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Mandarins make markets: Leadership rotations and inter-provincial trade in China☆

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ABSTRACT

The careers of many public officials span multiple localities, yet the economic effects of their inter-regional movements are not well understood. This paper focuses on the rotation of provincial leaders in China and studies its impact on regional economic integration. Estimation results using the gravity framework indicate that when a provincial leader is appointed as the party secretary of a new province, the trade volume from the new province to the old province increases, but not vice versa. Additional analyses using two novel datasets that capture the intensity of inter-provincial socioeconomic activities in China corroborate this finding. We then construct a quantitative trade model that incorporates input-output linkages and show that removing such inter-provincial links associated with the rotation of provincial leaders leads to an average welfare loss of 0.03%.

1. Introduction

Inter-regional rotation of personnel is common in the public sector. In the United States, bureaucrats and professional city managers advance their careers by moving from small to large localities (Carpenter, 2001; Watson and Hassett, 2004). In countries like Kenya, Russia, and China, national leaders regularly initiate reshuffles of local politicians and bureaucrats for political and strategic purposes (Hassan, 2016; Huang, 2002; Willerton, 1992). The rotation of officials sometimes even takes place on a global scale within a large, supra-national unit. Under the British Empire, for instance, colonial governors developed careers that spanned colonies in different continents (Xu, 2018). Through these rotations, officials can develop networks with firms and businesses in multiple localities. However, our understanding of how these rotations shape inter-regional economic activities still remains limited.

In this paper, we study the economic impact of the inter-regional rotation of government officials in the context of China. Specifically, we leverage China's unique cadre management system to empirically identify the effect of leading officials' cross-regional linkages on inter-provincial trade, as measured by the volume of railway cargo. Relying on a newly collected dataset that records the careers of the universe of political leaders at the municipal-level and above in China since 1999, we use the gravity framework to estimate the effect of provincial leadership rotation on inter-provincial trade in China. Our estimations in the benchmark setup show that when the party secretary (head of the local Communist Party Committee) of province *A* used to work as party secretary or governor of province *B*, the trade flow from province *A* to province *B* increases, but not vice versa. By contrast, the rotation of provincial governors, who are in charge of local economic development but ranked lower than provincial party secretaries, does not have any consistent effect on inter-provincial trade. These results are robust to including the multilateral resistance terms (Anderson and van Wincoop, 2003), running regressions with first-differencing to address potential endogeneity in policy changes (Baier and Bergstrand, 2007; Baier et al., 2014), and using various subsets of observations. We also find that this effect on inter-provincial trade is more salient when the party secretary

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of the new province used to hold a more senior position in the previous province.

We further explore whether the effect of the provincial leadership rotation on railway cargo flows is due to trade creation or trade diversion by utilizing two novel datasets. The first dataset is compiled from the "major events" chapter of each province's statistical yearbook. This section of the yearbook records, in chronological fashion, important political, economic, and social events that take place in a province. We conduct a text analysis and find that when the party secretary of province *A* used to work as party secretary or governor of province *B*, province *A*'s major event records contain more socioeconomic events related to province *B*. In addition, the increased number of events recorded are associated with business and inter-governmental exchange, but not with transportation, sports, or culture. Moreover, we also study the establishment of regional chambers of commerce (RCoCs, hereafter), a type of non-government organizations that aims to enhance business activities across regions. Using the Cox proportional hazard model, we show that when the party secretary of province *A* used to work in province *B*, merchants from province *B* are more likely to set up an RCoC in province *A*. These results are consistent with the gravity estimations and provide plausible explanations for how the rotations of provincial party secretaries affect railway cargo flows through reducing trade frictions.

Lastly, to quantify the welfare effects of leadership rotations, we construct and analyze a multi-region, multi-sector, Ricardian trade model. In this model, regions represent Chinese provinces or Rest of World and are connected through tradable agricultural and manufacturing goods. The model also incorporates input-output linkages like in Caliendo and Parro (2015) to capture both the direct and indirect effects of trade cost changes. We calibrate the model using data to match the effect of provincial leadership rotation on domestic trade with the results from the gravity estimations. In the benchmark scenario in which there is no trade diversion, connecting two provinces by leadership rotation reduces the uni-directional trade cost by 3.9%. In addition, removing the connections established through leadership rotations results in an average welfare loss of 0.03% among Chinese provinces. Moreover, we do not find evidence of welfare maximizing incentive of the actual provincial leadership rotations from the simulation results of the calibrated model.

Our research connects two separate but related fields in the literature. On the one hand, since the seminal work of Jones and Olken (2005), a number of studies have found that political leaders matter for economic growth (Besley et al., 2011; Adolph, 2013; Hodler and Raschky, 2014; Yao and Zhang, 2015).[1] However, we are not aware of any research that has explored the effect of leaders on trade across regions. On the other hand, trade economists have paid great attention to the political determinants of trade frictions (Meon and Sekkat, 2008; Dutt and Traca, 2010; Head et al., 2010; Berger et al., 2013), but the role of political leaders has yet to be studied. We rely on the gravity framework, which is consistent with a large class of trade models, to analyze the effect of the rotation of provincial leaders in China on inter-regional trade. In doing so, we help to address the respective gaps in the two areas of research.

