Private Returns to Public Investment: Political Career Incentives and Infrastructure Investment in China

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Why do politicians who have short tenure expectations have incentives to invest in long-term infrastructure projects? This mismatch between politicians' short tenures and the long-term needed for infrastructure projects to come to fruition is generally expected to result in underinvestment in critical infrastructure. However, recent data show that China makes massive investments in large-scale, long-term transportation projects. By proposing a political exchange model, we demonstrate a fundamental synergy between the incentives of short-term mayors and of provincial leaders that is realized as a result of subway projects. With both a difference-in-differences design and a fuzzy regression discontinuity design, we show that subway projects significantly increase the promotion chances of city mayors. Additional tests also confirm the mechanism of our theory. Mayors who obtain subway projects deliver economic benefits to provincial leaders. The provincial politicians' prospects of promotion are significantly improved thanks to these economic returns.

One important role of government is to provide public goods. Some public goods can be provided relatively quickly, but many public goods require a long-term investment before their benefits are realized. For instance, schools, dams, and roads take time to build. Yet, local politicians tend to have short tenure and so may not have strong incentives to provide public goods that require a long-term investment regardless of the eventual benefits those public goods may render to their constituents. This mismatch between short-term political incentives and long-term public goods provision can lead to underinvestment in long-term public goods.

We explore transportation infrastructure development as an important example of the mismatch between political and social welfare incentives. The development of such infrastructure as highways, railways, and subways is vital to urban growth and market integration (Donaldson 2018; Duranton and Turner 2012; Zheng and Kahn 2013). As well, subway lines may improve air quality (Gendron-Carrier et al. 2018). However, most transportation infrastructure takes a long time to complete. Hence, the politician who initiates it is unlikely to be the one to receive credit when the project is completed. The mismatch between a politician's tenure and the life cycle of infrastructure development reduces the incentives of politicians to provide such long-term public goods.

However, recent data show that China makes massive investments in large-scale, long-term transportation projects. Figure 1 presents data on railway and road investments for all members of the Organization for Economic Cooperation and Development (OECD) and representative developing countries such as China, India, Mexico, and Russia. We plot the share of investment in gross domestic product (GDP) for these countries in 2014 against their per capita GDP.[1] To assist interpretation, we also fit a linear regression line and plot the 95% confidence intervals. We see that China invested massively in transportation projects compared to countries with a similar income level (e.g., Mexico). In fact, China made more investment in both railways and roads than all 46 countries in

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1. The latest year for which the data are available is 2014.

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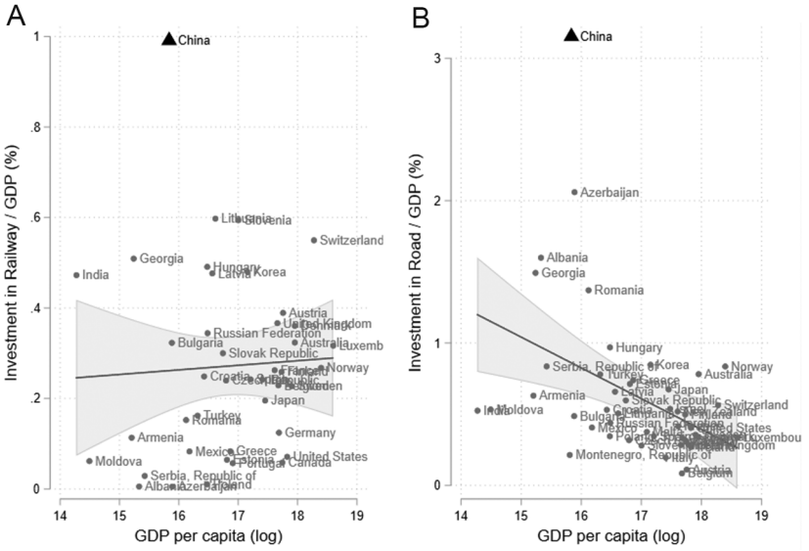

Figure 1. Investment in transportation infrastructure and GDP per capita: *A*, railways; *B*, roads. Line is a linear fit of the data sample. Shaded area is the 95% confidence interval. Data sources: OECD and World Bank.

figure 1 combined.[2] Additional analysis based on data from 1995 to 2015 (contained in app. sec. A) shows that China always invested more in railways and highways in the past 20-plus years than the United States and such developing countries as India and Mexico.

The figure helps make clear that there is a puzzle to be solved: How does China overcome the incentives mismatch and invest more in transportation infrastructure than others? To provide at least a partial explanation for this question, we focus on the political career incentives of local officials in China who initiate and finance the infrastructure investment. Our focus on local officials differs from earlier research that focuses on party strength (Simmons 2016) and politicians' electoral motivation (Cho, Lee, and Song 2019) at the national level to explain public investment.[3] Our primary concern is to understand local politicians' short-term political interests beyond any personal rent-seeking gains they may realize from infrastructure projects. When long-term public projects increase politicians' near-term ability to reap political returns, such as promotion, then they are eager to initiate such projects independent of local long-term gains. By studying the case of subway projects in Chinese cities, we find that there is a 21.3 percentage point increase in the chance that a mayor gets promoted to a higher position if she or he obtains a subway project. That is roughly a 50% increase from the baseline promotion rate of 43.2%.

Hence, our analysis demonstrates that it is the increased promotion chances for mayors, as well as the improved economic performance for provincial leaders as we will show later, that explain the political motivation for local officials to initiate large-scale, long-term infrastructure projects in China. These results help deepen our understanding of the political motivation (rather than economic incentives usually in the form of rent seeking) behind infrastructure investment by focusing on the career incentives of local officials. Before providing a detailed theoretical account and offering evidence for these results, we examine the set of answers proposed in the extant literature. Those answers, as we will see, focus on conditions and mechanisms that differ from the approach taken here.

THE POLITICAL LOGIC OF PUBLIC PROJECTS

Why do politicians have incentives to build infrastructure projects? Earlier research offers two explanations for this question. First, infrastructure projects offer rent-seeking opportunities to politicians (Keefer and Knack 2007; Lehne, Shapiro, and Eynde 2018; Robinson and Torvik 2005). Second, scholars studying distributive politics find that electoral incentives motivate politicians to initiate public projects. Since our concern is the political motivation behind infrastructure investment, we mainly review the second strand of literature in this section. We will consider the possibility of rent seeking in the "Mechanism and Alternative Explanations" section.

Electoral incentives and public projects

The intuition behind the electoral incentives argument is that an office-seeking politician can please the voters in her district by securing a public project. Hence, public projects

2. China spent €300.7 billion on roads and €94.6 billion on railways; all of the other 46 countries combined spent €216.7 billion on roads and €91.9 billion on railways according to data from the OECD in 2014.

3. Our empirical design also excludes such alternative explanations that focus on national-level variables by including city and year fixed effects.

are associated with higher chances of reelection in democracies. Several earlier studies provide empirical support for this theoretical prediction (Cadot, Röller, and Stephan 2006; Hong and Park 2016; Huet-Vaughn 2019; Voigtländer and Voth 2014). Moreover, local leaders can even take credit for public projects so long as they can associate the public projects with their image by, for instance, making visits to the project (Cruz and Schneider 2017).

