks are associated with modern economic agglomerations, there are other parks that have fizzled or even become "ghost towns". In past research we have documented that 30% of parks failed to generate local agglomeration benefits (Zheng et. al., 2017).

[1] As of 2006, there were 1,568 national-level and provincial-level industrial parks distributed in more than 270 Chinese cities, with 9,949 square kilometers in total.

The fact that we observe ex-post very different returns on place based capital investments raises a question about the initial site selection problem. Why did some Chinese leaders choose the "wrong" city to site this expensive place based investment?[2] This paper presents a revealed preference analysis of Chinese leaders' priorities. We reconstruct the choice set of possible locations to build a new park and we observe where the park is actually built. We follow McFadden's (1978) discrete choice approach to investigate the revealed preference of the Chinese Communist Party.[3]

A leader with political career concerns who seeks to rise in the Chinese Communist Party has an incentive to invest in projects that contribute to economic growth (Li and Zhou, 2005). Provincial economic performance, measured as real GDP growth, is considered to be the main performance measure for judging a provincial leader (Maskin et al., 2000). On the other hand, rising income inequality in China in recent years has been viewed as a threat to social stability. Since Hu Jintao became China's President in 2002, the Chinese Communist Party (the CCP) has sought to promote the "balanced development" strategy, and thus has also rewarded political leaders who have successfully reduced their area's income inequality. This suggests that provincial leaders tradeoff efficiency gains versus equity considerations when choosing where to locate place-based policies such as a new industrial park.

We posit that social connections between city leaders and the provincial leader also influences a provincial leader's park placement decision. This hypothesis builds on the emerging

[2] For instance, in 2011, the total fixed asset investment in 131 state-level industrial parks was 2092 billion RMB yuan ($332 billion US dollars), which was about 35% of the total fixed asset investment in the whole nation (China Statistic Yearbook, 2012).

[3] Each of the 31 provinces of China (including four municipalities with provincial status and five autonomous regions) has two political leaders: provincial CCP secretary and provincial governor. The former is the head of the provincial branch of the Communist Party, and the latter is the head of the provincial government. Provincial secretaries are ranked higher than provincial governors (Jia et al., 2015). By "provincial leaders", we mean either of these two political leaders in each province.

literature studying the political economy of public capital resource allocation. Studies such as Fisman (2001) and Jia et al. (2015) have documented the importance of social connections in determining economic outcomes in both China and Indonesia. The literature on Chinese politics (e.g. Dittmer (1995)) argues that Chinese political leaders build a network of loyal followers to reduce the likelihood of their being ousted from power.[4] One of the common strategies for leaders to maintain loyalty is to allocate scarce resources such as industrial parks in favor of the places where their connected subordinates are serving.

We estimate park site selection conditional logit models to test for the marginal effects of a city's growth potential, expected inequality reduction and social connections on the probability that a park is sited in a given city. This discrete choice framework allows us to measure how much economic growth a provincial leader is willing to sacrifice in order to help a subordinate friend. Our empirical approach documents that the misallocation of capital in China represents a tradeoff and thus has an "economic price" (the lost economic growth). A data innovation that we discuss below is our creation of a detailed social networks database that allows us to track the long term connections between provincial leaders and city leaders at different points in time.

To preview our findings, we find that a provincial leader is willing to sacrifice 1.6% of the province's annual GDP for helping a connected subordinate. These results contribute to the capital misallocation literature (Restuccia and Rogerson 2017). This literature has explored the consequences of capital misallocation but there is less work exploring the political economy of its causes or measuring its costs. While the Chinese Communist Party may be willing to bear some

[4] The city leaders promoted by provincial leaders will join the provincial government or become higher-ranking leaders in higher-ranking cities (e.g., from city mayor to city CCP secretary, or from a small city leader to a large city leader). Promoting political enemies may threaten the power of the provincial leaders.

efficiency cost to achieve social stability through lower inequality, the misallocation cost triggered by rewarding political connections is a pure loss of social welfare.

The Provincial Leader's Industrial Park Site Selection Problem

A provincial leader must choose one city in the province to receive a new industrial park. We assume that each provincial leader has the same objective function defined over three attributes. We test below for heterogeneous preferences. The provincial leader's probability of placing park *i* in city *j* is a function of expected economic growth, expected inequality reduction, and rewarding a social connection.[5] Provincial leader's career prospects are determined by the central government (Jia et al., 2015).

The provincial leader's expected utility from building a park in city *j* is expressed in equation (1).

$$U_{ij}{}^{*} = \beta_1 \overline{\Delta GDP}_{ij} + \beta_2 \overline{\Delta GINI\_GDP}_{ij} + \beta_3 CONNECTION_j + \varepsilon_{ij} \quad (1)$$

We model the provincial leader as choosing the expected utility maximizing location for the park. Under the assumption that ε_{ij} is a random variable from a standard Type 1 extreme value distribution, this yields the standard conditional logit formula.

[5] The site selection of a park includes two steps – choose a city for the park and then choose a location within the city for the park. The city choice is of the first order importance, and this decision is made by provincial leaders (after they receive the park quota from the central government). The choice of a location within a city is a secondary decision made by the city's leaders. In our previous work (Zheng et al., 2017), we study the within city consequences of park locational choice.

We measure the expected economic gain as the expected increase in the value-added (GDP) that park i will bring to city j, $\overline{\Delta GDP}$. The expected inequality reduction is measured as the expected decrease in the within-province city-level Gini coefficient (based on GDP per capita) attributed to the growth generated by this park, $\overline{\Delta GINI\_GDP}$.[6] Expected economic growth and expected inequality reductions will directly increase a provincial leader's promotion likelihood. Below, we report reduced form estimates testing whether provincial leaders are more likely to be promoted if their region is experiencing greater economic growth and reduced income inequality.

We build a comprehensive database of social connections between provincial leaders and city leaders to construct the connection measure, *CONNECTION* (see the data section, and Appendix 1). We are unable to quantify a dollar value of these personal benefits so we include a dummy variable indicating whether the provincial leader is connected to the urban leader.

We assume that provincial leaders are aware that they face a counter-factual treatment effect problem because they do not know what the GDP growth caused by a new park would be for each city in the choice set. As we discuss in the next section, we model the provincial leaders as econometricians who use all available information to impute this counter-factual expectation. Intuitively, a leader must predict what would be the GDP growth in each city if he assigns a park there. Throughout this paper, we assume a symmetry in solving this prediction problem between the econometrician and the decision maker. This approach allows us to circumvent the generated regressor problem (see Murphy and Topel, 2002). Under our assumption of symmetry, we are able to recreate the provincial leader's perceived tradeoff at the time he/she makes the allocation

[6] This is a city-level Gini coefficient, instead of an individual-level one. If the placement of a park in a city leads to the increase of this city-level Gini coefficient but also trigger some poor people from poor areas in that province to migrate to this city, it may not necessarily cause an increase of the individual-level Gini coefficient. However, our interviews with city and provincial leaders indicate that the upper-level officials care more about such a place-based city-level inequality measure.

decision. Provincial leaders will recognize that they may sacrifice significant expected economic growth by helping a political connection.[7] This is an "economic price" because there is a direct connection between local economic growth and being promoted within the CCP.

