# "Moving Umbrella": Identifying Collusion Through Bureaucratic Transfers And Investment Flows

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**Abstract**

Collusion between firms and government officials is ubiquitous but hard to detect. This paper studies collusion by tracing interregional investment flows after bureaucratic transfers in China using administrative firm registry data. The transfer of a leader from prefecture city A to B leads to 3% investment growth in the same direction. The connected firms are concentrated in high-rent sectors and are more likely to win land auctions at a lower price in the new location. The presence of connected firms blocks new firm entries and inhibits the innovations of other firms. Local leaders' career motives neutralize the tendency of collusion.

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# 1 Introduction

Collusion between firms and government officials is ubiquitous. However, empirically it is difficult to detect collusion and assess its economic impacts, in large due to lack of data. This paper aims to study collusion between bureaucrats and businesspeople through the lens of interregional investments in China. We propose a novel empirical strategy for studying collusion by linking investment flows to bureaucratic transfers.

Unlike Western politicians, who typically spend a long career in one locality and accumulate political capital there, local leaders in China, as bureaucrats, are transferred across geographic spaces regularly, often every few years. The transferred leaders face a challenge of boosting local economic growth quickly in the new territory. Lacking local knowledge and social networks, transferred leaders bear a tremendous cost of identifying, creating, and implementing new development projects and coordinating with local business elites. An alternative for transferred leaders, who face a relatively short time horizon before the next transfer, is to collaborate with trustworthy business partners from the jurisdictions where the leaders previously served. In doing so, the leaders provide a moving "protective umbrella" for their loyal business partners[1], forming a mutually beneficial relationship.

We use a unique administrative database of firm registration and comprehensive data on the career information of local leaders to conduct the empirical investigation. The previous literature mainly draws on publicly traded firms and focuses on politically connected managers or members of boards of directors as evidence of political connection. However, publicly traded firms constitute a small portion of the whole economy, especially in developing countries. It is unclear whether the findings can be externally validated among the vast small and medium enterprises. In comparison, our database covers all registered firms with detailed information about entry and exit. Hence, our approach is useful for capturing the prevalence of collusion for firms of all sizes.

The investigation documents a robust positive association between leader

[1] "Protective umbrella" is the translation for the Chinese term *Baohu San*, which literally refers to government officials who become a patron for private businesspeople.

transfers and interregional investment flows. Using the aggregate measure of paid-in capital of business registry as a proxy for investment, we find that the transfer of a leader from prefecture city A to B leads to 3% investment growth in the same direction. Similar investment patterns are not present within city pairs that did not experience a transfer or for investments in the reverse direction from B to A. Extending the analysis to the dynamic setting suggests that the effect persists throughout leaders' tenure but does not exist before the transfer.

We are aware that our interpretation on the correlation between leader transfers and investment flows as evidence of collusion is speculative. One alternative explanation is that transferred leaders alleviate information asymmetry and bring in more productive firms. Firms may also chase after capable leaders for seeking profitable opportunities. To clarify the underlying mechanisms, we investigate sectoral and ownership heterogeneity in the correlation between leader transfer and investments. We find that the new firms accompanying transferred bureaucrats are more likely to be privately owned and concentrated in high-rent sectors. Moreover, the new firms registered by connected owners from the same origins tend to buy land at a lower price from local governments. These findings are consistent with the premise of collusion.

We further investigate the impact of leader transfer on firm dynamics. First, we estimate the survival rates of firms from different origins. The Cox proportional hazards model reports that connected firms exhibit the highest survival rate when the leaders remain in office; however, once there patrons leave office, the survival rate of the connected firms falls dramatically, below that of unconnected firms. The discrepancy between connected and unconnected firms in survival rates suggests opportunistic investment patterns of the connected firms. Second, we find that the preponderance of connected firms deters the entry of other firms. Thus, investments connected with transferred leaders may aggravate capital misallocation, as suggested by Brandt et al. (2013). Third, the presence of connected firms impedes innovations of other firms.

We also aim to understand the political incentives behind the potential collusion. A sizable literature maintains that career-motivated incentives lay down an institutional foundation for supporting market-facilitating poli-

cies (Li and Zhou, 2005; Xu, 2011; Yao and Zhang, 2015). However, rent-seeking and collusion can go hand in hand with bureaucratic transfers, in particular for those with a small chance of promotion. Our analyses document three findings. First, the effect of transferred leaders is stronger for officials who were born in or spent a long career in the previous jurisdiction. Second, the pattern is stronger for leaders who were ineligible for further promotion due to the retirement age limit. Third, leader who were associated with connected investments were more likely to be prosecuted in the recent anti-corruption campaign. Assuredly, the upper-level government does punish collusion. Altogether, these results agree with the premise that pecuniary gains motivate the coordinated moves of leaders and the private sector. By contrast, career motives deter the temptation of leaders to accommodate connected firms.

This paper relates to a large literature examining the performance and investment patterns of politically connected firms (Amore and Bennedsen, 2013; Cingano and Pinotti, 2013; Faccio, 2006; Ferguson and Voth, 2008; Fisman, 2001; Fisman and Svensson, 2007; Chen et al., 2017; Li et al., 2008). The finding that connected firms are less capable of surviving market competition echoes the findings on economic distortions of political favoritism (Burgess et al., 2015; Fisman and Wang, 2015; Fisman et al., 2018; Hodler and Raschky, 2014).

The findings shed lights on the interplay between business and the government in China. The Chinese economic system is characterized by ubiquitous institutional frictions and corruption due to partial economic reform (Bai et al., 2014). Interregional barriers to trade are an essential source of distortion in China (Young, 2000). Local protectionism, capital market imperfections, and regionally varying legal environments all contribute to resource misallocation (Bai et al., 2004; Barwick et al., 2017; Brandt et al., 2013; Hsieh and Klenow, 2009; Zhang and Tan, 2007). Yet, it remains a mystery how China managed to maintain strong economic performance in such an institutional environment. Some recent researches suggest that informal patronage network may play a positive role of facilitating policy coordination through increasing fiscal transfers to politically connected regions or subsidies to connected firms (Lei, 2018; Jiang and Zhang, 2020). However, the economic dependence on patronage networks creates an ad-

ditional cost for clients due to the departure of political patrons or other policy uncertainties. Our paper echoes these nuances in showing that the departure of transferred leaders had a negative impact on the duration of connected firms in the market.

The paper also speaks to the political economy on public officials. There is an overall consensus in the empirical literature that democratic politicians get electorally sanctioned for corruption (Ferraz and Finan, 2011; Timmons and Garfias, 2015). In nondemocratic societies, it is not entirely clear how corruption may affect the political careers of officials who are not accountable to the citizens. In particular, the greasing argument suggests a necessary role of political officials in facilitating the market under weak institutions (Allen et al., 2005; Kaufmann and Wei, 1999). The findings on the distortive consequences of connected firms and the sanction of connected leaders are consistent with the Chinese government's claim that the anti-corruption campaign will benefit the long-term growth prospects of the country.

The remainder of this paper is organized as follows. Section 2 discusses institutional features. Section 3 describes the data. Section 4 presents the main results. Section 5 studies the economic consequences of the connected firms. Section 6 investigates how the pattern of connected firms is related to promotion incentives. Section 7 concludes.

# 2 Institutional Background

In this section, we discuss two institutional features that justify the empirical strategy. The first feature is the ubiquitous collusion between local leaders and the private sector, and the second feature is frequent bureaucratic transfers of local leaders across different regions.

In contrast to the central-command system during the Mao era, the Chinese economy since the 1980s is featured with a high degree of regional decentralization. Local governments have substantial discretionary powers over economic affairs, such as the development of industrial zones, land acquisition, public procurement, and local tax breaks and subsidies for investors. Local governments control a larger share of public revenue and expenditure compared with most countries (Shen et al., 2012). Meanwhile,

the evaluation and promotion of local leaders are contingent on relative local economic performance. This gives rise to strong political incentives for local leaders to boost investments by all means, potentially necessitating a collusive relationship with the private sector (Li and Zhou, 2005; Xu, 2011).

Personal deals are conducive to corruption. Under weak rule of law, investors face higher uncertainty in contract enforcement and larger potential threat to their property rights. Personal connections with government officials play a vital role in substituting formal institutions and facilitating the market (Xin and Pearce, 1996). The demand for political connections can be particularly strong in regions with a more adverse business environment (Li et al., 2008; Chen et al., 2011). The institutional friction forces the businesspeople and officials to form a reciprocal relationship. Under local government patronage, connected firms can enjoy some monopolistic rents in addition to convenience in entering new markets. Government officials may capitalize on their political power for private benefits. Using survey data on thousands of Chinese firms, Cai et al. (2011) report that 20% of the wage bills are expended as fees for maintaining collusive relationships with government officials.