However, electoral incentives can only explain small-scale, short-term infrastructure investments. Bonfiglioli and Gancia (2013) offer a theory for why electoral incentives undermine the development of long-term public projects. In their model, voters observe economic performance and welfare improvement during the first term of a mayor and decide whether to reelect the mayor for a second term accordingly. Hence, public projects that take a short period of time to complete can help the incumbent politician get reelected because the operation of these projects bolsters the signal of the incumbent's competence. By contrast, public projects that take a long period of time to complete cannot help the incumbent signal her competence before the election by improving the local economy or providing public services. Moreover, the construction of these public projects imposes additional costs on local residents (e.g., noise, taxes), which further hurt the incumbent's reelection prospects.[4]

A few recent empirical studies lend support to the theoretical predictions made by Bonfiglioli and Gancia (2013). By investigating public projects in 61 African countries, Marx (2018) reports that only completed, visible projects increase the reelection chances of local leaders. Even projects that are expected to finish soon are not associated with higher reelection chances for the incumbent. Hence, politicians have strong incentives to deliver short-term public projects that can be completed before the election. Furthermore, Williams (2017) shows that public projects in Ghana that will take a long time to complete are likely to become unfinished projects because of the "renegotiation risks" in the long term after election.

Moreover, electoral incentives motivate politicians to obtain small-scale projects. Grimmer, Messing, and Westwood (2012) find that frequently claiming credit for small public projects has a larger effect on voters' support for the US House members than claiming credit for one large-scale project. Voters rarely remember such details of projects as the amount and size, yet a high frequency of credit-taking messages helps voters update their impression of the politician. Hence, frequently securing relatively small-scale public projects is more helpful for a politician.

Large-scale, long-term public projects in China

The discussion above leaves us a puzzle. Why do politicians have incentives to invest in large-scale, long-term infrastructure projects? Building on these earlier studies, we extend the logic of electoral incentives to understand the development of large-scale, long-term infrastructure projects in China. In its essence, the electoral motivation argument posits that politicians serve the interests of those who select and promote them. In an electoral system, it is the voters who select their mayors and legislators. In a nondemocratic setting, a smaller group of people do the same work (Bueno de Mesquita et al. 2003). Local politician's political superiors provide the equivalent function that voters provide in democracies.[5]

Two changes take place as we replace voters by political superiors as the selectorate for city mayors. First, the costs for pursuing public investment in large-scale infrastructure are much lower in China. Critical costs for building public projects in democratic settings are the negative externalities (e.g., noise and pollution) and higher taxes. These costs may upset residents and so harm the reelection prospectus for the incumbent. The Chinese case differs on this critical point. While Chinese residents also have to bear noise and pollution, their views are much less important for the political career of city mayors compared to the views of mayors' political superiors. Furthermore, cities are not allowed to raise tax rates on residents. Such power is controlled by the central government. Hence, most city governments finance the public projects through city bonds, the payment of which depends mostly on the government's land sales revenue rather than raising the tax rate of local residents (Bai, Hsieh, and Song 2016).

Second, it is possible for city mayors to reap short-term political benefits from long-term, large-scale public investment under the Chinese system. The "top-down" political system in China makes such short-term political benefits possible for city mayors in those cases for which there is synergy between their political interests and those of the provincial leaders to whom they answer. Earlier research demonstrates that when provincial leaders deliver improved economic performance they are more likely to be promoted to the central government (Jia,

4. Bonfiglioli and Gancia (2013) find that uncertainty in politicians' performance increases long-term investment. Rather than focusing on uncertainty, we study how the institutional features of the Chinese system promote long-term investment.

5. We argue that the logic of an electoral system can be applied to the Chinese setting in the sense that (1) local officials still have to answer to a principal, and (2) like in electoral systems, local officials implement policies to win principal's support. This logic does not depend on who the principal is.

Kudamatsu, and Seim 2015; Li and Zhou 2005).[6] Such institutional arrangements of the Chinese system that require provincial politicians to produce economic and fiscal improvements make a political exchange between provincial leaders and city mayors possible. The central government's demand for robust economic performance by provincial leaders means that Chinese mayors are strongly incentivized to help their superiors, the provincial leaders, produce improved economic growth and fiscal revenue in exchange for benefits for themselves.

One mechanism for achieving these mutual interests is to invest in large-scale, long-term infrastructure projects. These projects boost economic growth through construction investment and generate more land sales revenue. Moreover, unlike democratic settings that undermine the development of large-scale, long-term public projects, the political exchange relationship in the Chinese system incentivizes city mayors to secure large-scale, long-term infrastructure projects. This is because the longer the term and larger the scale of the infrastructure projects, the bigger the economic and fiscal benefits to the city (and so, the province). These benefits offered by city mayors to provincial leaders engender the incentive for provincial leaders to reward those mayors. Hence, we should expect to see that these "helpful" mayors are more likely to get promoted. Those mayors who are unable or unwilling to undertake the effort to secure large long-term infrastructure projects, in contrast, are unlikely to be rewarded by their political superiors.

These theoretical expectations are closely linked to the literature on Chinese political selection that finds the economic and fiscal performance of local governments is positively associated with the promotion of local officials (Chen and Kung 2016; Landry 2008; Landry et al. 2018; Yao and Zhang 2015). At the core of these studies is a signaling model in which mayors use their past performance as a signal of their competence. While the signaling model explains political selection in China well, we contribute by proposing a different mechanism, namely, the political exchange between mayors and their provincial superiors. A crucial implication of our theoretical account is that even randomly assigned public projects increase the promotion chances of city mayors so long as they improve economic and fiscal performance for provincial leaders. Our identification strategy based on the generalized differences-in-difference (DID) and fuzzy regression discontinuity (RD) designs helps us create such "randomness" in subway projects that is critical for our theoretical account and blocks the causal mechanism of a signaling model.[7] Relatedly, these results are also consistent with the well-documented empirical pattern in democracies that random shocks to economic conditions affect the reelection prospectus of the incumbent (Bagues and Esteve-Volart 2016; Healy and Malhotra 2010).

Also closely related to our work here are recent studies that focus on how the "visibility" of public projects helps incumbents improve their approval rating (Marx 2018; Strange 2019). These studies uncover one important mechanism through which infrastructure projects improve the political survival of incumbents in democracies. However, visibility seems less important in authoritarian China because ordinary people, the subject of study in these articles, can hardly influence the career of politicians. By contrast, our political exchange model predicts, whether visible or not, public projects that yield substantial economic and fiscal improvements are more likely to improve the career prospectus of Chinese mayors. Our research design also excludes the visibility explanation because most city mayors are promoted before subways are completed or become visible at all.