After estimating equation (2), we obtain estimates of the average provincial leader's revealed preferences for expected economic gains (β_1), expected inequality reduction (β_2) and strengthening the loyalty of their connected city leaders (β_3).[8] We use the estimated coefficients to directly estimate the economic cost of capital misallocation – the expected amount of GDP this political leader is willing to sacrifice for helping his connected city leader.

By estimating our conditional logit models for subsets of our data, we test for whether the objectives of provincial governments change over time. After Hu Jintao became China's President in 2002, the Chinese Communist Party has paid more attention to the inequality issue. The leaders of poor provinces may continue to prioritize economic growth , while the leaders of rich provinces have started to put more effort on "balanced development".

Data Construction

Our data set covers 276 prefecture-level cities during the period of 1988-2008.[9] We collect additional data from the China city statistical yearbooks. We use GIS to calculate a city's straight-line distance to the nearest highway entrance, airport, railway station and the main seaport. (see Appendix 1 for variable definitions and summary statistics).

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[7] We acknowledge that we ignore province level general equilibrium effects triggered by the park. We are implicitly assuming that a new park located in city j generates new activity or attracts firms from outside the province, and it would not lead to significant reshuffling of economic activity (such as population migration) within the province. We also are assuming away any cross-city spillover effects. Alder et. al. (2016) directly test for park spillovers and find some evidence of positive spillovers for cities close to the treated city.

[8] In equation (1), we will control for a vector of city and park attributes. There may be other unobserved variables that also affect a park's placement across cities. We assume that these unobservables are uncorrelated with our X vector.

[9] We exclude four municipal cities and those in *Qinghai*, *Tibet*, and *Ningxia*. There was no new national- or provincial-level park built after 2008.

During our study period, 1,417 national and provincial level industrial parks were built in these 276 cities. Each went through a formal approval process. They have political autonomy in designing and experimenting with new institutions and preferential policies (Lu et al., 2016; Alder et al., 2016).[10] The "Bulletin List for the Official Boundaries of Chinese Industrial Parks" published by Ministry of Land and Resources in China provides information of each park's establishment year and the city it is located in. Cities in a province compete with each other to obtain a quota (permission) to build a provincial-level park, or obtain a quota (permission) to compete on behalf of the province for building a national-level park. Provincial leaders allocate the scarce resource of the park quotas (permissions) to cities[11]. Figure 1 presents the spatial distribution of national- and provincial-level industrial parks across cities over time in China[12]. The cities in eastern area of China account for more than half of the parks and most of them were built before 2002.

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[10] Industrial parks are authorized by different level governments: state, provincial, or prefecture (or below) government. Those parks authorized by the state and provincial governments enjoy more favorable policies, such as lower interest rate loans, larger tax, land price and utility price discounts. We only focus on those parks because many of the lower-level industrial parks did not obtain formal approval from the central and provincial governments and violated the relevant laws and regulations. In 2003, the central government investigated industrial parks regarding their potential violation of land use regulations and this resulted in a large number of those lower-level industrial parks being abolished (see Cartier (2001) and Adler (2013)).

[11] In China's administrative hierarchy, prefecture-level city government ranks below central and provincial governments. In terms of their administrative boundaries, a prefecture-level city comprises a core urban area (containing several districts/counties) and a surrounding peripheral area which include remote counties (and the towns in those counties). A city leader (party secretary or mayor) has jurisdiction over all the area within this administrative boundary.

[12] We divide China into three greater regions: Eastern region including *Beijing*, *Tianjin*, *Shanghai*, *Liaoning*, *Hebei*, *Jiangsu*, *Zhejiang*, *Fujian*, *Shandong*, and *Guangdong*, *Hainan*, and *Guangxi;* Central region including *Inner Mongolia*, *Jilin*, *Heilongjiang*, *Shanxi*, *Anhui*, *Jiangxi*, *Henan*, *Hubei*, and *Hunan*; Western region covering *Shananxi*, *Gansu*, *Qinghai*, *Ningxia*, *Xinjian*g, *Choingqing*, *Sichuan*, *Guizhou*, and *Yunnan Guangxi* (*Tibet* is excluded due to missing data).

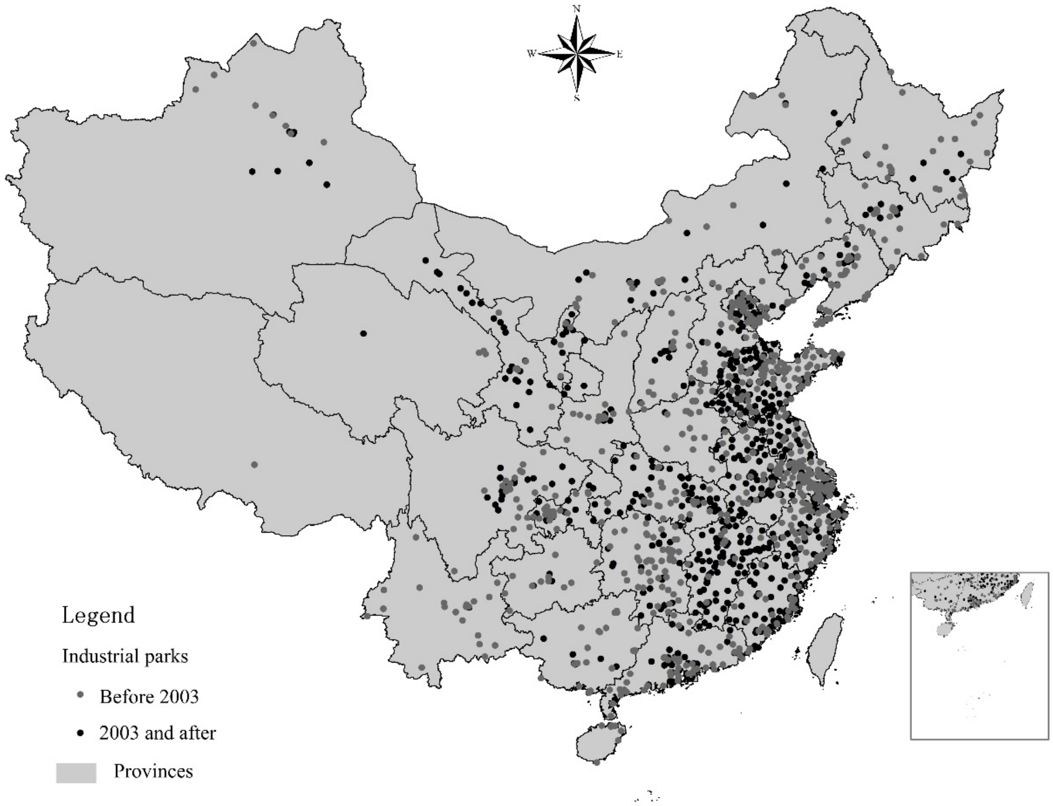


Figure 1:

China's State-level and Provincial-level Industrial Parks Built from 1998 to 2008

Predicting Economic Growth and Income Inequality Dynamics Induced by New Parks

We now explain how we construct the three key measures in the provincial leader's objective function (equation (1)). We need to estimate the expected park treatment effect on each city's GDP if that city received a specific park *i* ($\overline{\Delta GDP}$). We first create a propensity score measuring the likelihood that each city receives a park (see Appendix Table 3). For each treated city, we construct a control group of four cities with very similar propensity scores of winning an industrial park in the same year (see Appendix 2). We then run a difference-in-difference model to quantify the GDP increase after the treated city receives that park:

$$\log(Y_{jt}) = \beta_0 + \beta_1 * (dc * dt)_{jt} + \delta_j + \tau_t + \varepsilon_{jt}. \qquad (2)$$

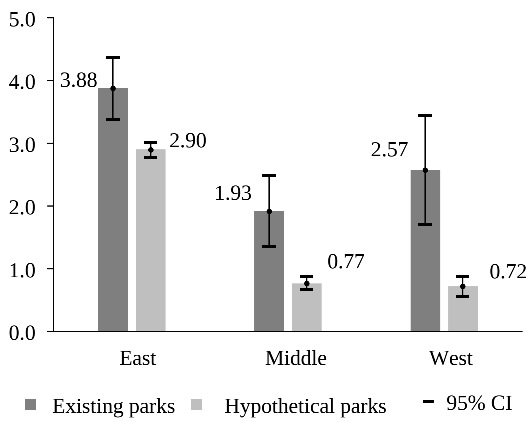
Where Y indicates the GDP for city j in in year t. dc_j is a dummy for whether city j is treated in year t (receiving a park). The dummy $dt_t = \{0,1\}$ denotes pre and post-treatment period. δ_j and τ_t are city and time fixed effects. ε_{jt} is an error term. The results are reported in Appendix Table 4.

This park treatment effect may vary across different cities. Some studies have found that industrial parks have a larger growth effect if the city features better economic fundamentals, and there are co-agglomeration benefits between the city's incumbent industries and the new industries introduced into the park (Li and Shen, 2015; Zheng et. al., 2017). Therefore, we decompose this treatment effect by assuming it is a function of city-park-year attributes (natural endowment *X*, economic fundamentals *Z*, park attributes and year dummies *T*):

$$\log Y_{jt} = \left(b_0 + b_1 \cdot X_j + b_2 \cdot Z_j + \sum b_t \cdot T_{jt}\right) \cdot (dc * dt)_{jt} + \delta_j + \tau_t + \varepsilon_{jt} \qquad (3)$$

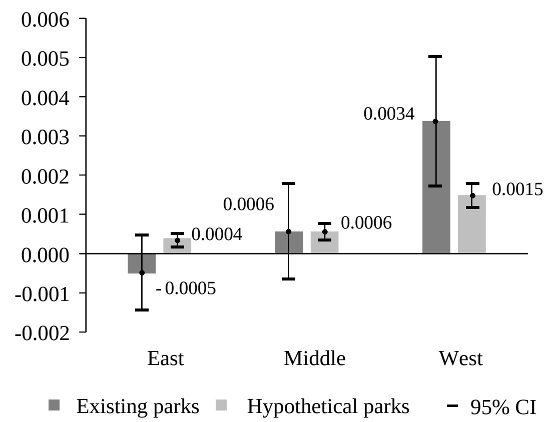
With the year dummies we are able to capture the trajectory of a city's GDP growth for the first year, the second year and several years later after the park is built. We use the estimated coefficients in the decomposition function to calculate the expected GDP increase and GDP per capita increase (one year, two years or several years after the park placement) if that city receives a park in that year. With these GDP per capita numbers, we then calculate the expected Gini coefficient change for each option. Please refer to Appendix 2 for the details.

Figure 2 shows the descriptive statistics of the one-year GDP increase and three-year Gini coefficient change due to the introduction of a real or a hypothetical park by region and by time period. Here we divide China into three regions (see footnote #10) and our study period into two regimes under two Chinese Presidents – Zemin Jiang (1989-2002) and Jintao Hu (2003-2008). On average, the expected city GDP increases generated by parks are larger in the east region, and in the latter period. At the same time, we can see that such expected GDP increase generated by an average industrial park is significantly larger than the counterfactual effect if placing this park in other cities. This indicates that provincial leaders do choose to place parks in the cities where those parks can generate higher expected economic gains. This preference (measured in the gap between real and hypothetical parks) is stronger in middle and western regions, and in the earlier period. When looking at how industrial parks change the expected income inequality in a province (Gini coefficient of GDP per capita), real parks in the east and middle regions do not have significant effect on Gini coefficient, but those in the west region significantly deteriorate income inequality. The regime change is clear – in the earlier period, the placement of industrial parks significantly deteriorates income inequality, while this pattern reverses in the latter period.



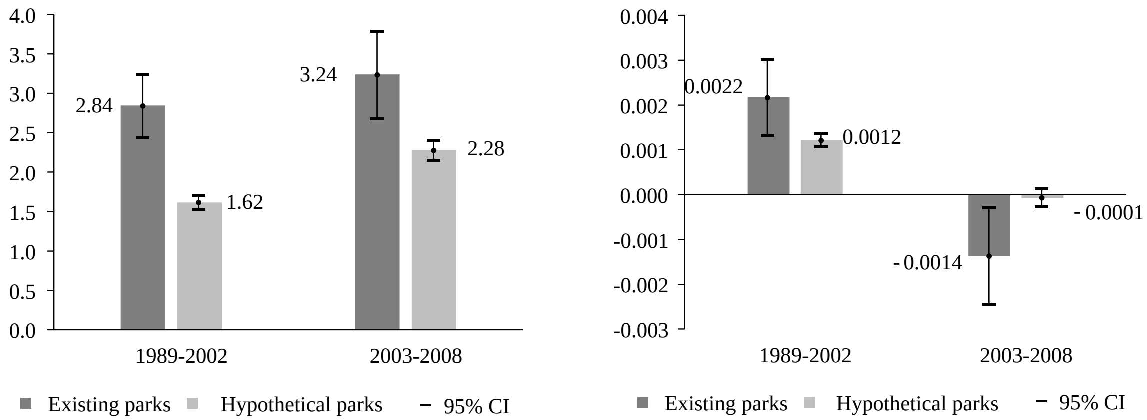
(a) One-year city GDP increase

(100 RMB million in 1980, by region)



(b) Three-year provincial Gini coefficient change

(by region)



(c) One-year city GDP increase

(100 RMB million in 1980, by period)

(d) Three-year provincial Gini coefficient change

(by period)

Figure 2: Estimated GDP increase and Gini coefficient change attributed to a real or a hypothetical park in a city

Measuring Social Connections

To test for the role of social connections as a cause of capital misallocation requires measures of the social connections between local officials (city mayor or party secretary) and the upper-level government leaders (provincial-level governor or party secretary). Past research on the political economy of such connections has emphasized two criteria (Xu 2017). One is that this social tie measure should be objective. The other is that such measure can solve the issue of endogenous social network information. To meet these criteria, we measure social connections between city leaders and provincial leaders along four dimensions: workplace, birthplace, university/college, and political faction.