The prevalence of political collusion with the private sector is an increasingly important concern of the ruling Communist Party (CPC). Following Xi Jinping's 2012 remark at a Politburo meeting that corruption would "inevitably lead to the downfall of the Party and the state" unless otherwise being contained,[2] massive anti-corruption crackdowns were pursued at all levels of the bureaucratic system. As a result, more than one million public servants were disciplined, sanctioned, or prosecuted for corruption.[3]

Local leaders are transferred among different regions and jurisdictions. Moreover, the leaders do not decide where to serve. Historically, lateral transfers were employed by imperial rulers primarily as a mechanism of bureaucratic control (Xi, 2019). The power of personnel management pertains to the CPC's Party Committee at one level above. Bureaucratic transfers do not follow strict timetables and are quasi-random from the

[2] https://www.bloomberg.com/news/articles/2013-12-30/china-s-xi-amassing-most-power-since-deng-raises-risk-for-reform

[3] http://www.bbc.com/news/world-asia-china-37748241

officials' view. Although the year of the CPC's National Congress observes the highest frequency of transfers, a considerable number of transfers also occur during other years. Even if leaders can expect a greater chance of transfer as their tenure increases, they are unlikely to know where they will next serve and cannot coordinate with the private sector in advance.

# 3 Data

The empirical analyses use six data sets. First, the main data used for investigating the effect of bureaucratic transfers on investment flows are structured on a panel of city-dyads that documents information on investment flows within each directed pair of cities. The Chinese State Administration for Industry and Commerce requires that all firms formally register and provide legal proof of paid-in capital prior to 2014. The administrative data of registered firms that we use for computing investment flows is thus far the most comprehensive data on investment activities in China. Second, we employ administrative data on land transactions to estimate the price premium of connected firms. Third, we use firm-level data on registrations to conduct survival analysis for connected and unconnected firms. Fourth, we use a panel of city-sector data to study the impacts of politically connected firms on the entry of other firms. Fifth, we adopt city-level data on innovation to evaluate the overall economic impacts of collusion on the quality of growth. Sixth, we rely on a comprehensive data set on the career paths of subnational leaders to examine the relationship between business collusion and officials' promotions and the probability of being investigated for corruption.[4]

[4]For the empirical investigation, we focus on the sample for 2000-2011, a decade of robust economic growth and rampant corruption. The massive anti-corruption campaign initiated by the central leadership of the CPC in 2013 led to the prosecution of thousands of high-ranking officials. The anti-corruption campaign is bound to deter the incentive for collusion. In addition, in 2013, the State Council implemented a set of reforms to streamline the firm registration procedure, including the removal of requirements for the amount of paid-in capital in 2014. Because of these structural changes, the data from firm registrations after 2012 may not reflect real investment activities.

## 3.1 City-Dyad Data Set on Investments

In the main data set for the benchmark analyses, each observation is a directed dyad between two cities. The sample consists of 296 cities and 87,320 directed pairs over 2000-2011.

**Investment Flows.** The dependent variables are constructed based on the scale of investment flows from city $i$ to $j$ in year $t$. The Chinese firm registry database provides information on the firm's legal representative, which can be identified by the first six digits of the representative's national identification number. Using that information, we are able to tell whether a new firm registration in city $j$ was a relocation connected to city $i$. We then construct two measures of investment flows from $i$ to $j$. The first variable is $\log(1 + \text{FLOW}_{ijt})$, which is the logarithm of the sum of registry capitals of all firms established in city $j$ that were connected to city $i$.[5] The second variable is a dummy variable, $1(\text{FLOW}_{ijt} > 0)$, which indicates whether the amount of investment measured by registry capital is positive or not. The average amount of capital flows thus measured is 21.4 million Renminbi in the whole sample, and the mean of $\log(1 + \text{FLOW}_{ijt})$ among all city dyads in the sample is 1.646. Among the observations in the sample, 10.1% have strictly positive investment flows.[6] Panel A of Table 1 reports descriptive statistics on investments.

**Bureaucratic Transfers.** The main independent variable is $\text{TRANSFER}_{ijt}$, a dummy indicating whether there was at least one official among all cities or provincial leaders presiding city $j$ in year $t$ who had a previous job title in city $i$. We consider five groups of government officials as city or provincial leaders: mayor, party secretary of a city, provincial governor, provincial party secretary, and member of a provincial party standing committee. For city leaders, the coding of the transfer dummy is straightforward. For example, Sun Ruibin was the mayor of Cangzhou in 2005-2006, and the party secretary of Handan in 2007-2008 before he was transferred to the next jurisdiction. During 2005 and 2006, there were no other leaders pre-

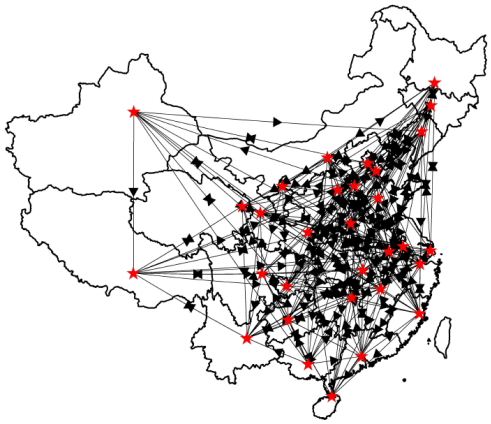
[5]The registry capital is not the firm's fixed assets. But according to Chinese Business Law, the registry capital should be proportional to the scale (and the assets) of the firm.

[6]Note that the effective controller of a firm needs not be a legal representative, and a (relatively small) proportion of firms have corporate, instead of individual, as legal representative. Hence, our measure is arguably a lower bound of the scale of investment flows.

siding Handan whose previous jobs were in Cangzhou. In turn, the transfer dummy is coded as 0 for the "Cangzhou→Handan" dyad for 2005-06 and as 1 for 2007-2008. If a city leader had one gap in his or her career record between two cities $A$ and $B$, we code $\text{TRANSFER}_{ABt}$ as 1 for the leader's tenure spent in city $B$.

Provincial leaders' powers and responsibilities usually cover all cities even when the official's position is physically located in one city. Thus, for provincial officials, we define their jurisdictions as covering all cities in the province. In turn, when a provincial official was transferred from province $A$ to province $B$, the value of the transfer dummy equals 1 for all directed pairs from cities in $A$ to cities in $B$. In case the official served in multiple jobs at the same time, we code the jurisdiction according to the job with the highest administrative ranking. Figure 1 shows the pattern of inter-province leader transfers during the period we investigate. It suggests that leader transfers are commonplace across different regions.

Figure 1: Network of Transferred Provincial Leaders



Notes: The figure shows the pattern of inter-province transfers of provincial leaders between 2000 and 2011. Each arrow between provincial capital cities indicates that there was at least one transfer within the directed dyad for that period.

## 3.2 Land Transaction

We obtained the land transaction data from the Ministry of Land and Resources.[7] The data document specific details, including information on location and time of transaction, purchaser, and size of the land parcels for all transactions granted by local governments from 2001 to 2016. Among the nearly one million transactions, only 43% of the transactions were purchases by registered business corporations.[8] We match the land transaction data to our registered firm data according to the name of the purchaser. We are able to match 90% of the purchases by registered firms. For our purpose, we focus on the sample from 2000 to 2011. Among all the land transactions in the investigated sample period, approximately 4% were purchased by proximate firms. Panel B of Table 1 summarized the key land transaction variables.

## 3.3 Firm Survival

We investigate the survival of different types of firms in the market. We differentiate all firms into four groups. The first group is CONNECT_HOLD, which includes all firms in city $j$ where a transferred leader remained in the same city. The second group is CONNECT_LEAVE, referring to firms registered in city $j$ and connected to a transferred leader who left his or her jurisdiction in city $j$. The third group is LOCAL, which includes firms established by local residents. The fourth group, which is the default group, consists of all firms established by individuals from other cities without having connections with transferred officials as specified in this paper. Table 1, Panel C reports the shares of different types of firms in the sample. On average, the scale of connected firms is similar to that of unconnected firms, but much smaller than local firms.