BACKGROUND: SUBWAY PROJECTS IN CHINA

The case of subway projects in China provides an appropriate setting to test our theoretical claims. Since subway projects, like all other infrastructure investment, translate into the pork that city mayors obtain for provincial leaders, all promotion-seeking mayors should have incentives to build subways regardless of the conditions of the city and the opinions of the residents. Hence, to avoid overinvestment in subways, the central government requires that city governments must obtain permission before they can start building a subway.

To get permission, a city government first proposes a plan for the subway system (PSS), including the layout, financing, expected utilization, and other detailed information for the network of several subway lines that the city government plans to build in the coming few years. This PSS will be reviewed first by the National Development and Reform Commission (NDRC), a ministry of the central government. Then, the NDRC coordinates with other central ministries (including the Ministry of Environmental Protection and the Ministry of Housing and Rural-Urban Development) to further review the PSS. If bureaucrats in all these ministries, especially the NDRC,

6. Although a recent study (Landry, Lü, and Duan 2018) shows that provincial leaders depend more on political connections than on their economic performance to get promoted, we are not aware of any study showing that economic performance does not matter at all for the political promotion of provincial leaders. Our analysis at the provincial level below is more consistent with Jia et al. (2015) and Li and Zhou (2005). We find that subway projects help provincial leaders get promoted.

7. We should note here that the purpose of our analysis is not to say that competence does not matter at all in securing subway approval. The goal of our analysis is to demonstrate that even after partialling out—rather than rejecting or, even worse, ignoring—the influence of the signal model, we still find empirical support for our theoretical account.

wish to approve the PSS, the NDRC will send the PSS, together with its suggestions, to the (vice) premier for final approval.

We focus on the approval of the subway plan (PSS). If the PSS is approved, the NDRC will disclose the approval to the public. Hence, we are able to collect a complete list of subway approvals made by the central government that we report in table A1 (tables A1–A30 are available online). However, we cannot identify the cities that had a failed application because the government is not required to disclose rejected PSSs. The lack of data for failed subway applications means that our focus is on what happens to the careers of mayors and provincial leaders following approval of the PSS. We then contrast their career paths with mayors and provincial leaders who do not have subways projects.

City mayors are the parties usually responsible for obtaining subway approval. When a city government plans to build a subway system, it will establish a new government agency called the "leading team for subway planning and construction." The primary function of this "leading team" is to coordinate the efforts of different departments within a city government and lead the preparation for the PSS. In most cases, city mayors are the head of leading team that is responsible for drafting the PSS, smoothing the application process, and implementing the construction plan. This is the primary reason why we focus on city mayors rather than city party secretaries (CPSs) who are not directly involved in the process of obtaining subway approval or building a subway system.[8]

A related concern is whether city mayors can expect to obtain subway approval within their expected tenure of roughly three years. The answer is yes. On average, it takes a mayor 1.4 years to get subway approval. The longest waiting time for subway approval is only three years. In contrast, construction of a subway line on average takes 5.2 years after approval so that the total time from proposal to completion of construction requires, on average, 6.6 years. This is much longer than the average tenure of a Chinese mayor. Therefore, proposing mayors are not likely to pursue subway construction with the expectation of being in office at the time the project is completed.[9]

DATA

We use several sources of data for empirical analysis. To begin, we collect an original data set of subway approvals. To collect these data, we rely first on the annual reports released by the China Association of Metros to obtain the list of cities that have already built a subway system or were still building their first subway line in 2017.[10] Then we searched the internet for each city on this list to identify the original subway approval.

Furthermore, we make use of two data sets about city mayors. The first is the CCER Official Dataset (Xi, Yao, and Zhang 2018). This data set reports the promotion of city mayors, their political connections to the provincial party secretary (PPS), and other basic characteristics (e.g., age, gender, education level). Moreover, we include additional variables recorded in the Chinese Political Elite Database (Jiang 2018), which contains rich information on mayors' characteristics and previous work experience.

Finally, we construct city-level variables from two sources. The first is the China City Statistical Yearbook, which contains rich information on Chinese cities, such as the city population, GDP, GDP growth rate, annual fiscal revenue, unemployment rate, and so on. The second data source is the China Urban Construction Statistical Yearbook, which records detailed information on urban infrastructure investment and land sales data. We combine all these data sets into a city-year panel data set for empirical tests.

Because the central government reviews subway applications on the basis of rules adopted in 2003, we focus on subway approvals made after 2003. Moreover, to facilitate apples-to-apples comparisons, we drop a few "outlier" cities in our data sample. They include four province-level megacities, namely, Beijing, Tianjin, Shanghai, and Chongqing, and another 15 vice-province-level cities.[11] Their mayors are minister-level or vice-minister-level appointments; therefore, the promotion of mayors in these cities is completely different from that of other prefecture-level cities. Taken together, our analysis focuses on a city-level panel data set for 265 prefecture-level cities spanning from 2003 to 2016.[12] We present the summary statistics for this city panel data set in table 1.

IDENTIFICATION STRATEGY

Our baseline identification strategy is a generalized DID design. More specifically, we use the following equation for empirical analysis:

$$\text{Promotion}_{it} = \beta_0 + \beta_1 \text{Approval}_{it} + \gamma X_{it-1} + \theta_i + \pi_t + \varepsilon_{it}. \quad (1)$$

8. We provide further qualitative evidence in app. sec. B that city mayors rather than CPSs are the major officials who lead and coordinate the application process.

9. After mayors complete their tenure, their expectation is that they will be assigned to work in another place. Only 30% of mayors continue to work as CPSs of the same city. Among those mayors who have obtained subway approval, only 11% of them continue to work in the same city as a CPS in our data.

10. The 2017 annual report is the latest one released by the China Association of Metros.

11. The vice-province-level cities include Guangzhou, Wuhan, Harbin, Shenyang, Chengdu, Nanjing, Xi'an, Changchun, Jinan, Hangzhou, Dalian, Qingdao, Shenzhen, Xiamen, and Ningbo.

12. Most data we use here are not yet available after 2016.

Table 1. Summary Statistics

Variable	*N*	Mean	Min	Max
Mayor promoted within three years	3,843	.412	.00	1.00
Mayor connection	3,839	.011	.00	1.00
Mayor age	3,804	50.20	33.00	61.00
City population	3,571	417.42	14.19	1,591.76
City GDP (billion ¥)	3,852	135.57	3.177	1,954.74
City fiscal revenue (billion ¥)	3,856	10.40	.12	313.65
City GDP growth rate (%)	3,844	12.09	−19.38	109.00
Mayor obtaining subway approval	3,861	.04	.00	1.00
City investment in infrastructure per capita (¥)	3,848	699.33	.00	13,236.19
City GDP per capita (¥)	3,845	32,218.63	99.00	468,000.00
City land sales revenue per capita (¥)	3,855	296.91	.00	40,277.59
City fiscal revenue per capita (¥)	3,855	2,697.62	70.327	81,467.34

The outcome variable Promotion_{it} is a dummy variable indicating whether the mayor of city i is promoted within three years from year t. We define a mayor's promotion according to the following criteria: the city mayor is promoted to (*a*) party secretary of a prefecture-level city or (*b*) a vice-province-level position (e.g., vice governor of a province).[13] City mayors cannot be promoted directly to a province-level or even higher position without first going through *a* or *b*. We use a lead of three years because the average tenure of Chinese mayors is roughly three years. We also use a mayor's promotion within one, two, four, or five years as robustness checks in appendix section D and obtain similar results.