The first measure defines a city leader and a provincial leader to be connected if they once worked in the same workplace, based on the assumption that politicians are more likely to be friend with those who share the work experience in the same place. Jia et al. (2015) measure social connections for provincial governors with top leaders in the central government using this shared work experience approach. The second measure is based on the geographic location where politicians were born. The underlying assumption is that politicians are more likely to keep close relations with others who come from the same birthplace. Do et al. (2017) provide evidence for favoritism towards one's hometown by government officials in Vietnam. The third measure defines social connections between city leaders and provincial leaders as they share the study experience in the same university or college. This is based on the assumption that politicians are more likely to form social ties in their alumni network. Fourth, we define city leaders and provincial leaders to be connected through their political factions. The underlying assumption is that politicians tend to be allies when they belong to the same faction (Francois et al., 2016). We highlight two main factions within the CCP, *tuanpai* (the Communist Youth League of China, CYLC) and non-*tuanpai*.

To build these social connections, we construct a data set on the city and provincial leaders between 1980 and 2010 in China by undertaking a large-scale data collection from *Duxiu*, a local Scholar Search Engine with millions of digitized literatures, newspapers, journalists and books in Chinese provided by China's CNKI. This data set contains extensive biographic information on each official including name, birth year, birth place, education record, the list of positions held in the party or in the government in the past along with the period in which each position was held, and the record of whether he had received the training in China's Central Party School.

CONNECTION is a dummy variable. Jia et. al. (2015) find that among all measures of social connections, the workplace-based one works the best. We mainly use the workplace-based social connections measure between city and provincial CCP party secretaries. Jia et. al. (2015) follow a similar strategy. In China's bureaucratic hierarchy, party secretary has a higher ranking than the governor at the same administrative level (province or prefecture city). We also use the connections between the other three pairs of leaders: city party secretary and provincial governor; city mayor and provincial party secretary; city mayor and provincial governor. More details are provided in Appendix 1.

Results

The Association Between Province Economic Growth and the Leader's Promotion Chances

We first estimate a logit model where we fit a provincial leaders' promotion likelihood as a function of province level variables. We seek to learn about the provincial leaders' incentives given the Chinese central government's promotion criteria. We follow the model specification and variable construction in Jia et al. (2015). Table 1 reports the logit model results. The dependent variable is a dummy indicating whether the provincial leader is promoted in year *t*.

Table 1: The Likelihood of Promotion for Provincial Leaders

	(1) All provincial leaders	(2) Provincial CCP secretaries	(3) Provincial governors
ΔGDP	1.133**	1.106*	1.108*
	(0.492)	(0.594)	(0.617)
ΔGINI_ GDP	0.0164	-0.102	0.135
	(0.211)	(0.194)	(0.341)
CONNECTION_CENTRAL	0.0687***	0.0757***	0.0558*
	(0.0143)	(0.0238)	(0.0326)
Controls	Yes	Yes	yes
N	801	409	392
R^2	0.279	0.314	0.272

Notes: *ΔGDP* is the average annual growth rate of that province since the leader assumed office until year t, measured as the deviation from the sample mean (11.4%). *ΔGINI_ GDP* is the percentage change of Gini index (GDP per capita weighted by population) since the leader assumed office until year t. *CONNECTION_CENTRAL* is a dummy indicating whether this leader is connected to the seven to nine leaders in the Politburo Standing Committee in the central CCP. Provincial dummies, year dummies (separate sets of year dummies for CCP secretary and governor in column (1)), and term dummies measuring how many years the leader has held this position) are controlled for. Standard errors clustered at the province level are reported in parentheses.

Provincial GDP growth is highly and positively associated with provincial leader's promotion likelihood (Maskin et al., 2000, Jia et al., 2015). Within-province inequality decreases matter more for the provincial party secretary's promotion. We know that the provincial party secretary has a higher rank and authority than the provincial governor. Thus, below we mainly focus on the attributes of party secretaries. Not surprisingly, these provincial leaders' social ties with top leaders in the central government also help them to get promoted. These results support the claim that provincial leaders have a career incentive to pursue economic growth. We now turn to explore their preferences in siting new parks.

The Determinants of Industrial Park Placement

Table 2 reports the baseline estimates of equation (2). New parks create a cumulative growth process as a new agglomeration takes root. This means that the long run growth effects are larger than the short run effects (see Zheng et. al. 2017). Across columns (1) to (4), we consider the short-, medium- and long-run impacts, from 1 year to 10 years after the opening of a park. Here $\overline{\Delta GDP}$ is the expected accumulated GDP increase over that period, and $\overline{\Delta GINI\_GDP}$ is the expected change in the Gini coefficient of GDP per capita between the start and end year of that period. The dummy *CONNECTION* equals one if the provincial leader and city leader in the park's city in the opening year are socially connected. In this baseline model we use the workplace-based connection measure between the city and provincial CCP secretaries.

For each time horizons, $\overline{\Delta GDP}$ and *CONNECTION* both have a statistically significant effect on the likelihood of site selection. When a provincial leader decides where to place a park, he considers both short-run and long-run growth effects. For the short-run (one year), if a park is expected to generate a 100 million RMB GDP increase to a given city, this city will enjoy a 0.76 percentage point increase in the likelihood of receiving the park. Since $\overline{\Delta GDP}$ is the expected accumulated GDP increase, its coefficient shrinks from column (1) to (4) but the size of its effect is stable.

Controlling for the effects of a new park on economic growth and regional cross-city income inequality, we find that social connections influence the siting of a park. This connection variable is statistically significant at the 1% level in each of the four regressions. As shown in column (1), the probability that a park is placed in a given city increases by 6.6 percentage points when the local leader is connected.

For the whole sample, income inequality is not a major consideration for provincial leaders' park placement decision. The coefficient of $\overline{\Delta GINI\_GDP}$ is insignificant for all time horizons. It has a positive sign in the first year, and turns negative since the third year. This is a suggestive evidence that the inequality concern only matters when provincial leaders consider a park's long-term impact.