## 3.4 City-sector Data on Firm Entry and Patent

We evaluate the effects of politically connected firms on other types of firms. The main dependent variable is $\log \text{K\_ENTRY}_{ist}$, the logarithm

[7] http://www.mnr.gov.cn/

[8] The rest of land was purchased or transferred to local governments, public enterprises (such as schools and hospitals), and NGOs.

of the total registry capital of newly registered firms in industry $s$ in city $i$ during year $t$. Specifically, we calculate the scale of three types newly registered firms differentiated by their political connections: (1) local firms; (2) unconnected non-local firms, whose legal representatives were not local and did not come from the same city as the incumbent leaders; and (3) connected non-local firms, i.e., the firms whose legal representatives moved with incumbent leaders from the same area. The main explanatory variable is CONNECT_SHARE$_{it}$, the registry capital share of existing connected firms in all firms in city $i$ during year $t$. We also study the impact of connected firms on innovation. For this purpose, we use data from China State Intellectual Property Office (SIPO) and construct measures of patent applications and granted patents at the city-sector level. The summary statistics for these variables are shown in Table 1, Panel D.

## 3.5 Biographic Data Set on Officials

We assemble a set of variables of leaders' personal backgrounds and career paths. We use these variables to investigate intermediate channels of facilitating politically connected investments and evaluate their impacts on political turnovers and the propensity of corruption. Depending on the purpose of the analysis, the following variables may be constructed on city-pair bases or individual bases. Table 1, Panel E, presents the summary of the main variables related to the leaders' career paths.

**Officials' Characteristics.** We conduct several tests on what kinds of officials are most conducive to investment flows when moving to new jurisdictions. In the literature on regional favoritism and collusion, political leaders with high local network homophily are more likely to act in accordance with local interest groups. Motivated by those observations, we construct a dummy variable, NATIVE$_{ijt}$, which takes value 1 if at least one leader presiding city $j$ at time $t$ previously worked in city $i$ and that official was born in city $i$. A hometown affiliation implies a shared cultural belief between the leader and local interest groups, which helps them build trust. We also account for the impact of the length of previous tenure. The dummy variable 1(TENURE $\geq$ 5YR) indicates that an official served in his or her previous position for a tenure of five years or more. For the whole

Table 1: Summary Statistics

| | N | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| | | Panel A: City-Dyad Data Set on Investments | | | |
| log(1+ FLOW) | 1,047,840 | 1.65 | 2.09 | 0 | 17.63 |
| 1(FLOW> 0) | 1,047,840 | 0.10 | 0.30 | 0 | 1 |
| 1(TRANSFER) | 1,047,840 | 0.06 | 0.24 | 0 | 1 |
| log(GDP Per Capita, Origin) | 1,047,840 | 5.79 | 0.75 | 0 | 8.11 |
| log(GDP Per Capita, Destination) | 1,047,840 | 5.79 | 0.75 | 0 | 8.11 |
| log(Population, Origin) | 1,047,840 | 9.83 | 1.65 | 0 | 17.48 |
| log(Population, Destination) | 1,047,840 | 9.83 | 1.65 | 0 | 17.48 |
| NATIVE | 1,047,840 | 0.01 | 0.07 | 0 | 1 |
| LONG_TERM | 1,047,840 | 0.02 | 0.13 | 0 | 1 |
| | | Panel B: Land Transactions | | | |
| log(Price per hectare) | 153,294 | 5.325 | 1.736 | 2.03E-06 | 11.513 |
| log(Registry Capital) | 153,297 | 6.660 | 1.642 | 0.001 | 14.010 |
| 1(Connected) | 153,297 | 0.040 | 0.197 | 0 | 1 |
| | | Panel C: Firm Survival Set | | | |
| 1(Death) | 2,438,195 | 0.37 | 0.49 | 0 | 1 |
| CONNECT_HOLD | 2,438,195 | 0.02 | 0.13 | 0 | 1 |
| CONNECT_LEAVE | 2,438,195 | 0.02 | 0.12 | 0 | 1 |
| LOCAL | 2,438,195 | 0.719 | 0.45 | 0 | 1 |
| log(Paid-in Capital) | 2,438,195 | 4.19 | 1.72 | 0.000 | 24.02 |
| | | Panel D: City-sector Level Data Set | | | |
| log K_ENTRY, unconnected | 66,228 | 2.66 | 3.66 | 0 | 16.79 |
| log K_ENTRY, connected | 66,228 | 8.07 | 3.69 | 0 | 23.09 |
| log K_ENTRY, local | 66,228 | 5.78 | 4.42 | 0 | 24.09 |
| CONNECT_SHARE | 64,596 | 0.03 | 0.09 | 0 | 0.88 |
| log (PatApp+1) | 63,673 | 0.601 | 1.391 | 0 | 11.07 |
| log (PatGrt+1) | 66,228 | 0.459 | 1.221 | 0 | 10.88 |
| | | Panel E: Biographic Data Set on Officials | | | |
| Turnover | 712 | 0.86 | 0.55 | 0 | 2 |
| 1(Caught) | 506 | 0.10 | 0.30 | 0 | 1 |
| log(Connected Capital Flow, Term) | 712 | 2.43 | 4.48 | 0 | 15.53 |
| log(Connected Capital Flow, Career) | 506 | 4.52 | 5.37 | 0 | 15.53 |

sample of officials, 28.8% served for a long tenure of five years or more.

Due to the rules of mandatory retirement, provincial leaders must retire by age 65, and city leaders must retire by age 60. In turn, provincial leaders who do not get promoted by age 63 will have little chance of promotion and are likely to be transferred to ceremonial positions. By a similar token, 58 becomes a de facto retirement age limit for city leaders. We capture the officials' incentives in view of their distance to retirement age. $1(AGE \geq RL)$ is a dummy variable indicating whether an official moving from city $i$ to $j$ reached the de facto retirement age, that is, 63 for provincial leaders and 58 for city leaders. In our sample, 5% of the observations reach the de facto retirement age limit.

**Turnovers and Prosecutions.** In section 5, we investigate how the scale of politically connected investment flows affects the career advancement of subnational leaders. For this purpose, we construct several variables based on the official-term observations. $\text{TURNOVER}_{ij}$ is a three-value categorical variable: 0 if the official's political career is terminated following the term;[9] 1 if the official served in a different jurisdiction and remained at the same level; and 2 if the official was promoted. In the sample, 23.5% of the leader-terms ended up with termination, 67.4% remained at the same ranking, and 9.1% received a promotion.[10] We also construct a dummy variable $\text{Caught}_i$ for each subnational leader who appears in the sample. The dummy takes the value 1 if that official was investigated or prosecuted for corruption as of the end of 2016. The information is based on the official website of the Central Commission for Discipline Inspection (CCDI) of the CPC.[11] Among all the 506 leaders who were transferred at least once, a tenth were later found to be corrupt.

[9] An official's political career can be terminated for different reasons, including formal retirement, being sanctioned for corruption or negligence, such as severe workplace accidents, and health issues, and so on.

[10] The biographic information on the officials was obtained from the CCER Official Dataset (COD).

[11] `http://www.ccdi.gov.cn`

# 4 Baseline Results

## 4.1 Bureaucratic Transfers and Investment Flows

The baseline model for estimating the effect of bureaucratic transfer on firm flows in the same direction as the bureaucratic transfer is specified by the following equation.

$$\log(1+\text{FLOW}_{ijt}) = \alpha\ \text{TRANSFER}_{ijt} + X_{ijt}\beta + \lambda_{ij} + \gamma_t + \delta_t \times \eta_{R,S} + u_{ijt} \quad (1)$$

In Equation (1), the subscript $ijt$ specifies the direction of investment flows from city $i$ to $j$ during year $t$. $\alpha$ is the main parameter of interest. $X_{ijt}$ is a vector of control variables, including the logarithm of real per capita GDP and the logarithm of the populations of both cities at time $t$. $u_{ijt}$ is the term of random disturbance. In addition, $\lambda_{ij}$ denotes city-dyad fixed effects, and $\gamma_t$ stands for year fixed effects, which we control throughout the baseline estimations. Controlling city-dyad and year fixed effects addresses two potential channels of endogeneity: (1) some city-dyads are more closely connected to each other than other city pairs, and they have more frequent exchanges of leaders and greater inter-city investments; and (2) the frequency of leader transfers and the amount of inter-city investments move in sync in some years, presumably due to political business cycles. Further, investment flows are likely to be correlated with the long-term trajectory of economic development in specific regions, which may consequentially bias the estimate if booming cities also systematically export more or fewer leaders. Due to the legacy of the planned economy, the economic endowments and industrial structures of cities in China tend to be clustered in specific administrative regions. Altogether, the degree of spatial correlation in the level of economic development is high within each of the following six macro-regions: North, Northeast, East, South, Southwest, and Northwest. To deal with this problem, we control a set of region-specific time trends, $\delta_t \times \eta_{R,S}$, which are constructed by interacting region dummies with the political cycle specific time trends.[12]

[12]The subscript $R$ stands for the grand region which city $i$ belongs to, $S$ stands for the grand region which city $j$ belongs to.