Our primary explanatory variable, Approval_{it}, is a dichotomous indicator equal to 1 if the mayor of city i in year t has obtained a subway approval and to 0 otherwise.[14] One methodological challenge is that it is hard to identify which mayor can claim credit for subway approval because city governments do not disclose which mayor started the work of applying for approval. We pinpoint this mayor by the following procedure: we identify the period (*a*) when the city government establishes the leading team for subway planning and construction or (*b*) when the city government submits a PSS to the central government, whichever is available.[15] The endpoint of this period is defined as when the city government acquires approval. Usually, during this period, there is only one mayor, and we identify this mayor as the one who applies for and gets the subway approval.

However, in a few cases, cities had two mayors between when the city government applies for the subway project and when the city obtains approval. In these situations, we identify the second mayor as the credit taker because she or he oversees the subway approval in her or his term. One problem with this coding rule is that this second mayor may have only worked on subway approval for a short time. There is one such case. The mayor of Kunming was appointed in 2013, the same year as his government obtained subway approval. Because his predecessor had worked on subway approval for a much longer time than him, we identify the earlier mayor in Kunming as the one who takes credit for the approval. We also conduct additional analysis by dropping the case of Kunming in appendix section D (table A8), and our results still hold.

In equation (1), we also include a vector of city-level, one-year lagged, time-variant control variables X_{it-1}. Lags are used to avoid posttreatment bias. Variables θ_i and π_t are city and year fixed effects respectively. We cluster standard errors at the city level to deal with city-level serial correlation. The focus of the empirical analysis is β_1, which we expect to be positive.

After clarifying the identification strategy, we discuss how our research design overcomes several empirical challenges. One primary source of selection bias is that only certain cities can build subways. This selection problem can take various forms. First, one may wonder whether cities that received the first approval relatively recently are unlikely to obtain a second approval. But subway approval need not be a one-time occurrence for a city. In practice, 13 cities have received more than one subway approval, generally involving expansion.

Another possible form of selection bias is that mayors receiving subway approval may be more likely to be promoted

13. We consider alternative measures for mayoral promotion in table A4.

14. Recall that we do not have data on rejected proposals, so the category 0 includes any rejected proposal and any city that did not offer a proposal. Meanwhile, after mayors leave office, the indicator will be switched to 0 if the successors do not get their own subway approval. Therefore, our design deviates from a canonical DID design where the treatment will not switch off once it turns on.

15. Our preferred measure is *a*. When *a* is not available, we use *b*.

Table 2. Subway Approval and Mayoral Promotion

	Mayor Promoted within Three Years			
	(1)	(2)	(3)	(4)
Subway approval	.251***	.270***	.257***	.213**
	(.095)	(.096)	(.098)	(.096)
City FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Mayor controls		✓	✓	✓
City controls			✓	✓
Province-year FE				✓
Dependent variable mean	.426	.429	.432	.432
Observations	3,647	3,566	3,092	3,071

Note. Standard errors clustered at the city level are reported in parentheses. Control variables: (1) mayor controls include gender, ethnicity, age, education level, political connection with provincial party secretary, and previous work experience in county government, provincial government, central government, state-owned enterprises, university, and the Communist Youth League; (2) city controls include population, GDP size, GDP growth rate, and fiscal revenue in the previous year. FE = fixed effects.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

because they are already more capable and politically connected. We adopt several strategies to deal with this problem. First, we include measures for the competence and political connections of city mayors as control variables. These include (1) primary economic indicators of the city (i.e., population, GDP, government fiscal revenue, and GDP growth rate) as measures for mayors' competence in promoting the local economy; (2) essential characteristics of mayors such as education, age, gender, and race; (3) mayors' political connections with provincial leaders; and (4) earlier work experience of the mayor.[16] To conserve space, we discuss the definition and source of these variables and report their descriptive statistics in tables A2 and A3.

DOES SUBWAY APPROVAL IMPROVE MAYORAL PROMOTION?

This section contains the results of our statistical analysis. We first present the results of our baseline DID design. Then we test the critical "parallel trend assumption" of a DID design and present the dynamic effects of subway approval. We finally introduce the fuzzy RD design. All results across different designs and specifications demonstrate that subway approval increases a mayor's near-term chances of being promoted.

Baseline results with a generalized DID design

Table 2 contains the main results of our analysis. The outcome variable evaluates mayoral promotion in three years. The model in column 1 only includes subway approval as the explanatory variable, as well as city and year fixed effects. The model in column 2 adds mayoral characteristics, including age, gender, ethnicity, education background, political connections with the PPS, and earlier work experience. Column 3 adds major city-level variables, including city population, GDP size, government fiscal revenue, and GDP growth rate. These controls are intended to correct for any selection bias due to the expectation that more populous, prosperous, and fiscally robust cities are more likely to obtain subway approval and mayors of such cities are most likely to get promoted. In column 4, we add province-year fixed effects to control for all province- and time-specific characteristics. The political connections of provincial leaders to the central government, for instance, are captured by these province-year fixed effects. Subway approval is positively and significantly associated with mayoral promotion in all these specifications.

We perform several robustness checks and placebo tests and present the results in appendix section D. We highlight some tests here. First, we use alternative measures for the economic

16. We use a mayor's workplace connections to the PPS to measure political connections. This variable is coded 1 if a mayor worked with the PPS before becoming mayor. We consider another four measures for a mayor's political connections in table A5 and obtain similar results.

performance of the city to avoid the influence of extreme values or misreported economic data by city governments. We do so by taking the average of city-level variables in the previous three years, replacing GDP growth by nighttime light intensity, and decomposing GDP growth into the growth of different sectors. Furthermore, we repeat our analysis with a smaller sample of cities that have obtained subway approval by 2016. By doing so, we only pick up the temporal variation that some cities obtain subway approval earlier and some other cities later. Additionally, following Landry et al. (2018), we restructure our data set into a cross-sectional data set for mayors from 2003 to 2016 and repeat our analysis with cross-sectional regressions. Finally, we consider alternative measures for mayoral promotion. Our results remain robust in all these tests.

Furthermore, we conduct several tests to control for the signaling mechanism. Following Chen and Kung (2016), we add mayor fixed effects into our generalized DID specification. These mayor fixed effects should capture all the time-invariant features of mayors. If we consider mayors' competence and political connections to be quite stable during their tenure (which is roughly three years), mayor fixed effects should capture a large portion of the influence of these variables. Our results are robust to the inclusion of mayor fixed effects. This demonstrates that when competence (and so, the associated signal) is controlled for, subway approval still increases the probability of promotion.