Table 2: Conditional Logit Estimates of the Industrial Park Locational Choice Decision

	(1) 1 year	(2) 3 years	(3) 5 years	(4) 10 years
$\overline{\Delta GDP}$	0.00759**	0.00264***	0.00158***	0.000796**
	(0.00347)	(0.000995)	(0.000587)	(0.000316)
$\overline{\Delta GINI\_GDP}$	1.765	-0.452	-0.408	-0.323
	(4.739)	(0.812)	(0.464)	(0.387)
CONNECTION	0.0663***	0.0694***	0.0667***	0.0686***
	(0.0219)	(0.0214)	(0.0216)	(0.0215)
N	16543	16386	16166	16130
pseudo R^2	0.013	0.013	0.014	0.013
Total cost of social connections GDP (100 million RMB)	8.74	26.29	42.22	86.18
Annualized cost of social connections GDP (100 million RMB)	8.74	8.76	8.44	8.62
Annualized cost of social connections as a share of provincial GDP	1.62%	1.62%	1.56%	1.60%

Note: The reported coefficients represent marginal effects df/dx. Robust standard errors are reported in parentheses, which are clustered at province-year level. * p < 0.10, ** p < 0.05, *** p < 0.01.

Our estimates allow us to calculate the misallocation costs induced by social ties. By taking the ratio of the ΔGDP coefficient divided by the coefficient of the connection variable, we measure the GDP loss a provincial leader is willing to sacrifice to reward connections. The last three rows in Table 1 present these estimates. The annualized cost of social connections is quite stable for short and long time horizons – about 850 to 875 million RMB, around 1.5% - 1.6% of that province's annual GDP. This is a large number. In Appendix 3, we perform some robustness checks on the effect of social connections. We control for the city secretary's individual attributes (age, education attainment, tenure, and whether he/she was born in that province). We also include the other three connection measures (based on college, birthplace and faction), or the connections between other city and provincial leaders (city mayor, city party secretary, and provincial governor). The results are quite stable. The economic price of supporting connections ranges between 1.1% - 1.6% of a province's annual GDP.

Evidence of Shifting Government Priorities

We explore the heterogeneity in provincial leaders' preferences along two major dimensions: by region and by time period. China's eastern region (coastal area) is the most developed area, while the western region features poorer provinces. GDP growth is still the first priority (compared to inequality concern) for officials in the poor regions. On the other hand, Confucian culture may be more prominent in the inland regions (the middle and west) due to the weaker influence of western countries. Social ties are a key mechanism to maintain social order and stability in Confucian culture.

Table 3 reports the results with the three-year cumulative GDP increase and Gini coefficient change after the introduction of a park. We report the regional results in columns (1) to (3). We find that the leaders of richer provinces (in the eastern region) have started to address the inequality concern, while the leaders of poorer provinces (in the middle and western regions) still put more effort on economic growth over equality. Social connections matter everywhere, but the misallocation cost it triggers (measured in the share of provincial GDP) is higher in poorer regions.

Table 3: Testing for Heterogeneous Preferences of Provincial Leaders by Region and Time

	By region			By period	
	(1) East	(2) Middle	(3) West	(4) 1989-2002	(5) 2003-2008
$\overline{\Delta GDP}$	0.00217	0.00272^{*}	0.00610^{***}	0.00482^{***}	0.00146
	(0.00135)	(0.00161)	(0.000823)	(0.00113)	(0.00138)
$\overline{\Delta GINI\_GDP}$	-1.769^{*}	0.875	1.523	0.0400	-1.733^{***}
	(0.922)	(1.370)	(2.232)	(1.542)	(0.645)
CONNECTION	0.0537^{**}	0.0739^{*}	0.119^{***}	0.0777^{***}	0.0592^{*}
	(0.0265)	(0.0380)	(0.0429)	(0.0276)	(0.0332)
N	9352	5454	1580	7893	8456
pseudo R^2	0.010	0.012	0.063	0.024	0.009
Annualized cost of social connection GDP (100 million RMB)	8.25	9.06	6.50	5.37	13.52
Annualized cost of social connection as a share of provincial GDP	1.19%	1.91%	2.69%	1.17%	2.15%

Note: Top number in cell is marginal effect df/dx. Robust standard errors are reported in parentheses, which are clustered at the province-year level. * p < 0.10, ** p < 0.05, *** p < 0.01.

Column (4) and (5) present the regression results for two regimes under two Presidents – Zemin Jiang (1989-2002) and Jintao Hu (2003-2008). In Jiang's regime, Chinese Communist Party put economic growth as the first priority, and GDP growth was the major factor in local officials' performance and promotion evaluation. Later, the rising inequality and associated social conflicts pushed CCP to switch to a more "balanced growth" strategy. President Hu proposed his idea of "scientific outlook on development" which emphasizes social stability and sustainability. We do observe a clear regime change in our discrete choice model estimates. In Hu's era, the Gini variable becomes significantly negative, while the GDP effect is weaker. Provincial leaders are willing to sacrifice more economic growth for an inequality decrease, so poorer cities get more chance to receive a park. The misallocation cost of social connections is even higher in Hu's era.

Conclusion

This paper has contributed to the capital misallocation literature by studying the choices of Chinese provincial leaders in allocating local economic development projects, namely new industrial parks. These new sub-city employment centers bundle together an agglomeration of firms co-located to reduce the transportation costs of ideas, and goods.

By explicitly studying the place based investment site selection problem, we contribute to the recent literature studying the consequences of such investments. Leading empirical papers examining the impact of place based policies either use propensity score matching (Kline and Moretti 2011) or "just missed treated" (Greenstone, Hornbeck and Moretti 2010) to overcome the selection challenge that such spatial investments are not randomly assigned. In China, there are major place based programs such as the creation of industrial parks where a large enough number of these treatments have been built to allow for a more systematic examining of this political selection equation.

We have modeled the provincial leader as anticipating the expected gains that would be realized if a new industrial park is placed in a given city. In this sense, our work explicitly embraces Heckman et. al. (2006) essential heterogeneity approach. The decision to take a treatment (in our setting assigning a park to a given city) is a function of the expected gain from the treatment. In the standard essential heterogeneity research, the decision maker's objective is to maximize a one dimensional criteria such as earnings. We have modeled provincial leaders as choosing to site a park while trading off three key features of cities.

While such parks are intended to stimulate economic growth and to reduce spatial income inequality (by boosting the income of low income cities), provincial leaders have discretion over where they site such parks. By creating a new social connections database, we document that Chinese provincial leaders are willing to sacrifice some urban economic growth in order to help a local leader who is a social connection. Political connections are a cause of capital misallocation. Such decisions do impose some costs for the decision maker. In the Chinese Communist Party, provincial leaders are more likely to be promoted if their province's GDP is growing faster. Our estimates suggest that a leader reduces his own promotion chances by about 1.8 percentage points when he assigns a park to a connected friend.[13]

[13]This calculation is based on the results reported in Table 2. The annualized cost of a social connection as a share of provincial GDP is around 1.6%. Multiplying this number with the coefficient of ΔGDP in Table 1 column (1) (1.133) yields that the cost of social connections will reduce provincial leaders' promotion probability by 1.8 percentage points.