Table 2: Baseline Results

| Dependent Variable | log(1+FLOW) | | | | l(FLOW>0) | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 1(TRANSFER) | 0.029** | 0.028** | 0.027** | 0.030** | 0.003*** | 0.003*** | 0.003** | 0.004** |
| | (0.012) | (0.012) | (0.012) | (0.012) | (0.011) | (0.001) | (0.001) | (0.002) |
| Controls | N | Y | Y | Y | N | Y | Y | Y |
| Dyad FE | Y | Y | Y | Y | Y | Y | Y | Y |
| Year FE | Y | Y | Y | Y | Y | Y | Y | Y |
| Regional Political Cycles | N | N | Y | Y | N | N | Y | Y |
| Transferred Dyads Only | N | N | N | Y | N | N | N | Y |
| R-squared | 0.066 | 0.067 | 0.067 | 0.034 | 0.021 | 0.021 | 0.022 | 0.022 |
| Observations | 1,047,840 | 1,047,840 | 1,047,840 | 222,632 | 1,047,840 | 1,047,840 | 1,047,840 | 222,632 |
| Number of City Dyads | 87,320 | 87,320 | 87,320 | 18,636 | 87,320 | 87,320 | 87,320 | 18,636 |

Notes: The sample covers 87,320 city-dyads from 2000 to 2011. In all columns, city-dyad and year fixed effects are included. Controls include log per capita real GDP and log population of both the origin and the destination cities. Regional political cycles refer to the interaction between two regional dummies and a dummy for the year in the national political cycle. * 10%, ** 5%, *** 1%.

Table 2 presents the baseline estimates. In all the specifications, we cluster the standard errors at the city-dyad level. In the column (1) of Table 2, we only control city-dyad fixed effects and year fixed effects. The coefficient for $\text{TRANSFER}_{ijt}$ is 0.029 and significant at the 0.05 level. Column (2) includes basic control variables, the logarithm of real GDP per capita, and the logarithm of population of both cities. Column (3) further adds the regional time trends. The estimated coefficients are similar to those provided in column (1). For robustness, we also estimate the effect of leader transfer using only city-dyads that experienced at least one transfer during the sample period. As column (4) shows, this leads to a shrink in the sample size, but the estimated coefficient is unchanged.

Columns (4) through (8) of Table 2 present the estimated results using the dummy variable $1(\text{FLOW}_{ijt} > 0)$ as the dependent variable. The coefficients for $\text{Transfer}_{ijt}$ for most specifications are about 0.03 and statistically significant at conventional levels. For the whole sample, the rate of observing a positive flow of inter-city investments, as defined in section 3.1 is one in 10. The results reported in columns (4) to (8) imply that a leader who is transferred between two cities increases the probability of positive investments in the following years of the leader's tenure by 3%. For transfer of provincial leaders, the total impact is amplified by the definition of leader transfers. For example, the transfer of a provincial leader from Shanxi province to Shandong is then associated with an increase in investment of total registry capital by approximately 120 million RMB (about US$18.5 million).[13] In Table A1 of the appendix, we provide several placebo tests. First, we present the estimate for the "effect" where the treatment group is randomly assigned city-dyads in proportion to the number of real transfers each year. Second, we implement a placebo test in which the explanatory variables include $\text{TRANSFER}_{ijt}$ and a dummy variable $1(\text{OTHER})_{ijt}$, which indicates that there is at least one incumbent leader in $j$ who transferred from a third city other than from $i$. Third, we estimate the baseline model using the inverted variable for transfer, that is, $\text{TRANSFER}_{jit}$, as the explanatory variable for investment flows $\text{FLOW}_{ijt}$. None of the esti-

[13]There are 11 prefecture-level cities in Shanxi and 17 cities in Shandong. Since the mean of inter-city investment flows is RMB 21 million, thus the expected increase in inter-city investment flows in total is about $21 \times 0.03 \times 11 \times 17 = RMB120million$.

mates have a significant impact interregional flows of investment as induced by bureaucratic transfers.

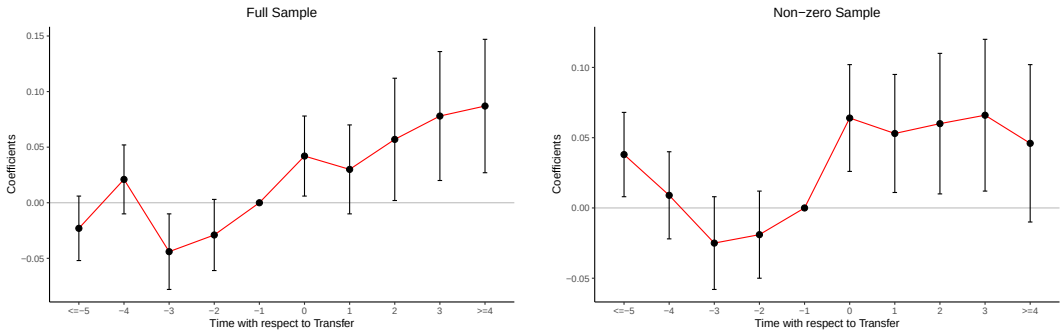
## 4.2 Dynamic Effects

Although bureaucratic transfers are determined by their political superiors, the assignments may be coordinated with development purposes that are simultaneously correlated with investment flows. This gives rise to a concern about reverse causality in the sense that leaders are appointed to carry out development projects. In this case, investment flows may have occurred regardless of the direction of leader transfer. To test this mechanism, we estimate the dynamic effects of bureaucratic transfer on investment flows. The equation for estimation is specified as the following.

$$\log(\text{FLOW}_{ijt}) = \sum_{\tau=-d_1}^{0} \alpha_\tau \, \text{TRANSFER}_{ijt} \times \rho_{ij,t+\tau} + \sum_{\kappa=2}^{d_2} \alpha_\kappa \, \text{TRANSFER}_{ij,t+\kappa} \times \mu_{ij,t+\kappa} + X_{ijt}\beta + \lambda_{ij} + \gamma_t + u_{ijt} \quad (2)$$

In equation (2), investment flows from $i$ to $j$ at time $t$ are evaluated dynamically for the time window $[t - d_1, t + d_2]$. The dummy variable $\text{TRANSFER}_{ijt}$ indicates that an incumbent leader presiding city $j$ at time $t$ was previously transferred from city $i$. The dummy variable $\rho_{ij,t+\tau}$ indicates whether the official from city $i$ was first appointed to $j$ at time $t + \tau$. The subscript $\tau$ is an indicator of time periods prior to $t$, and $d_1$ represents the period leading to $t$ for four years or more. In turn, the coefficients $\alpha_\tau$ capture the post-trend of the effect of leader transfer on investment flows: that is, how a newly transferred leader affects investment flows throughout his or her tenure as leader of city $j$. By contrast, the dummy variable $\text{TRANSFER}_{ij,t+\kappa}$ characterizes whether there is a transferred leader from $i$ to $j$ at time $t + \kappa$, and the dummy $\mu_{ij,t+\kappa}$ indicates that the leader was *not* in office at time $t$. The superscript $d_2$ represents the period lagging $t$ for five years or more. Following these definitions, $\alpha_\kappa$ capture the pre-trends of the moving leaders' effect on investments: how a transferred leader may "affect" investment flows before he or she assumes power.

Figure 2: Dynamic Effects of the Transfers




Notes: The figures illustrate the dynamic effects of a leader transfer on $\log(1+\text{FLOW}_{ijt})$. In both figures, the horizontal axis indicates the year since a city-dyad experienced a leader transfer. Time 0 indicates the first year of the new leader's tenure. The vertical axis corresponds to the estimated dynamic effects. The results are estimated using the baseline specification (with controls, city-dyad fixed effects and year fixed effects) with the difference that the transfer dummy is replaced by the interaction terms of the transfer dummy and a set of time dummies. The coefficient at time $-1$, the last year before new leader's arrival, is normalized to 0. The 95% confidence interval around each plotted coefficient is reported, with standard errors being clustered at the city-dyad level. The left panel presents the results obtained from the full sample. The right panel presents the results obtained from using city-dyads that experienced at least one leader transfer during 2000-2011.