Finally, we conduct a placebo test by examining whether subway approval increases the promotion chances of a CPS. As discussed above, the CPS is not responsible for subway application or construction; therefore, we should not observe increased promotion chances for the CPS due to subway approval. And indeed we do not find that subway approvals are correlated with the promotion of a CPS.

Dynamic effects analysis

One critical aspect of the DID design is the "parallel trends assumption." To test this assumption and demonstrate the dynamic effect of subway approval on a mayor's promotion, we employ the following model specification:

$$\text{Promotion}_{it} = \sum_{\gamma \geq -4, \gamma \neq +1}^{\gamma \leq +5} \beta_\gamma \text{Approval}_{i(t+\gamma)} + \omega X_{it-1} + \theta_i + \pi_t + \varepsilon_{it}, \quad (2)$$

where $\text{Approval}_{i(t+\gamma)}$ is a set of dummy variables indicating whether city i has obtained subway approval at time $t + \gamma$. Hence, β_γ measures the effect of subway approval both before the city has obtained approval (i.e., $\gamma > 0$) and after the city has obtained subway approval for γ years (i.e., $\gamma < 0$).[17] The parallel trends assumption requires that all β_γ (when $\gamma > 0$) are not significantly different from 0.

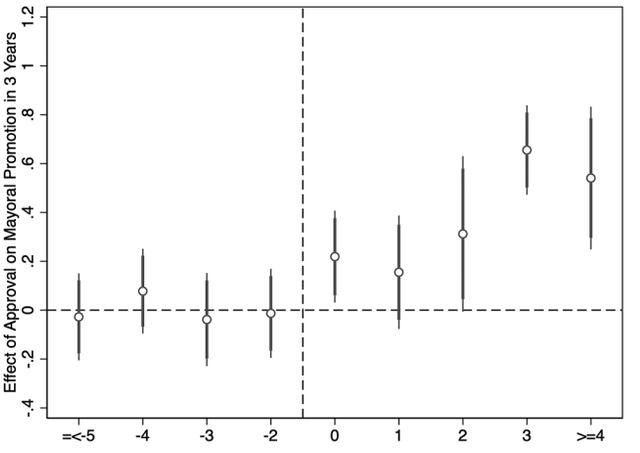

Figure 2. Dynamic effects of subway approvals on mayor promotion. Each circle indicates a point estimate for the effect of subway approval, and vertical bars are the 90% and 95% confidence intervals. Negative numbers on the horizontal axis refer to the years before a city receives subway approval; positive numbers indicate the years since the city receives subway approval. We omit the year before the city obtains subway approval (i.e., when $\gamma = +1$) as a baseline. All coefficients should be interpreted in comparison with this baseline year.

Figure 2 contains the results of the dynamic test.[18] It shows that before the city obtains subway approval (-5 to -1 on the X-axis), the expectation of future approval does not affect the mayor's promotion.[19] However, once the city receives subway approval, its mayor has a significantly higher chance of getting promoted. This effect continues to hold as long as the mayor who obtained the approval is still in office. Additional analysis in appendix section E (table A14) shows that, after that mayor leaves office, the effect of subway approval on the promotion of future mayors drops to around zero. Hence, future mayors who have not worked on the subway's approval do not enjoy a higher chance of promotion. Taken together, these results demonstrate that our DID design satisfies the critical parallel trends assumption.

A fuzzy regression discontinuity design

To be eligible for creating a subway system, a city must satisfy four central government requirements. These four required criteria include (1) the city's annual fiscal revenue exceeds

17. For example, $\text{Approval}_{i(t-2)} = 1$ means t is two years after the year when city i gets its first subway approval, and $\text{Approval}_{i(t+2)} = 1$ means t is two year before that.

18. We report regression results in app. sec. E.

19. A joint F-test gives an F-statistic $= 0.58$ and cannot reject the null hypothesis $\beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$.

¥10 billion, (2) the city's GDP reaches at least ¥100 billion, (3) the city's population exceeds 3 million people, and (4) more than 30,000 people per hour are expected to use a subway line. While cities satisfying these four requirements are not guaranteed to have subways, those not satisfying them are not eligible to have a subway. These requirements offer us an opportunity to identify the effect of subway approvals through a fuzzy RD design.

We use city population to construct the fuzzy RD design. We first explain why the other three criteria cannot be employed in a discontinuity design. Most obviously, we cannot use the fourth requirement because only those cities that apply for subway approval are required to calculate the expected number of users. Second, local governments in China manipulate such key economic figures as GDP and fiscal revenue (Wallace 2016). The chances are that the manipulation of these economic statistics will result in a nonrandom sorting of GDP and fiscal revenue. Hence, they are not a good basis for a reliable RD design (McCrary 2008). Appendix section F contains density plots and results for McCrary tests for the first three requirements. We find clear sorting patterns for GDP and fiscal revenue figures around the critical thresholds required to build subways. Hence, GDP and fiscal revenue are not appropriate running variables because of these sorting patterns around the cutoffs.

To use the city population as the running variable in our fuzzy RD design, it must satisfy another two requirements. First, cities whose population is just above 3 million and just below 3 million are expected to be similar to each other. This requirement is imposed to ensure that the fuzzy RD design creates a balanced treatment and control group. To show this is the case, we test whether pretreatment covariates are balanced around the population cutoff. We apply this test to all control variables used in table 2, which include the mayor's basic characteristics, political connections, and earlier work experience and the city's economic performance (lagged by one year). Figure A4 (figs. A1–A12 are available online) contains the results of the balance tests. We see that all variables are balanced, showing that cities whose population is slightly larger than 3 million people are quite similar to those whose population is just below 3 million.[20]

The second criterion for a valid running variable is that the cutoff cannot be used as the threshold for other policies or programs. If this requirement is not satisfied, we cannot tell whether any observed effect is caused by subway approval or, instead, by other public policies that use the same population threshold. However, we believe that the compound treatment problem is not a primary threat to our population fuzzy RD design. For instance, to the best of our knowledge, a population of 3 million is not a cutoff for mayors' wage rates or fiscal transfers to cities in China, both of which are popular sources of compound treatment in population RD designs in European countries (Eggers et al. 2018).[21]

We adopt a parametric, instrumental variable (IV) approach to the fuzzy RD design. More specifically, we first assume that the promotion of city mayors takes the following functional form:

$$\begin{aligned}\text{Promotion}_{it} = {} & \beta_0 + \beta_1 \widehat{\text{Approval}_{it}} + \tau f(Z_{i,t-2}, \text{Pop}_{i,t-2}) \\ & + \gamma X_{it-1} + \theta_i + \pi_t + \varepsilon_{it},\end{aligned} \tag{3}$$

where $Z_{i,t-2}$ is the IV, that is, a dummy variable indicating whether the city is home to more than 3 million residents. Hence, $f(Z_{i,t-2}, \text{Pop}_{i,t-2})$ is a function of the running variable (i.e., the population size of the city) and its interaction with $Z_{i,t-2}$. The first stage of our model is specified by the following equation:

$$\begin{aligned}\text{Approval}_{it} = {} & \alpha_0 + \alpha_1 Z_{i,t-2} + \lambda f(Z_{i,t-2}, \text{Pop}_{i,t-2}) \\ & + \mu X_{it-1} + \theta_i + \pi_t + \varepsilon_{it},\end{aligned} \tag{4}$$

where subway approval is predicted by the IV. One potential problem of this parametric fuzzy RD design strategy is that we have to assume a functional form of $f(Z_{i,t-2}, \text{Pop}_{i,t-2})$, and the results are dependent on this assumption. We also include city fixed effects θ_i and year fixed effects π_t in order to alleviate the potential bias caused by city-level unobserved factors (Holbein 2016).