Furthermore, our work also complements existing studies on domestic fragmentation and trade frictions in China. Starting from Young (2000)'s controversial claim that China's reform since the 1980s "has resulted in a fragmented internal market with fiefdoms controlled by local officials", other researchers have also found evidence of local protectionism using various data sources and empirical methods (Bai et al., 2004; Poncet, 2005; Lu and Tao, 2009). However, while most studies consider political factors to be one of the potential mechanisms, not many of them provide direct empirical analysis. One exception is Xu and Cao (2017), who find that the relocation of provincial leaders also accompanies capital flow in the same direction. The other is the concurrent work by Nian and Wang (2019), who find that firms follow their headquarter city politician's move by purchasing more land at lower prices. Most closely related to our paper here is the recent work by Shi et al. (2019), who provide evidence that cross-regional movements of prefecture-level leaders induce investments to move from leaders' old posting localities to the new ones. We differ from these works in two ways. First, we focus on the movements of provincial leaders instead of city-level leaders; provincial politicians are fewer in numbers but potentially have more power and means to influence the economy given their elevated status in the political system. Second, and more importantly, instead of mainly focusing on investment growth in destination cities, we examine a much wider range of socioeconomic activities in the destination and origin localities. Our analysis based on several new data sources suggests that cross-regional movements of political leaders can also lower trade frictions and lead to a more general deepening of inter-regional economic linkages, as evidenced by the more rapid flows of goods, entrepreneurs, and information.

This paper proceeds as follows. Section 2 briefly discusses the administrative structure and cadre rotation system in China. Various datasets used in the empirical analysis are also introduced in this section. Section 3 describes the setup of gravity equations and analyzes the regression results. Section 4 focuses on exploring whether the gravity estimates are a result of trade creation or trade diversion and provides additional evidence using data from the major event records and the establishment of the RCoCs. In section 5, we construct and calibrate a quantitative trade model to quantify the welfare effects of leadership rotation. The last section concludes with a summary.

2. Background and data

In this section, we first briefly discuss the political structure and the cadre rotation system in China. Descriptive evidence is presented to support our claim that the rotation of provincial leaders can be considered a quasi-natural experiment. The data used in the empirical analysis are also introduced in this section.

2.1. Provincial leadership rotations in China

China has a one-party political system with the highest decision-making body being the Politburo Standing Committee (PSC) of the Communist Party. Each Chinese province (including direct-controlled municipalities and autonomous regions, all of which hold provincial status) has two political leaders: party secretary and governor. The party secretary is the head of the provincial Communist Party Committee, whereas the governor is the head of the provincial government. Party secretaries are ranked higher than provincial governors, even though governors in theory have the executive power (Yao and Zhang, 2015). Provinces are the highest sub-national units in China's administrative hierarchy, hence provincial leaders have the final say over the most important political, policy, and personnel matters within their provinces. They can, for example, grant informal subsidies or tax rebates to certain firms or sectors, provide government guarantees for bank financing, and protect investors' property rights against predation

[1] A growing body of research has specifically investigated the effects of political leaders on the economy within the context of China. An early pioneering study by Li and Zhou (2005), for example, finds that "the likelihood of promotion of provincial leaders increases with their economic performance, while the likelihood of termination decreases with their economic performance". Xu et al. (2007) emphasize the role of provincial governors and find that a new provincial governor relocated from another province can improve GDP growth by 1%. On the other hand, Yang et al. (2010) find that a new provincial party secretary or governor from the central government actually hinders GDP growth. The latest work in this strand of literature is by Persson and Zhuravskaya (2016) in which they distinguish provincial party secretaries promoted within the provinces they govern from those relocated from outside. The authors find that local provincial party secretaries spend a greater share of budgetary resources on education and health care and invest less in construction infrastructure.

by lower level officials. Therefore, the preferences and performance of provincial party secretaries often have significant implications for the patterns of economic activities both within and between provinces (Persson and Zhuravskaya, 2016).

Both party secretaries and government executives are appointed by the Organization Department of the Party Committee one level above.[2] At provincial level, the promotion of senior leaders is determined by the PSC. Provincial leaders are regularly rotated across different regions. This has been a long-standing practice that can be traced back to as early as the Qin Dynasty (221–206 BCE) (Zhao, 2015). This practice distinguishes China not only from democracies, wherein politicians rarely change the constituencies they represent, but also from many Communist/non-liberal democratic regimes, in which the frequency of inter-regional transfers is much lower (Rochlitz et al., 2015). Among officials who served as provincial party secretaries or governors between 1999 and 2016, almost all of them worked in more than one province and about 42% of them served in leadership posts (i.e., party secretary or governor) in two or more provinces.