Figure 2 presents the dynamic effects of a transferred leader on the investment flows within the city-dyad. We normalize the effect at $t = -1$. The coefficients at $t = -2, -3, ...$ stand for the estimates for $\alpha_\kappa$, the pre-trends of difference between the treated group and the control group. The coefficients at $t = 0, 1, 2...$ stand for the estimates for $\alpha_\tau$, the post-trends of difference between the treated group and the control group. The left panel presents the estimates using the full sample, and the right panel presents the estimates using only the city-dyads that had experienced at least one transfer during 2000-2011.

It is clear from Figure 2 that a transfer of a leader from any city $i$ to $j$ does not make investment flow from $i$ to $j$ faster than within other city-dyads for all the five years before the transfer occurs. The estimated pre-trend differences are negative or insignificant in most cases. The investment flow from $i$ to $j$ in the treated group six years or more before the transfer is somewhat faster than that in the control group. However, the average tenure of city leaders is about three years, meaning that superiors coordinate bureaucratic transfers and investment flows two terms in advance. This scenario is next to impossible, given the similar pattern of frequent reshuffle at the upper level. At the same time, the post-trend differences between the treated and control groups are positive and highly significant for most cases. The dynamic pattern lends further support to the idea that transferred leaders themselves, rather than policy coordination at the upper levels, have played a major role in inducing investment flows along the same direction as the transfers.

## 4.3 Sectoral and Ownership Heterogeneity

Admittedly, the previous results are not direct evidence about collusion or rent-seeking. Nevertheless, as long as collusion is partially responsible for the increase in investment flows, areas with more corruption should exhibit a stronger pattern. Following this reasoning, we study firm heterogeneity in the pattern of investment flows. First, we divide all firms into two groups, hight-rent and low-rent sectors, based on the average sector profit-to-asset ratios. As in Huang et al. (2017), we define high-rent sectors as those with above-median profit-to-asset ratios, and low-rent sectors

as those with below-median profit-to-asset ratios. We then calculate the investment flows in the high- and low-rent sectors and estimate separately. Second, we distinguish different ownership types for all firms: state-owned, collectively owned, and privately owned, through identifying whether the effective controller in the registry information is a state or state-owned enterprise, collective community, or individuals. We expect that the results are more significant for private firms than for state-owned enterprises and collective ownership, as private firms are the least assured of the rule of law and rely more on the patronage of local leaders.

Columns (1) and (2) of Table 3 report estimates for effects of leader transfers on directed investment flows in high-rent sectors. Similar to the baseline results, the coefficients for leader transfer are significantly positive. The sizes of the coefficients obtained for high-rent sectors are slightly smaller than those obtained using total investments, perhaps because the volume of hight-rent investment is a subset of the total. In contrast, the same estimations for investment flows in low-rent sectors yield insignificant coefficients with much smaller magnitudes, as shown in columns (3) and (4). The discrepancy between high-rent and low-rent sectors in the effect of leader transfer is consistent with the premise that corruption (rent-seeking) is an important underlying force of inter-city investment flows. In addition, the estimates exploring ownership heterogeneity presented in columns (5) through (7) are also consistent with our conjecture. The effects are nonexistent for state-owned enterprises and firms of collective ownership; however, measuring investment flows considering only private firms yields a significant coefficient close to that of the baseline results.

## 4.4 Land Transactions

We also leverage other sources of administrative data to test whether the proximate firms capitalize rents from a collusion with transferred leaders. In recent research on land transactions by local governments in China, Chen and Kung (2018) employ firm-level transaction data to show that firms that were connected to the top-level leadership of the CPC received a significant price discount in land purchases. Following the same spirit, firms in collaboration with local leaders may enjoy lower land acquisition cost.

Table 3: Heterogeneity by Industry and Ownership

| Dependent Variable | log(1 + FLOW) | | | | | | |
|---|---|---|---|---|---|---|---|
| | By Industry | | | | By Ownership | | |
| | High-Rent Sectors | | Low-Rent Sectors | | State-owned | Collective | Private Firms |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| 1(TRANSFER) | 0.020** | 0.019* | 0.005 | 0.004 | -0.005 | -0.002 | 0.034*** |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.004) | (0.003) | (0.011) |
| Controls | N | Y | N | Y | Y | Y | Y |
| City-Dyad FE | Y | Y | Y | Y | Y | Y | Y |
| Year FE | Y | Y | Y | Y | Y | Y | Y |
| R-squared | 0.052 | 0.052 | 0.027 | 0.028 | 0.001 | 0.004 | 0.072 |
| Observations | 1,047,840 | 1,047,840 | 1,047,840 | 1,047,840 | 1,047,840 | 1,047,840 | 1,047,840 |
| Number of City-Dyads | 87,320 | 87,320 | 87,320 | 87,320 | 87,320 | 87,320 | 87,320 |

Notes: The sample covers 87,320 city dyads from 2000 to 2011. In all columns, city-dyad and year fixed effects are included. Controls include log per capita real GDP and log population of both the origin and the destination cities. High-rent sectors include those with above-median profit-to-asset ratios, and low-rent sectors correspond to those with below-median profit-to-asset ratios * Significant at 10%, ** 5%, *** 1%.

The price premium could be a form of corruption. It may also be a subsidy granted by local governments to attract new investors and help accomplish development projects. Although it is difficult to disentangle these two mechanisms due to the opacity of the business-bureaucrats relationship, the finding on the price discount lends support to the existence of collaboration between local leaders and the private sector.

A notable example is the case of Qiu He, who was the party secretary of Kunming, the provincial capital city of Yunnan province, from 2007 to 2011. Soon after Qiu He's transfer from Jiangsu province to Kunming in 2007, a small real estate company originally from Suqian, a city in Jiangsu province, followed Qiu He to register in Kunming, a rare move for a local real estate developer in the Chinese environment. Within the four years during Mr. Qiu's tenure as the party secretary of Kunming, the connected real estate developer grew from 5 million RMB to an empire of multi-billions in registry capital and was able to control 8% of the total urban area for development projects in Kunming. Qiu He was promoted to the position of vice party secretary of Yunnan province in 2011 and stayed in that position until being investigated in the anti-corruption campaign in 2015. The CEO of the developer Liu Minggao resigned from his role in the same year, and after that, the company stopped most of its business activities in Yunnan province.

Table 4 reports the regression of log land purchase price on a set of dummy variables for the status of connection to leaders. 1(CONNECTED) indicates whether the firm shared the same origin city with the transferred leader.[14] We control for a set of dummies to address unobservable industry, city, transaction year and month effects, and the longevity of the firm. As is evident from Table 4, column (1), being connected to a transferred leader is associated with a nearly 4 percentage points discount in the unit land price compared with those without connections. In column (2), we control for the area of land parcels and the paid-in capital of firms, and the estimated coefficient of 1(CONNECTED) is similar. Column (3) further breaks down the types of firm connections into three categories: CONNECT_HOLD, which indicates that firms are connected to a transferred leader and that

[14]That is, if an owner originally from city $A$ registered a firm $i$ in city $B$ at the time when a leader presiding in $B$ was transferred from $A$, 1(Connected) equals 1 for firm $i$.

leader remains in the same jurisdiction; and CONNECT_LEAVE, which indicates that firms are connected to a transferred leader and that leader has left the jurisdiction; and the other firms. Connection to transferred officials lowered the purchase cost for firms only in times when the recipient city remained under the leader's jurisdiction. The size of the unit price discount is about 5% for Connect_Hold, meanwhile, social proximity does not appear to help if the connected leader had retired or transferred from the city. Overall, the results presented in Table 4 seem to be consistent with a story about coordinated moves between transferred leaders and firms that results in government-granted benefits for socially proximate firms.