Finally, we select the optimal bandwidth for fuzzy RD design by following Imbens and Kalyanaraman (2012). The optimal bandwidth is roughly 1.06 million people around the cutoff (3 million people). In other words, we focus on cities whose population size ranges from 1.94 to 4.06 million. While the bandwidth may seem wide, cities included in this range are medium-sized Chinese cities.[22] Furthermore, given that the standard deviation of city population size is 2.4 million, our bandwidth of 1.06 million people is

20. To overcome the problem of multiple testing in the balance test, we conduct additional tests to control for family-wise error rate in table A15 following Eggers et al. (2015).

21. Yet, this cutoff of 3 million people could be associated with a different set of land and population policies. Cities above 3 million people are categorized as "type II major cities" in China. In these type II major cities, land sales quotas and *hukou* quotas (i.e., the quota for legally registered residents in urban China) are larger than for smaller cities. To avoid the influence of these compound treatments, (1) we control for population size to block the confounding influence of the different *hukou* policies for type II major cities; (2) we also test whether subway approval is associated with a larger area of land sales in the "Mechanism and Alternative Explanations" section and do not find evidence to support this claim.

22. The median population size for a Chinese city is 3.6 million.

not wide. To further alleviate the concern that results and inference are sensitive to the choice of bandwidth, we repeat our analysis with both narrower and wider bandwidths than 1.06 million people as a robustness check. The results are generally consistent with those reported in this section. Finally, we only focus on cities with GDP larger than ¥100 billion and annual fiscal revenue higher than ¥10 billion, because only these cities are eligible to build subways.

The results based on the fuzzy RD design are reported in table 3. First, we check whether the results are susceptible to the weak instrument problem. We report the first-stage results in panel B and the *F*-statistics of the first stage at the bottom of table 3. The coefficient of the IV is positive and significant at the 1% level. Moreover, *F*-statistics of all specifications are safely larger than 10, the conventional cutoff to identify a weak instrument. These results demonstrate that our IV is not a weak instrument.

The second-stage results are reported in panel A of table 3.[23] The results across all specifications show that subway approval increases the promotion chances of mayors. One may also notice that the coefficients reported in table 3 are larger than those in table 2. We believe that this difference between the DID design and fuzzy RD design is mainly due to the different data samples used in these two tests. Most notably, the sample for the fuzzy RD design is medium-sized cities with a population of around 3 million, while the DID design uses all the cities. The effect of subway approval may be more salient for cities right around the cutoff of 3 million residents, and the fuzzy RD design captures this local average treatment effect of the compliers.

We perform several robustness checks on the results that were presented in table 3. First, we check placebo cutoff (2, 4, and 5 million population) to see whether our fuzzy RD design is valid. Not surprising, we do not find any significant results (in table A20). Second, we investigate whether the results are robust to alternative functional forms. In table A18, we further add the quadratic term for the running variable and its interaction with the IV. We obtain similar results. Moreover, we show that the results are robust to alternative bandwidth choices and kernel choices in figure A10 and table A19, respectively.

Table 3. Subway Approval and Mayors' Promotion: Fuzzy Regression Discontinuity Design

	Mayor Promoted in Three Years		
A. Second stage:			
Subway approval	.478***	.496***	.411***
	(.051)	(.178)	(.140)
Population	.425	−.182	−.415
	(.754)	(.822)	(1.135)
Population × IV	−.262	1.201	.976
	(2.320)	(3.279)	(2.968)
	Subway Approval		
B. First stage:			
IV (population >3 million)	1.012***	1.013***	1.012***
	(.027)	(.037)	(.078)
City FE	✓	✓	✓
Province-year FE	✓	✓	✓
Mayor characteristics		✓	✓
City characteristics			✓
Observations	148	143	143
Cragg-Donald *F*-statistic	53.47	34.12	29.27

Note. Bandwidth is 1.06 million people, which is selected on the basis of the optimal bandwidth methods by Imbens and Kalyanaraman (2012). Rectangular kernel is used. Standard errors clustered at the city level are reported in parentheses. FE = fixed effects; IV = instrumental variable (i.e., population >3 million).
* $p < .1$.
** $p < .05$.
*** $p < .01$.

MECHANISM AND ALTERNATIVE EXPLANATIONS

Results reported in the previous section show that subway approval enhances the promotion chances of mayors. In this section, we examine the mechanism underlying these results. There are two parts to the mechanism. First, subway approval is expected to produce the economic performance that provincial leaders require. Second, the improved economic performance that is expected to accompany subway approval should help provincial leaders get promoted. In this section, we present evidence for both parts of the mechanism and then consider several alternative explanations.

Economic and fiscal benefits

To show that subway approval improves the city's economic and fiscal indicators, we use the following model specification:

$$Y_{it} = \sum_{\sigma \geq -4, \sigma \neq +1}^{\sigma \leq +5} \beta_\sigma \text{Approval}_{i(t+\sigma)} + \omega X_{it-1} + \theta_i + \pi_t + \varepsilon_{it}, \quad (5)$$

where Approval_{it} is a dummy variable indicating whether city i in year t got its first subway approval. Moreover, similar to equation (2), we add in nine different dummy variables,