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Appendix 1: Data, Variable Definitions and Summary Statistics

A. Measuring Social connections

We create four measures of connection based on information on workplace, birthplace, alumni networks, and political factions. In China's political system, the two top officials are both in charge of local administrative affairs. At the city level, one is the party secretary and the other is the mayor. At the provincial level, they are the party secretary and the governor. Thus, there are four pairs of connections based on the four dimensions mentioned above. We summarize the shares of city-level top officials who are politically connected to the corresponding provincial level key leaders in Appendix Table 1. As shown in Column (2), roughly one quarter of the 107 provincial level party secretaries are politically connected with his/her city-level subordinates (party secretaries) if they have worked in the same workplace, based on the assumption that politicians are more likely to befriend others who share a similar working experience in the same place.

Appendix Table 1: Shares of City-Level Top Officials Who Are Connected to Its Upper-Level Government Key Leaders, Four Dimensions

	Provincial party secretary		**Provincial governor**	
	(1)	(2)	(3)	(4)
	City-level Party Secretary	City Mayors	City-level Party Secretary	City Mayors
Workplace	24.3%	14.0%	27.0%	17.7%
Birthplace	4.3%	4.0%	3.6%	5.5%
Alumni	0.7%	0.4%	1.7%	1.7%
Faction	2.7%	3.0%	4.5%	3.8%
No. of Provincial officials	107		136	

B. City-level Attributes

To model a city's economic fundamentals, we assemble a vector of city attributes. These time invariant city level variables include; the longitude and latitude coordinates, the city's spatial distances to the nearest highway, airport, railway station, and the main seaport. We have also collected information the city's annual average temperature and rainfall. We also use the topographic data to construct another two city-level geographic variables, the share of land with slope smaller than 15 degrees and the ratio of water bodies. The first panel of Appendix Table 2 reports summary statistics for these geographic endowments variables at the city level.

The second set of fundamental city level variables are time varying. They include; per capita GDP, per capita foreign direct investment, per capita fixed asset investment, total population, per capita industrial output, per capita import, per capita export, per capita college students, and number of existing state and province-level industrial parks. The data on these variables are drawn from the annual China's Urban Statistics Yearbooks. The summary statistics for these variables are illustrated in the second panel of Appendix Table 2.

Appendix Table 2: Descriptive Statistics for the City-Level Attributes

Variables	Mean	Std. dev.	Min	Max
Geographic fundamentals				
Log spatial distance to the nearest highway	1.89	2.34	-4.49	6.11
Log spatial distance to the nearest airport	4.34	1.11	1.03	6.24
Log spatial distance to the nearest railway station	1.21	1.41	-4.80	6.96
Log spatial distance to the nearest seaport	5.69	1.39	0.61	8.22
Log total area	9.34	0.83	7.01	12.44
Log average temperature	2.64	0.38	1.44	3.23
Log average rainfall	6.70	0.58	4.32	7.89
Share of land with slope smaller than 15 degrees	0.74	0.21	0.20	1.00
Ratio of water bodies	0.04	0.06	0.00	0.53
Latitude	32.90	6.65	18.25	50.24
Longitude	113.99	7.15	84.87	131.16
Economic fundamentals				
Log per capita GDP	8.59	1.04	5.90	12.74
Log per capita foreign direct investment	0.58	4.62	-11.53	7.78
Log population	5.71	0.78	2.29	8.09
Log per capita fixed asset investment	7.31	1.44	2.28	13.89
Log per capita industrial output	8.51	1.39	2.94	13.45
Log per capita import	-7.18	5.87	-12.69	9.77
Log per capita export	-4.54	7.09	-12.69	10.06
Log per capita college students	1.74	4.36	-11.10	11.23
No. of existing state and province level SEZs	1.97	3.08	0	40
Whether to have a good university (dummy)	0.07	0.26	0	1

Appendix 2: Estimation of the City Specific Expected Park Induced Economic Growth Effects

To estimate the expected counterfactual treatment effect of establishing an industrial park on local economic growth we employ a difference-in-difference (DID) approach based on a set of city-level characteristics including both geographic and economic fundamentals. Using the DID model estimation results, we calculate what economic outcome (GDP and GDP per capita) a city would achieve if it receives an industrial park. Using the data on predicted GDP per capita we calculate what GINI coefficient in terms of economic equity would be in a province as the provincial governor assigns an industrial park in one of the cities. Our analysis considers ten-year accumulated economic growth outcomes associated with GDP and GDP per capita brought by an industrial park. The constructions of the expected economic outcomes in cities and corresponding GINI coefficient associated with economic equity are presented as follows.

A. Expected GDP growth

We follow the treatment effects research design approach and assume that the economic outcomes of observably similar locations would be, on average, identical for treated and control cities (the conditional independence assumption, or CIA). A second key identification assumption is that the treatment does not impact outcomes for the untreated one (the single unit treatment value assumption, or SUTVA). See Footnote #6 in the text.

We construct control cities for each treatment city employing propensity score matching method. First, we restrict our sample into cities whose leaders do not have political connection. Then we define a group of treatment cities and a group of control cities and estimate the probability of treatment. Next, we estimate a propensity score model (PSM) based on city-level characteristics including the geographic and economic fundamentals variables listed in Appendix Table 2. Finally, we construct a group of control cities for each treatment city based on propensity scores. These control cities are expected to have similar probability of winning an industrial park given these city-level conditions.

The linear probability model of location choice of industrial parks is specified as follows:

$$\text{prob(whether city j is home to park i)} = \alpha_0 + \theta X_{jt} + \rho Z_j + \omega_{jt} \quad \text{(A1)}$$

where X_{jt} is a set of time-invariant geographic fundamentals variables, Z_j is a set of economic fundamentals that vary over time, and ω_{jt} is an error term. Appendix Table 3 reports the results on the location choice of industrial parks with statistically significant variables included. Based on these estimated coefficients we construct the propensity scores and match a treatment city with four control non-treated ones in an interval using the nearest neighbor approach.

Appendix Table 3: The Location Choice of Industrial Parks

	Industrial park is built
Parknum	-0.0148***
	(0.00441)
ln(*FDI_PC*)_lag1	0.00821***
	(0.00206)
ln(*Import_PC*)_lag1	0.00617***
	(0.00188)
University	0.0614***
	(0.0169)
ln(*Totalarea*)	0.0257***
	(0.00873)
Flatland<15°	0.121***
	(0.0443)
ln(*Rain*)	0.0460**
	(0.0188)
N	4191
pseudo R^2	0.051

Note: The top number in the cell is marginal effect df/dx. Robust standard errors are reported in parentheses. These are clustered at province-year level. Following the "top down" procedure in Crump et al. (2008), we drop the covariate with the smallest t-statistic until all remaining covariates has a t-statistic larger than or equal to 2 (in absolute value). Among these covariates with statistically significance,*Parknum* is the total existing industrial parks in city *j* in year *t*. *FDI_PC and Export_PC*, are city j's per capita foreign direct investment and per capita export, respectively. *Totalarea* is city's total land area. *Rain* indicates average rainfall. *University* indicates whether city *j* has a good university. *Flatland*<15°, and *Latitude* is city j's share of land with slope smaller than 15 degrees.
* p < 0.10, ** p < 0.05, *** p < 0.01.