Table 4: Connected Firms and Price of Land

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent variable: | log(Price per hectare) | | | |
| 1(CONNECTED) | -0.037* | -0.038* | | |
| | (0.022) | (0.022) | | |
| CONNECT_HOLD | | | -0.053* | -0.052* |
| | | | (0.030) | (0.030) |
| CONNECT_LEAVE | | | -0.002 | -0.004 |
| | | | (0.033) | (0.033) |
| LOCAL | | | -0.010 | -0.011 |
| | | | (0.013) | (0.013) |
| log(land area) | | 0.041*** | | 0.041*** |
| | | (0.006) | | (0.006) |
| log(registry capital) | | -0.003 | | -0.003 |
| | | (0.003) | | (0.003) |
| Industry Dummies | N | Y | N | Y |
| Establish Year Dummies | N | Y | N | Y |
| Transaction Year-month Dummies | N | Y | N | Y |
| City Dummies | N | Y | N | Y |
| R-squared | 0.064 | 0.065 | 0.065 | 0.065 |
| Observations | 153,294 | 153,291 | 153,294 | 153,291 |

Notes: The sample covers 153,294 land transactions during 2000-2011. Standard errors are clustered at the city level. * Significant at 10%, ** 5%, *** 1%.

# 5 Economic Impacts

## 5.1 Survival Rates for Different Types of Firms

If collusion is a driving force of investment flows, connected and unconnected firms should exhibit different patterns of firm performance. The literature provides mixed views on the impacts of collusion on firm performance. On the one hand, payments to corrupt leaders may be an investment on political connections, so connected firms may benefit from corruption with a social cost (Cingano and Pinotti, 2013; Chen et al., 2017). On the other hand, dealing with powerful leaders implies spending resources on unproductive purposes. Thereby, the dependence on political rent-seeking may undermine entrepreneurship (Baumol, 1990) and lower connected firms' productivity in the long term (Earle and Gehlbach, 2015; Fisman, 2001).

Due to lack of data on investments and profits, we are unable to study directly the effects of being connected to transferring leaders on firms' performance. Instead, we use the information on the time of registration and cancellation in the registry data set to study the survival rate of different types of firms. Specifically, we estimate the hazard rate of a firm dropping out through the following Cox Proportional Hazards model.

$$h_{m,p}(t) = h_0(t)\ \exp[\alpha_1\ \text{CONNECT\_HOLD}_{m,t} + \alpha_2\ \text{CONNECT\_LEAVE}_{m,t} + \alpha_3\ \text{LOCAL}_{m,t} + \beta\ \log(\text{CAPITAL}_m) + \delta_p + \mu_t] \quad (3)$$

The dependent variable $h_{i,p}(t)$ is the hazard of firm $i$ located in province $p$ dropping out at time $t$. Function $h_0(t)$ represents the nonparametric baseline hazard of exit. The key independent variables are three dummies characterizing the types of firms. $\text{CONNECT\_HOLD}_{m,t}$ and $\text{CONNECT\_LEAVE}_{m,t}$ are defined as in Table 4. $\text{LOCAL}_{m,t}$ specifies whether the legal representative of that firm is a local resident at time $t$. The base group consists of firms with legal representatives from cities other than the firm's location and incumbent leaders' previous job location. The four categories are mutually exclusive and the coefficients of $\alpha_1$ to $\alpha_3$ reflect the differentiated

likelihood of drop-out for the three groups in proportion to that of the base group. In addition, we control for the logarithm of paid-in capital, province fixed effects, along with year dummies indicating when the firms were established.

Table 5: Firm Survival: Cox Proportional Hazard Rate

| Dependent Variable | Hazard Rate | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| CONNECT_HOLD | -0.235*** | -0.217*** | -0.159*** |
| | (0.013) | (0.013) | (0.013) |
| CONNECT_LEAVE | 0.182*** | 0.186*** | 0.154*** |
| | (0.012) | (0.012) | (0.012) |
| LOCAL | -0.026*** | -0.086*** | -0.146*** |
| | (0.003) | (0.003) | (0.003) |
| log(CAPITAL) | | -0.213*** | -0.216*** |
| | | (0.001) | (0.001) |
| Provincial Dummies | Y | Y | Y |
| Establishment Year Dummies | N | N | Y |
| Log pseudo-likelihood | -13,086,401 | -13,031,786 | -12,979,282 |
| Observations | 2,438,195 | 2,438,195 | 2,438,195 |

Notes: The sample covers more than two million firms established during 2000-2011. Base group: unconnected & established by people outside the province. We randomly chose one sixth of the full sample to avoid calculation difficulties. * Significant at 10%, ** 5%, *** 1%.

Table 5 presents the estimates for the Cox Proportional Hazards models. In column (1), where only the three group dummies are controlled, the coefficient for LOCAL is -0.026 and significant at the 0.01 level. So firms established by local people endure longer than those by unconnected nonlocals. Interestingly, the survival rates are bifurcated between nonlocal connected firms and firms whose connected patrons were further transferred away. The coefficients of CONNECT_HOLD and CONNECT_LEAVE are, respectively, -0.235 and 0.182. This implies that the firms in the first category are 21% less likely to exit the market ($1 - \exp(-0.235) = 0.21$) than the base group, but the same set of firms can become 20% more likely to exit the market once the connected leaders are gone ($1 - \exp(0.182) = 0.20$). Unsurprisingly, firm survival is positively associated with the scale measured by the registry capital. But neither the scale, province dummies, nor establish-year dummies change the estimates qualitatively, as columns (2)

and (3) show.

The divergence in the survival rates between firms connected with incumbents and those connected with former leaders is in support of the logic of collusion. One explanation for the puzzling pattern of firm survival is that the connected firms were simply less efficient, and they had to rely on the patronage of subnational leaders to be sustained in market competition. A second explanation is that those connected firms mainly served the purpose of rent-seeking and money laundering, and they pulled out of the market once their connections were gone. In both cases, political leaders serve as agents of private interests in facilitating inter-city investments.

## 5.2 Impacts on Firm Entry

We now turn to evaluate the impacts of politically connected firms on the whole market. We focus on the entry of new firms. If collusion is an important channel of inducing connected investments, the existence of such activities may raise transaction costs and deter the entry of potential entrepreneurs. Suppose otherwise, firms follow leaders because of the latter's strong reputation for managing the local economy, through pro-market policies and infrastructure investments. In this case, we should expect more firms to follow the successful predecessors of those connected firms. To test this, we estimate the scale of new investments, proxied by the sum of registry capital, by each city-sector as the following equation.

$$\log \text{K\_ENTRY}_{ijt} = \gamma \log \text{K\_STOCK}_{ij(t-1)} + \alpha \text{ lag SHARE}_{i,t-1} + \beta X_{it} + \lambda_{ij} + \lambda_t + t \times \lambda_i + t \times \lambda_j + \epsilon_{ijt} \quad (4)$$

In equation 4, the dependent variable is $\log \text{K\_ENTRY}_{ijt}$, the logarithm of the sum of the registry capital of firms in sector $j$ established in city $i$ and year $t$. The variable of interest is $\text{SHARE}_{i,t-1}$, the share of politically connected firms in the sum of registry capital among all firms present in city $i$ at time $t-1$. We consider this share as a measurement for the pervasiveness of political collusion between transferred leaders and the businesses. We control for $\log \text{K\_ENTRY}_{ijt}$, the stock of all registry capital by city-

Table 6: Entry Deterrence Effects

| Dependent Variable | log K_ENTRY, Connected | | | log K_ENTRY, Unconnected | | | log K_ENTRY, Local | | |
|---|---|---|---|---|---|---|---|---|---|
| | Panel A: Full Sample | | | | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| lag SHARE | 1.836*** | 1.836*** | 1.836*** | -0.267 | -0.325* | -0.339* | -0.115 | -0.249 | -0.246 |
| | (0.237) | (0.237) | (0.237) | (0.180) | (0.183) | (0.182) | (0.171) | (0.189) | (0.188) |
| Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Year FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| City-Industry FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| City Linear Year Trend | N | Y | Y | N | Y | Y | N | Y | Y |
| Industry Linear Year Trend | N | N | Y | N | N | Y | N | N | Y |
| R-squared | 0.084 | 0.128 | 0.160 | 0.068 | 0.098 | 0.166 | 0.065 | 0.111 | 0.167 |
| Observations | 51,403 | 51,403 | 51,403 | 51,403 | 51,403 | 51,403 | 51,403 | 51,403 | 51,403 |
| Number of City-industries | 5383 | 5383 | 5383 | 5383 | 5383 | 5383 | 5383 | 5383 | 5383 |
| | Panel B: High Rent Sectors | | | | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| lag SHARE | 1.643*** | 1.464*** | 1.565*** | -0.473** | -0.558** | -0.567** | -0.209 | -0.392* | -0.389* |
| | (0.282) | (0.372) | (0.375) | (0.228) | (0.236) | (0.235) | (0.217) | (0.237) | (0.236) |
| Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Year FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| City-Industry FE | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| City Linear Year Trend | N | Y | Y | N | Y | Y | N | Y | Y |
| Industry Linear Year Trend | N | N | Y | N | N | Y | N | N | Y |
| R-squared | 0.073 | 0.114 | 0.149 | 0.054 | 0.086 | 0.152 | 0.048 | 0.090 | 0.142 |
| Observations | 38,128 | 38,128 | 38,128 | 38,128 | 38,128 | 38,128 | 38,128 | 38,128 | 38,128 |
| Number of City-industries | 3993 | 3993 | 3993 | 3993 | 3993 | 3993 | 3993 | 3993 | 3993 |