23. We graphically present the fuzzy RD results in fig. A8.

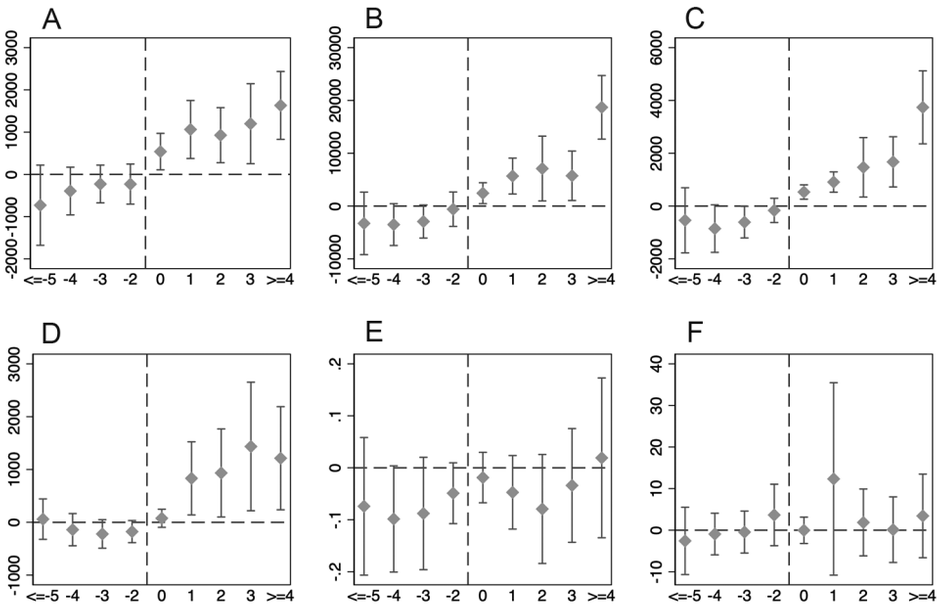

Figure 3. Dynamic effects of subway approvals on economic performance, unemployment rate, and air quality: *A*, infrastructure investment; *B*, GDP per capita; *C*, fiscal revue; *D*, land sales revenue; *E*, unemployment rate; *F*, air quality. Each circle indicates a point estimate. Vertical bars are 95% confidence intervals. The dummy variable indicating one-year-prior treatment status (i.e., when $\sigma = +1$) is omitted from the regression.

$\text{Approval}_{i(t+\sigma)}$, to check whether the effect of subway approval on the city's economic performance only starts to appear after the city has obtained the approval.

The results are contained in figure 3. We first examine the per capita infrastructure investment and GDP per capita in figures 3*A* and 3*B*. In both cases, future subway approvals do not have a significant effect before the city receives approval (-5 to -2 on the *X*-axis). However, once a city obtains subway approval (0–4 on the *X*-axis), its investment in infrastructure per capita sees a jump of roughly ¥500 (per capita), and the reported city GDP per capita also becomes significantly higher. Both effects become more substantial as time goes by, showing that subway projects produce long-term investment and growth.

Next, we test whether subway projects enhance government fiscal revenue. In figure 3*C*, we report the dynamic effects of subway approval on total government fiscal revenue per capita. We see that after the city obtains subway approval its fiscal revenue increases significantly. One possible threat to the validity of this finding is that there could have been selection effects at work. Specifically, it might have been the case that cities with better fiscal records were more likely to get subway approval. However, in fact the ex ante fiscal revenue of cities that received subway approval was not, on average, higher than was true for cities that did not receive or did not pursue subway approval.

Next, we focus more closely on a specific type of fiscal revenue for city governments, namely, land sales revenue. Since the state owns all the land, only the government can sell land use rights through auctions in China. These land auctions have recently become a primary source of fiscal revenue for many city governments. In figure 3*D*, we test whether subway projects increase the land sales revenue for a city government. We use land sales revenue per capita as outcome variable. As shown in figure 3*D*, from the second year onward after a city obtains subway approval, land sales revenue for the city government becomes significantly higher. We do not find a significant effect on land sales revenue before subway approval.[24]

Taken together, the results contained in figures 3*A*–3*D* demonstrate that subway approval significantly improves the economic and fiscal performance of the city (and so, the province). Note that most of these improvements take place as soon as the city obtains subway approval. Moreover, these economic and fiscal indicators continue to increase after the city obtains a subway and after the mayor leaves office. Hence, provincial leaders can observe the improved economic and fiscal performance of the city relatively quickly, thus justifying the increased promotion chances of mayors in the near term.

A competing explanation to that offered here focuses on the contention that subway projects can improve the welfare of city residents. Rather than the hypothesized synergy between the career of mayors and provincial leaders given subway approval, perhaps the welfare improvement for citizens explains

24. Readers who are interested in why land sales revenue increases are directed to fig. A11. We show that the increased land price rather than a larger area of land explains the higher land sales revenue.

the improved promotion chances for city mayors who have obtained subway approval. The welfare improvement explanation, however, is unlikely to explain mayoral promotion because welfare improvements will be realized primarily after the subway begins operation. Completion of the subway does not occur while the mayor who secured approval is in office. Still, two potential welfare improvements may occur before the subway becomes operational, and so we must consider their impact.

Subway construction implies that more workers will be hired to design and build subway lines. Furthermore, new businesses will begin to develop along the future subway lines. Hence, a city building a subway is expected to have a lower unemployment rate. An additional beneficial economic impact is likely to arise once residents learn that their city is going to build a subway. They may then delay their plans to buy cars, choosing to use public transportation more. This may lead to better air quality. We test these two conjectures in figures 3*E* and 3*F*. The evidence does not support these two conjectures.

Table 4. Subway Approval and the Promotion of Provincial Party Secretary

	PPS Promoted within Three Years		
	(1)	(2)	(3)
Subway approval	.159*	.165**	.161**
	(.085)	(.072)	(.071)
Province FE	✓	✓	✓
Year FE	✓	✓	✓
PPS controls		✓	✓
Province controls			✓
Provinces	26	26	26
Observations	390	390	390

Note. Standard errors clustered at the province level are reported in parentheses. We exclude four municipalities and Tibet. FE = fixed effects; PPS = provincial party secretary.
* $p < .1$.
** $p < .05$.
*** $p < .01$.

The promotion of the provincial party secretary

We now investigate whether subway projects help the PPS get promoted. Since we argue that the PPS rewards mayors who obtain subway projects, we should expect that subway projects also improve the promotion chances of the PPS. Otherwise, the PPS is unlikely to have the required incentive to reward a subway project.

We examine the effect of subway approvals on the promotion of the PPS in table 4. We focus on PPSs rather than governors because PPSs have the strongest influence on mayors' political career in a province.[25] The outcome variable is a dummy variable indicating whether the PPS is promoted to the level of vice premier within three years.[26] We choose three years to be consistent with our main specifications. The results are also robust when we use the promotion of PPS within one, two, four, or five years as the outcome variable (see table A22).

In column 1 of table 4, we only include our major explanatory variable, namely, an indicator for whether a city in the province obtained a subway approval, as well as province and year fixed effects. Then in column 2, we further add the age, education level, and gender of the PPS. In column 3, we include such province-level variables as GDP size, population size, fiscal revenue size, and GDP growth rate (all lagged by one year). Across all specifications, we see that subway approval is always positively and significantly associated with the promotion of the PPS. These results demonstrate that subway projects are useful "pork" that may help the PPS build up performance and get promoted to the central government. Moreover, we also plot the dynamic effect of subway approval on the promotion of PPSs in figure A12. This figure demonstrates that the improved promotion chances of PPSs only show up after the province obtains a subway approval.

Future utilization rate

Although subway projects do not produce short-term welfare improvements in terms of either jobs or air quality for residents (see figs. 3*E* and 3*F*), subway approvals pave the way for welfare improvements for residents once the subway lines start to operate. Hence, an alternative explanation for our results is that mayors who have obtained subway projects are rewarded for these long-term welfare improvements. In this case, promotion reflects the "current value" of future welfare improvements.