Then we conduct the estimations on the GDP growth effect of introducing an industrial park using these PSM matched samples in a DID framework:

$$\log Y_{jt} = \beta_0 + \beta_1 * dc_j + \beta_2 * dt_t + \beta_3 * (dc * dt)_{jt} + \delta_j + \tau_t + \varepsilon_{jt}. \qquad \text{(A2)}$$

where Y indicates the GDP for city j in in year t. dc_j is a dummy for whether city j is a treatment city or not. The dummy $dt_t = \{0,1\}$ denotes pre and post-treatment period. δ_j and τ_t are city and time fixed effects. ε_{jt} is an error term. The results are reported in Appendix Table 4. The introduction of an industrial park is positively related to local economic growth. This is consistent with the findings in Alder et al. (2016).

Appendix Table 4: Baseline Estimates of the Effect of an Industrial Park on Local GDP

	ln(*GDP*)			
	(1) State- and Province-level	(2) State-level only	(3) Province-level Only	(4) State- and Province-level
dc×dt	0.0296 (0.0193)	0.100^{***} (0.0356)	0.0223 (0.0197)	
dc×dt× Province_level				0.0256 (0.0191)
dc×dt× State_level				0.0619^{**} (0.0297)
Constant	3.368^{***} (0.0442)	2.902^{***} (0.105)	3.831^{***} (0.0840)	3.372^{***} (0.0453)
City fixed effects	Yes	Yes	Yes	Yes
Pair fixed effects	Yes	Yes	Yes	Yes
Province×year fixed effects	Yes	Yes	Yes	Yes
N	18,522	2,699	15,823	18,522
R^2	0.961	0.981	0.961	0.961

Note: Column (1) and (4) include all state and province-level industrial parks. Column (2) considers state-level industrial parks and column (3) cover province-level industrial parks.
Robust standard errors are reported in parentheses, which are clustered at city level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

We allow the treatment effect of a park (β_3) to differ as a function of city level attributes that include city-level characteristics (X_j), including geographic and economic fundamentals as presented above, park-level attributes (Z_j) including the size of a park, and time dummies representing the *t*-th year after the park being estimated (T_{jt}). To implement this approach, we take a parametric linear stand on the marginal treatment effect and substitute this expression into equation (A2). This yields:

$$\log Y_{jt} = \left(b_0 + b_1 \cdot X_j + b_2 \cdot Z_j + \sum b_t \cdot T_{jt}\right) \cdot (dc * dt)_{jt} + \delta_j + \tau_t + \varepsilon_{jt} \qquad \text{(A3)}$$

where $b_0 + b_1 \cdot X_j + b_2 \cdot Z_j + \sum b_t \cdot T_{jt}$ represents the growth rate of GDP in city j from building a new park in year t. Appendix Table 5 reports the estimation results based on expanded specification (A3).

Appendix Table 5: Expanded Estimates of the Effect of Industrial Park on Local GDP

	ln(*GDP*)
dc	0.0420***
	(0.00234)
dt	-0.0112*
	(0.00575)
dc×*dt*×ln(*Population*)_lag1	-0.0674***
	(0.0120)
dc×*dt*×ln(*GDP*)_lag1	0.0579***
	(0.0144)
dc×*dt*×ln(*Output*)_lag1	0.0204***
	(0.00701)
dc×*dt*×ln(*Import*)_lag1	-0.00313***
	(0.00101)
dc×*dt*×ln(*Export*)	-0.00230***
	(0.000767)
dc×*dt*×ln(*Dis_highway*)	-0.00668***
	(0.00179)
dc×*dt*×ln(*Dis_port*)	-0.0132***
	(0.00375)
dc×*dt*×*Flatland*<15°	0.114***
	(0.0295)
dc×*dt*×*Latitude*	-0.00279***
	(0.000751)
dc×*dt*×*Park areas*(1-7)	Yes
dc×*dt*×*Built years*(1-10)	Yes
City fixed effects	Yes
Pair fixed effects	Yes
Province×year fixed effects	Yes
N	18118
R^2	0.964

Note: Following the "top down" procedure in Crump et al. (2008), we drop the covariate with the smallest t-statistic until all remaining covariates has a t-statistic larger than or equal to 2 (in absolute value). Among these covariates with statistically significance, *Population, GDP, output, import*, and *export* indicates city-level total population, GDP, industrial output, import, and export, respectively. *Dis_highway, Dis_port, Flatland<15°* are the spatial distance to the nearest highway, spatial distance to the nearest seaport, the share of land with slope smaller than 15 degrees, respectively.
Robust standard errors are reported in parentheses, which are clustered at province-year level. * p < 0.10, ** p < 0.05, *** p < 0.01.

Finally, using such estimated growth rate of GDP we calculate the accumulated growth in GDP (***Delta GDP***) from year 1 to year 10 for a city when it hosts or is assumed to host an industrial park. The first panel of Appendix Table 6 provides the descriptive statistics for the estimated ΔGDPs.

Appendix Table 6: Descriptive Statistics for Expected Delta GDP and Gini Coefficient Change

variables	Mean	Std. dev.	Min	Max
***ΔGDP* (100 million RMB in 1980)**				
1 year	2.03	5.12	-6.57	39.13
2 yeas	3.73	9.99	-13.74	76.19
3 years	5.96	15.26	-19.95	116.57
4 years	8.20	20.54	-26.13	157.03
5 years	10.83	26.11	-31.61	199.90
6 years	13.35	31.61	-37.28	242.14
7 years	15.04	36.47	-44.48	279.10
8 years	16.34	41.03	-52.37	313.67
9 years	17.58	45.56	-60.38	347.86
10 years	17.87	49.38	-70.12	376.06
ΔGINI_GDP				
1 year	0.001	0.003	-0.026	0.023
2 yeas	0.001	0.005	-0.060	0.042
3 years	0.001	0.008	-0.088	0.058
4 years	0.000	0.011	-0.112	0.073
5 years	0.000	0.013	-0.131	0.086
6 years	0.000	0.014	-0.146	0.097
7 years	-0.001	0.015	-0.165	0.106
8 years	-0.001	0.016	-0.184	0.113
9 years	-0.001	0.016	-0.201	0.118
10 years	-0.001	0.016	-0.214	0.120

B. Constructing the Expected change in the GINI coefficient

Another key variable in our revealed preference test of industrial park site selection is an equity criteria measured by the GINI coefficient in GDP per capita. We construct this variable in two steps. In the first step, we repeat estimate equations (A2) and (A3) but this time using GDP per capita as the dependent variable. Appendix Table 7 and 8 present the estimation results. We calculate the accumulated growth in GDP per capita from the first year to the tenth year using estimates of $b_0 + b_1 \cdot X_j + b_2 \cdot Z_j + \sum b_t \cdot T_{jt}$ for a city when it hosts an industrial park.