Notes: The sample covers 279 cities, 20 industries, and 12 years over 2000-2011. The dependent variable is the log registry capital of one type of new entry firms (connected, unconnected, or local). Controls include the lag log aggregate capital stock of the incumbent firms, log population, urbanization rate, and the output shares of the secondary industries. * Significant at 10%, ** 5%, *** 1%.

sector in the last period. $X_{it}$ is a vector of city-level controls including the logarithm of real GDP per capita, logarithm of population, urbanization rate, and share of output in the secondary industry. We include city-sector fixed effects ($\lambda_{ij}$), year fixed effects ($\lambda_t$), and city- and sector-specific time trends ($t \times \lambda_i$ and $t \times \lambda_j$) for a robustness check.

Table 6 presents the estimates respectively concentrating on the entry of three types of firms: nonlocal connected firms, nonlocal unconnected firms, and local firms. The types follow the same definitions as those discussed in section 4.5. Panel A provides the estimates for parameter $\alpha$ based on the full sample. Unsurprisingly, the share of connected firms strongly predicts the arrival of more connected firms in the following year, as columns (1) to (3) report. However, the preponderance of connected firms appears to be negatively correlated with the entry of others. The coefficients presented in columns (4) to (6) are all negative, and the effects are stronger and statistically more significant for the nonlocal unconnected firms than for local firms.

In Table 6, Panel B, the estimates use only the subsample of firms in high-rent sectors. The results are qualitatively similar, and now the share of connected firms has a stronger and more significant impact of deterring new entries of unconnected and local firms. The coefficient for unconnected firm is -0.567 (p=0.05) and that for local firms is -0.389 (p=0.1). In turn, an increase of one standard deviation in the share of connected firms at time $t-1$ translates to a reduction in the entry rate by 5% for unconnected firms ($-0.567 * \times 0.087 \approx -0.049$) and a reduction by 3.4% for local firms ($-0.389 * \times 0.087 \approx -0.034$) in terms of the total registry capital. Once again, the discrepancy between the estimations obtained on the full sample and on the high-rent sectors only is suggestive that the pattern of investments moving across cities following the leaders is related to collusion.

## 5.3 Impacts on Innovation

To evaluate further the economic consequences of connected firms, we investigate how the share of connected firms shapes innovative activities in the market. Corruption renders a high risk of predation for firms, undermining productive entrepreneurship and encouraging unproductive en-

trepreneurship in the spirit of Baumol (1990). If the share of connected firms is reflective of collusion, we should expect that the share of connected firms is negatively associated with innovation. To test this hypothesis, we use the number of patents by each city-sector as a measure of innovation and specify the estimation as follows.

$$\log \text{PAT}_{ist} = \gamma \log \text{PAT}_{is,t-1} + \alpha \, \text{SHARE}_{i,t-1} + \beta X_{it} + a_{is} + \lambda_t + t \times \delta_p + t \times \mu_s + \epsilon_{it} \tag{5}$$

In equation (5), we use the number of patents at the city-sector level as a proxy for innovation. We control for the lagged dependent variable and a set of control variables, including the lagged term of aggregate capital stock of existing firms, logarithm of population, rate of urbanization, and output share of secondary industries at the city level. The main variable of interest is $\text{SHARE}_{i,t-1}$, the capital share of connected firms among all existing firms. In addition, we control for city-sector fixed effects $a_{is}$, time fixed effects $\lambda_t$, city-specific time trends $t \times \delta_p$ and sector-specific time trends $t \times \mu_s$.

Column (1) of Table 7 presents the results using the number of filed patent applications by city-sector. The coefficient of lag SHARE is -0.131 and significant at the 0.05 level. An increase of one standard deviation in lag SHARE reduces the number of patent applications. Columns (2) and (3), respectively, report the estimates using the number of patent applications normalized by city population and the total registry capital of all existing firms in that city-sector. The results remain negative and significant. In columns (4) through (6), we adopt the number of approved patents as an alternative measure of innovation. The coefficients based on total and normalized approved patents are consistent with the results obtained from applications in columns (1) to (3).

# 6 Accounting for Political Incentives

The results presented in the previous sections attest to the premise that the inter-city investment flows following transferred leaders may have stemmed from collusion and rent-seeking behaviors. In this section, we

Table 7: The Effects of Political Connections on Innovation

| Dependent Variable | log(PatApp+1) | log(PatApp/Pop+1) | log(PatApp/K+1) | log(PatGrt+1) | log(PatGrt/Pop+1) | log(PatGrt/K+1) |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| lag SHARE | -0.131** | -0.027*** | -0.034* | -0.130** | -0.017** | -0.025* |
| | (0.061) | (0.009) | (0.017) | (0.053) | (0.008) | (0.013) |
| Controls | Y | Y | Y | Y | Y | Y |
| City-Sector FE | Y | Y | Y | Y | Y | Y |
| Year FE | Y | Y | Y | Y | Y | Y |
| City × Year Trend | Y | Y | Y | Y | Y | Y |
| Sector × Year Trend | Y | Y | Y | Y | Y | Y |
| R-squared | 0.389 | 0.376 | 0.221 | 0.385 | 0.367 | 0.203 |
| Observations | 51,403 | 51,384 | 51,403 | 51,403 | 51,384 | 51,403 |
| Number of City-industries | 5,383 | 5,383 | 5,383 | 5,383 | 5,383 | 5,383 |

Notes: The sample covers 279 cities, 20 industries, and 12 years for 2000 - 2011. The dependent variables are the log number of applied/granted patents (normalized by the population of the city or by the total registry capital of the city-industry) in a specific year, city, and industry. The main independent variable is the lag share of the registry capital of the connected firms in the city. Controls include the lag log aggregate capital stock of the incumbent firms in the city-industry, log population, urbanization rate, and the output shares of the secondary industries of the city. * Significant at 10%, ** 5%, *** 1%.

focus on the supply side of the of collusion, that is, the incentive and cost of subnational leaders to provide patronage for firms to move along with them. Our analyses confront two potential explanations for investment flows (rent-seeking versus career concern) with data on the career turnovers of subnational leaders. Whether a leader is transferred to a different jurisdiction at some point in his or her career may be endogenous, hence, assessments on the impacts of connected firms with transferred leaders may not generalize to the sample of officials who did not experience any transfer throughout their careers. Due to the lack of a proper counter-factual, it is infeasible to estimate the effect of connected firms on the turnover of non-movers. Keeping this caveat in mind, we run a tentative test on the effect of connected firms among all leaders who were transferred at least once during the sample period.[15] First, we estimate the effect of the scale of collusion, as measured by the capital share of connected firms among all firms operated locally, on the promotion of transferred leaders in a similar fashion as in Li and Zhou (2005). The specification is the following.

$$\begin{aligned}
&\Pr[\text{TURNOVER}_{ir} = 0] = \Lambda(\alpha_1 - X\beta), \\
&\Pr[\text{TURNOVER}_{ir} = 1] = \Lambda(\alpha_2 - X\beta) - \Lambda(\alpha_1 - X\beta), \\
&\Pr[\text{TURNOVER}_{ir} = 2] = 1 - \Lambda(\alpha_2 - X\beta)
\end{aligned} \tag{6}$$

with

$$X\beta = \beta_0 \text{ SHARE}_{ir} + \beta_1 \log(\text{CAPITAL}_{ir} + 1) + X_{ir}\beta_2 + \delta_{ir}$$

Equation (6) estimates the relationship between connected firms and promotion with ordered probit models. The dependent variable TURNOVER is a categorical variable of three values: 0 for the termination of a leader's tenure, 1 for any position remaining at the same rank, and 2 for promotion to another position with higher rank. We separately code the turnover of leaders for each leader $i$ at the end of term $r$. $\Lambda(\cdot)$ specifies the cumulative logistic distribution function, with $\alpha_1$ and $\alpha_2$ being two cut-off values to be estimated. The main variable of interest is SHARE, the capital share