A direct implication of this view is that, among all the mayors who have obtained subway approvals, on average, those who are promoted should have produced more of these long-term welfare improvements for their residents compared to those mayors with subway approval who are not promoted. To test this implication, we collected subway ridership data from the China Association of Metros. They have released detailed subway ridership data since 2013. We use the number

25. As a placebo test, we check the effect of subway approval on the promotion of provincial governors (who do not exert as strong an influence on the political careers of Chinese mayors as PPSs) in table A21. We do not find evidence that subway projects help governors get promoted.

26. This level includes membership in the Politburo, membership in the central Secretariat, vice premier of the State Council, vice president of the National People's Congress, and the vice president of the Chinese People's Political Consultative Conference.

of subway riders to measure the future welfare improvement because taking the subway (and any consequences of this action) is a direct way to assess the value that the subway added to the city's residents. However, additional tests using these data (contained in table A23) do not find that subways in cities whose mayor was promoted have more subway riders. These results demonstrate that the promotion is not a reflection of future utilization of subways.

Strategic appointment of mayors

Another inference that might be drawn from our findings is that provincial leaders appoint politically connected individuals as mayors in cities that will then obtain subway approval. If this is the case, our results are driven by factional political ties rather than by a political exchange relationship between mayors and provincial leaders. However, the evidence already presented refutes this argument. We have controlled for different measures of mayors' political connections with the PPS or governor of the province. The explanation for promotions proffered here remains robust in the models that control for these indicators. This is true both for the generalized DID design and the fuzzy RD design.

To alleviate any further concern for the strategic appointment of politically connected mayors just before the announcement of subway approvals, we test whether city mayors are more likely to be replaced in one, two, or three years before the city is granted subway approval. The results are presented in table A24. From this table, we see that the turnover rate of mayors is not significantly different in years shortly before the city obtains subway approval than other times. This demonstrates that there is no systematic pattern in which provincial leaders replace city mayors shortly before a city obtains subway approval.[27]

Corruption

Finally, we consider whether subway construction breeds rent-seeking opportunities that make it feasible for mayors to trade money for promotion. To test whether this mechanism can explain our results, we first identify all mayors who were investigated for corruption by using the CCER Official Dataset and the Chinese Political Elite Database. We code a mayor as a "corrupt mayor" if she or he has ever been investigated for corruption. As reported in table A26, we do not find that subway projects are correlated with a higher chance of mayors being investigated for corruption controlling for city-level variables and mayor characteristics (including mayors' political connections with provincial leaders). This provides at least suggestive evidence that personal rent seeking is not a major goal for pursuing subway investment. Similarly, our results are robust to the inclusion of "corrupt mayor" as a control variable (see table A27).

Moreover, we explore whether lower-tier city officials reap private benefits in subway investment. We employ the data on corruption investigations against officials at all levels of political appointment from Wang and Dickson (2019) and test whether cities that pursue subway investment have more city officials investigated for corruption. As reported in table A28, we do not find evidence to support this conjecture.

Finally, we employ a third variable to measure the corruption of city officials. Following Chen and Kung (2019), we proxy the local corruption by the presence of discounted land sales to companies associated with the so-called princelings, namely, the relatives of Politburo members. As shown in table A29, we do not find evidence that mayors who obtain subway approvals are more likely to sell land at a discounted price to such political elites as princelings than other mayors who do not secure a subway approval.[28] Nor do we find that the inclusion of discounted land sales to princelings as a control variable changes the main findings reported in table 2. Taken together, perhaps surprisingly, our analysis does not support the notion that mayors pursue subway projects to reap economic rents.

CONCLUDING REMARKS

Why do city mayors have incentives to make investment in long-term transportation infrastructure projects such as subway lines? With original panel data of Chinese cities from 2003 to 2016, we show that mayors obtaining subway approval have an additional 21.3 percentage point chance of getting promoted. By focusing only on cities with a population around 3 million and employing a fuzzy RD design, we find that mayors with subway approvals have an additional 33.7 percentage point chance of being promoted in these medium-size cities. These results explain why Chinese mayors have incentives to work on subway projects even if they are unlikely to be in office at the completion of the project.

Moreover, our results point to the ineffectiveness of the seemingly powerful, approval-based system for infrastructure investment in China. Although one initial goal of the central government approval is to reduce politically motivated infrastructure investment (Huang 1999), we demonstrate that the

27. We also check the turnover of less educated mayors in table A25 and obtain similar results.

28. However, our analysis does show that subsequent mayors are more likely to sell land to princelings at a discounted price. While this finding indicates that subway projects breed elite favoritism in the long run, the fact that future mayors may benefit economically from subway projects does not explain why the incumbent mayor who is not expected to reap rents would initiate a subway project in the first place.

central bureaucracy (e.g., the NDRC) does not eliminate the politics-driven infrastructure projects. Further, we demonstrate a fundamental synergy between the incentives of mayors and of PPSs that is realized as a result of subway projects (and, by inference, other large infrastructure projects). Mayors who have subway approval deliver economic benefits to the PPS. The PPS's prospects of promotion are significantly improved thanks to these economic returns. In response, PPSs promote those mayors whose subway approval proved beneficial for the PPS. Thus, as one hand rewards the other, both mayors and PPSs can rise in the political hierarchy.

Hence, going back to the puzzle of the extremely high infrastructure investment in China (fig. 1), we show that this is at least partly due to the strong political career incentives of its local officials. More specifically, two features of the Chinese system sustain this result. First, the central government evaluates provincial officials mainly on the basis of their economic performance. Second, city officials, who plan, propose, and implement subway projects are held accountable to higher-ups rather than local residents. To the extent that these two institutional features are unique in China, the lower infrastructure investment in other countries perhaps has a more local explanation than is suggested in other research that looks at national factors (Cho et al. 2019; Simmons 2016). More broadly, countries that are more likely to reward local officials for initiating long-term investment in the short term (either through economic or political means), especially before the completion of the tenure of local officials, will have higher infrastructure investment. Out study demonstrates how China achieves this goal by combining a top-down political hierarchy that holds mayors accountable to provincial leaders and a growth-oriented system to evaluate performance of provincial leaders.

Another critical question is whether similar results can be found in other types of infrastructure investment. While answering this question requires us to investigate other forms of public projects, the logic of our current work implies that all infrastructure investment that stimulates economic and fiscal performance in the city should increase the promotion chances of city mayors. Hence, we should expect to obtain similar results if we study such infrastructure projects as airports. Another critical requirement is that provincial leaders can clearly identify the credit takers for public projects. Many intercity transportation infrastructure projects (such as highways and high-speed railways) may fall prey to this problem, thus making the theoretical prediction less clear.

Hence, future research can further investigate why the Chinese government can promote investment in intercity highways and high-speed railways. To answer this question, we may need to study another institutional feature of the Chinese political system that is not investigated in this article, namely, the coordination function of the central government (Lei and Nugent 2018). Whether such coordination based on a top-down authoritarian regime is part of the explanation for the massive infrastructure investment in China deems further investigation. More generally, to what extent institutional features at the national level, compared to the local political dynamics examined in this article, can explain the variation of long-term, large-scale infrastructure investment demands more systematic analysis.

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