Appendix Table 7: Baseline Estimates of the Effect of an Industrial Park on Local GDP per Capita

	ln(*GDP per capita*)			
	(1) State- and Province-level	(2) State-level Only	(3) Province-level Only	(4) State- and Province-level
dc×dt	0.0325**	0.0947***	0.0214	
	(0.0142)	(0.0235)	(0.0147)	
dc×dt×State_level				0.0271*
				(0.0141)
dc×dt×Province_level				0.0637***
				(0.0214)
Constant	8.791***	8.327***	8.938***	8.899***
	(0.0307)	(0.0595)	(0.0335)	(0.0309)
City fixed effects	Yes	Yes	Yes	Yes
Pair fixed effects	Yes	Yes	Yes	Yes
Province×year fixed effects	Yes	Yes	Yes	Yes
N	18346	2680	15666	18346
R^2	0.986	0.995	0.987	0.986

Note: Column (1) and (4) include all state and province-level industrial parks. Column (2) considers state-level industrial parks and column (3) cover province-level industrial parks.
Robust standard errors are reported in parentheses, which are clustered at city level. * p < 0.10, ** p < 0.05, *** p < 0.01.

In the second step, we calculate the GINI coefficient in GDP per capita at the province year level under the assumption that the park is built in a given city. Intuitively, if a poor city in a province receives the park and if the park is effective at increasing that city's GDP per-capita then the GINI coefficient for the province declines after the park is placed there.

The descriptive statistics for the estimated *ΔGINI_GDP*s are presented in the second panel of Appendix Table 6.

Appendix Table 8: Additional Estimates of the Effect of an Industrial Park on Local GDP per Capita

	ln(*GDP per capita*)
Dc	-0.00519
	(0.00368)
Dt	0.000320
	(0.00215)
dc×*dt*×ln(*Dis_highway*)	-0.00507***
	(0.00159)
dc×*dt*×ln(*Dis_port*)	-0.0130***
	(0.00352)
dc×*dt*×*Flatland*<15°	0.0851***
	(0.0271)
dc×*dt*×*Latitude*	-0.00593***
	(0.00104)
dc×*dt*×ln(*GDP_PC*)_lag1	0.0488***
	(0.0149)
dc×*dt*×ln(*FAI_PC*) _lag1	-0.0264***
	(0.00795)
dc×*dt*×ln(*Output_PC*) _lag1	0.0240***
	(0.00605)
dc×*dt*×ln(*Import_PC*)_lag1	0.00255***
	(0.000841)
dc×*dt*×ln(*Export_PC*)_lag1	-0.00195***
	(0.000739)
dc×*dt*×ln(*Collegestu_PC*) _lag1	-0.00278***
	(0.000909)
dc×*dt*×ln(*Totalarea*)	0.0147**
	(0.00661)
dc×*dt*×ln(*Rain*)	-0.0257***
	(0.00887)
dc×*dt*×*Park areas*(1-7)	Yes
dc×*dt*×*Built years*(1-10)	Yes
City fixed effects	Yes
Pair fixed effects	Yes
Province×year fixed effects	Yes
N	17887
R^2	0.987

Note: Following the "top down" procedure in Crump et al. (2008), we drop the covariate with the smallest t-statistic until all remaining covariates had a t-statistic larger than or equal to 2 (in absolute value). Among these covariates with statistically significance, *Dis_highway*, *Dis_port*, *Flatland*<15°, and *Latitude*, are city's spatial distance to the nearest highway, spatial distance to the nearest seaport, the share of land with slope smaller than 15 degrees, and the latitude, respectively. *GDP_PC, FAI_PC, Output_PC, Import_PC, Export_PC,* and *Collegestu_PC* are city-level per capita GDP, per capita fixed asset investment, per capita industrial output, per capita import, per capita export, and per capita college students, respectively. *Totalarea* is city's total land area. *Rain* indicates average rainfall.
Robust standard errors are reported in parentheses, which are clustered at province-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix 3: Robustness Checks

We present several robustness checks. One possible concern with our estimation is omitted variable bias. To address this issue, we augment the X vector in equation (2) to include additional individual attributes for a city's party secretary. These include his age, education attainment, tenure, and whether he/she was promoted in that province. We also control for other three sources of connections a provincial party secretary is connected to his/her subordinated friends, including whether to share the same university to graduate, whether to be born in the same place, or whether to belong to the same political faction. In addition, we consider the role of social connections of provincial governor, another top leader at the provincial level by controlling for his/her four dimensions of connections with the subordinated city party secretaries. As illustrated in Appendix Table 9, the results are robust to controlling for these extra variables..

Appendix Table 9: Robustness Checks

	(1) Controlling for city leaders' personal characteristics	(2) Including other three possible political connection	(3) Including political connection among different officials
$\overline{\Delta GDP}$	0.00270***	0.00269***	0.00244**
	(0.000992)	(0.000994)	(0.000998)
$\overline{\Delta GINI\_GDP}$	-0.321	-0.473	-0.712
	(0.811)	(0.842)	(0.824)
Social connection	0.0640***	0.0686***	0.0451*
	(0.0208)	(0.0211)	(0.00236)
Age	0.000859		
	(0.00203)		
Education	-0.00244		
	(0.00919)		
Local	-0.00164		
	(0.0196)		
Tenure	-0.00528		
	(0.00477)		
Social connection-		0.0377	
sharing the college to graduate		(0.0245)	
Social connection-		-0.0189	
sharing birth place		(0.0495)	
Social connection-		0.0184	
belonging to the same faction		(0.0518)	
Social connection-			0.0387*
between city party secretary and provincial governor			(0.0218)
Social connection-			0.00655
between city mayor and provincial party secretary			(0.0283)
Social connection-			0.0410
between city mayor and provincial l governor			(0.0248)
N	15758	16386	16386
pseudo R^2	0.013	0.013	0.015
Annual cost of social connection GDP (100 million RMB)	7.90	8.50	6.16
Annual cost of social connection Proportion of province GDP	1.46%	1.57%	1.14%

Note: Top number in cell is marginal effect df/dx. Robust standard errors are reported in parentheses, which are clustered at province-year level. *Age* and *Education* indicate the age and education information for a city's party secretary, respectively. *Local* indicates whether a city's party secretary is promoted from lower-level local government in the city.
Robust standard errors are reported in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.