[15] Among all subnational leaders, the movers were more likely to be promoted and more likely to be prosecuted for corruption than non-movers.

of connected firms among all newly registered firms during term $r$. To address the possibility that the prevalence of connected investments may be correlated with leaders' effort of investment facilitation across all cities, we also control for $\log(\text{CAPITAL}_{ir} + 1)$, the scale of all registry capital during leader $i$'s term $r$. In addition, $\delta_{ir}$ denotes a set of dummy variables characterizing leader and provincial features. We then proceed to estimate the effect of connected firms on the probability of a transferred leader being prosecuted for corruption. The model is specified as follows.

$$\Pr[\text{CAUGHT}_i = 1] = \Lambda[\beta_0 \ \text{SHARE}_i + \beta_1 \ \log(\text{CAPITAL}_i + 1) + X_i\beta + \delta_i], \tag{7}$$

In the estimation of equation (7), each observation is a political leader who was transferred at least once throughout the sample period. The dependent variable, $\text{CAUGHT}_i$, is a dummy indicating whether the leader was caught and prosecuted for corruption as of the end of 2016. $\Lambda(\cdot)$ is the cumulative logistic distribution function. Similarly as in equation (6), SHARE stands for the ratio of connected registry capital and $\log(\text{CAPITAL}_i + 1)$ is the total amount of registry capital throughout the leader's tenure in the sample period. $\delta_i$ represents a set of dummies reflecting provincial and leader features.

As Table 8, columns (1) to (3), reports, more connected investments from a leader's previous jurisdiction do not help the promotion of transferred leaders. Indeed, the coefficients are negative notwithstanding the lack of statistical significance. In columns (4) through (6), the estimates for corruption prosecution suggest that the coefficients for SHARE are all positive and significant at the conventional level. The results are robust when we include various dummies related to leaders' age, rank, number of previous transfers, as well as interactive terms of personal traits. Meanwhile, the total amount of registry capital does not matter for promotion or corruption prosecution. In addition, Table A2 in the appendix shows that the pattern of induced investment flow is stronger when officials had more local experiences and minimum promotion incentives. These results suggest a separating equilibrium for bureaucratic incentives: officials who hope for promotion may be more cautious and disciplined, while those

Table 8: Impacts on Officials' Career Outcomes

| Dependent Variable | TURNOVER | | | CAUGHT | | |
|---|---|---|---|---|---|---|
| | Ordered Logistic | | | Logistic | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| SHARE | -0.024 | -0.025 | -0.023 | 0.068* | 0.073** | 0.065* |
| | (0.055) | (0.059) | (0.059) | (0.040) | (0.037) | (0.036) |
| Lag. log (CAPITAL +1) | | 0.002 | 0.002 | | 0.004 | 0.006 |
| | | (0.003) | (0.003) | | (0.005) | (0.006) |
| Constant cut1 | -3.816** | -5.069*** | -2.739 | | | |
| | (1.533) | (1.854) | (2.463) | | | |
| Constant cut2 | 0.007 | -1.239 | 1.113 | | | |
| | (1.513) | (1.828) | (2.445) | | | |
| Controls | N | Y | Y | Y | Y | Y |
| Province FE | Y | Y | Y | NA | NA | NA |
| YEAR FE | Y | Y | Y | NA | NA | NA |
| Ranking FE | Y | Y | Y | N | Y | Y |
| Ranking × AGE FE | N | N | Y | N | N | Y |
| Age Cohort FE | NA | NA | NA | Y | Y | Y |
| Transfer Mode FE | NA | NA | NA | Y | Y | Y |
| Transfer Mode × Ranking FE | NA | NA | NA | N | Y | Y |
| Log Pseudo-likelihood | -584.6 | -581.9 | -581.6 | -161.5 | -152.3 | -151.9 |
| Pseudo R2 | 0.038 | 0.042 | 0.042 | 0.025 | 0.056 | 0.059 |
| Observations | 712 | 712 | 712 | 469 | 469 | 469 |

Notes: Results in columns (1) to (3) are obtained from using individual data, and results in columns (4) to (6) are obtained from using individual-term data, respectively. The official ranking dummies in columns (1) to (3) refer to dummies for the highest ranking throughout the official's career, and the results those in columns (4) to (6) refer to the official's current ranking for the term. The transfer pattern dummies indicate how many inter-province and intra-province transfers the official has experienced in his career. The year dummies in Panel B are dummies for the starting year of the term. * Significant at 10%, ** 5%, *** 1%.

with weaker career incentives and better local knowledge are more likely to engage in collusion. Consequently, officials with little hope of promotion spend more effort on rent-seeking. This makes them more vulnerable to corruption investigation than non-colluders.

# 7 Conclusion

This paper uses a novel strategy to study the impact of collusion on firm dynamics across geographic spaces. By tracing the direction of leader transfers in China, we estimate significant increases of investment flows right after the transfers. In addition, the connected new firms that travel with officials (1) concentrate in high-rent sectors; (2) obtain a price premium in land transactions; (3) have a higher survival rate when the leaders remain in office, but have a much lower survival rate once the connected leaders are transferred elsewhere; (4) are negatively associated with new entries in the market; (5) undermine the level of innovation in subsequent years; and (6) increase the likelihood of corruption prosecution for the transferred leaders.

Collusion between officials and the private sector is common. Personal networks may help alleviate institutional frictions and facilitate the expansion of markets across different regions. However, the reliance on collusion comes with a price by crowding out investors without strong connections and deterring innovations. Hence, in the long term, collusion imposes a social cost by inhibiting productive entrepreneurship (Baumol, 1990; Murphy et al., 1991). In response, the government implemented massive anti-corruption campaigns to purge colluding officials.

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# Appendix Not for publication

Table A1: Placebo Tests

| Dependent Variable | log(1+ FLOW) | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| l(TRANSFER), Randomly Reassigned | 0.010 | | |
| | (0.008) | | |
| l(OTHER) | | -0.052*** | |
| | | (0.010) | |
| l(TRANSFER) | | 0.028** | |
| | | (0.012) | |
| l(TRANSFER), Inverted | | | 0.008 |
| | | | (0.008) |
| Controls | Y | Y | Y |
| Dyad FE | Y | Y | Y |
| Year FE | Y | Y | Y |
| R-squared | 0.027 | 0.067 | 0.027 |
| Observations | 1,047,840 | 1,047,840 | 1,047,840 |
| Number of City-Dyads | 87,320 | 87,320 | 87,320 |

Notes: The sample covers 87,320 city-dyads from 2000 to 2011. In all columns, city-dyad and year fixed effects are included. Controls include log per capita real GDP and log population of both the origin and the destination cities. * Significant at 10%, ** 5%, *** 1%.

Table A2: Accounting for Leader Characteristics

| Dependent Variable | log(1+ FLOW) | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| 1(TRANSFER) | 0.019 | 0.011 | 0.021** |
| | (0.012) | (0.020) | (0.011) |
| 1(TRANSFER) * 1(NATIVE) | 0.156*** | | |
| | (0.053) | | |
| 1(TRANSFER) * 1(TENURE $\geq$ 5 YR) | | 0.024 | |
| | | (0.022) | |
| 1(TRANSFER) * 1(AGE$\geq$RL) | | | 0.172** |
| | | | (0.040) |
| Controls | Y | Y | Y |
| Dyad FE | Y | Y | Y |
| Year FE | Y | Y | Y |
| R-squared | 0.067 | 0.067 | 0.066 |
| Observations | 1,047,840 | 1,047,840 | 1,047,840 |
| Number of City-Dyads | 87,320 | 87,320 | 87,320 |

Notes: The sample covers 87,320 city-dyads over 2000-2011. The dummy variable NATIVE is equal to 1 for the city-dyad $ij$ at time $t$ if a transferred leader from city $i$ to $j$ was originally born in city $i$. 1(TENURE $\geq$ 5YR) is a dummy variable that equals 1 if the transferred leader served in the previous jurisdiction for five years or more. 1(AGE $\geq$ RL) equals 1 if a transferred official had reached the de facto "retirement age" due to the CPC's routine practice of age limits, that is, 63 for provincial leaders and 58 for city leaders. In all columns, city-dyad and year fixed effects are included. Controls include log per capita real GDP and log population of the origin and destination cities. * 10%, ** 5%, *** 1%.