We claim that the choice of destination for any given rotation at province level is determined in quasi-random fashion. In other words, while it may be possible to predict which provincial leader will be promoted or rotated to another province, no observable measures can predict the destination of the rotation. We provide descriptive evidence to support our claim in this section and present additional empirical evidence in the Appendix. First, it is important to note that the goals that rotation seeks to achieve are mostly political rather than economic. According to the Chinese Communist Party's own organization document, cadre rotation is intended to serve three main functions: (1) to fulfill certain policy tasks in the destination province, (2) to hone the leadership skills of the selected cadres, and (3) to prevent cadres from holding a leadership position for too long in a given locality (CCP, 1999, 2006). Economic considerations are typically secondary in reshuffling decisions. Moreover, in practice, the destination of the rotation at province level is heavily influenced by the availability of appropriate positions. Most of the time, such availability in turn depends on a series of complicated factors beyond an individual's control, such as retirement, term limits, disciplinary investigations, or simply movements in other positions.

The quasi-random nature of the rotation process can be best illustrated through an examination of the career trajectory of the current general secretary Xi Jinping. As the son of a vice-premier and someone who joined the ranks of "reserve cadres" very early in his career, Xi's career has presumably involved a much greater degree of deliberate planning and high-level intervention compared to most other politicians. However, while Xi regularly experienced promotions and transfers throughout his career, the destinations of those transfers appear to have been anything but planned. More specifically, Xi underwent two major reshuffles as a provincial leader. First, in 2002, he moved from provincial governor of Fujian to provincial governor (and later provincial secretary) of the neighboring Zhejiang province. Before Xi, no provincial leader in Fujian had ever been appointed laterally to Zhejiang[3]; Xi himself also described his transfer as "completely unexpected", as he had initially expected to be placed in a western province, where he had deeper personal and family connections (Weng, 2005).

In 2007, Xi, who was then the party secretary of Zhejiang, experienced another rotation—or plausibly a major but implicit promotion. He was appointed to be the party secretary of Shanghai, a position widely regarded as a critical stepping stone to membership in the PSC. Although at that time Xi was seen by many as a likely contender for a central leadership post, no one was able to predict that his path to the party center would run through Shanghai. This path was not available until September 2006, when the position was vacated due to the unexpected firing of the former Shanghai party boss, Chen Liangyu (Jiang and Yang, 2016). Even after the purge, the central leadership did not see Xi as the most preferable candidate to fill that vacancy, and his appointment was the result of a compromise between major political coalitions at the top (WikiLeaks, 2006).

In Table A.2 of the Appendix, we provide more systematic evidence on the exogenous nature of rotation destinations by regressing the incidents of leadership rotation on a host of covariates for both the origin and destination provinces. Our analysis suggests that although the economic performance of a party secretary's current province does have some predictive power for whether a rotation will occur, none of the commonly used provincial socioeconomic variables (e.g., GDP, population, distance to/contiguity with the origin province) can accurately predict whether a province will be the destination of a rotated leader. This gives us some confidence in the credibility of our research design. We offer a number of additional tests to address the potential endogeneity problem in later sections.

2.2. Data

The data on political leaders are drawn from the China Political Elite Database (CPED),[4] a newly constructed database containing extensive biographical information on over 4000 key municipal, provincial, and national leaders in China since the late 1990s. For each leader, the CPED provides standardized information about the time, place, organization, and rank of every job assignment listed in his or her curriculum vitae, which is collected from government websites, yearbooks, and other trustworthy online sources. In this paper, we focus on the subset of officials who served at top provincial posts (i.e., as provincial secretaries or governors) between 1999 and 2016.

Fig. 1 visualizes the inter-provincial linkages established by governor-to-secretary or secretary-to-secretary rotations. During the period covered by our data, there were a total of 55 links created by such rotations, of which 37 were due to secretary-to-secretary rotations and 18 were due to governor-to-secretary rotations. All but one of the mainland provinces (Ningxia) either received provincial party secretaries from or sent top leaders to become party secretaries in other provinces. Generally speaking, more developed and politically significant provinces are more likely to be the destination of rotations. However, consistent with our earlier claim about exogeneity, the patterns of movement also show that party secretaries who arrive at these more prestigious destinations can come from a wide range of origin provinces, and it is quite rare for there to be more than one leadership movement between any given province dyad.[5]

Whereas the focus of this paper is on the relationship between cadre rotation and economic linkages across provinces in China, the fact that there is no official record of inter-provincial trade flows poses a major challenge. As documented in Yu (2013), existing studies focusing on domestic trade in China have either used the inter-provincial input-output table, which covers a very short time span, or had to estimate trade flows using gravity estimations. Our approach is to approximate the domestic trade across Chinese provinces using the volume of railway cargo, which is published annually in the *China Railway Yearbook*.

[2] For government executives, appointments have to be approved by the local People's Congress, but this procedure is just a formality in most cases.

[3] In a more systematic analysis, we compile a comprehensive list of province pairs that have experienced movement of leading provincial cadres (i.e., the provincial secretary or the governor). We find a total of 60 pairs between 1995 and 2014, but only two pairs (Jilin to Chongqing and Qinghai to Jiangxi) saw the movement of more than one provincial leader.

[4] See Jiang (2018) for the details of the database.

[5] In the empirical analysis, we use several ways to address the presence of implicit hierarchies among provinces, including using time-varying fixed effects for both origin and destination provinces and conducting sub-sample analyses that exclude "better" destinations such as the centrally directed municipalities (*zhixia shi*).

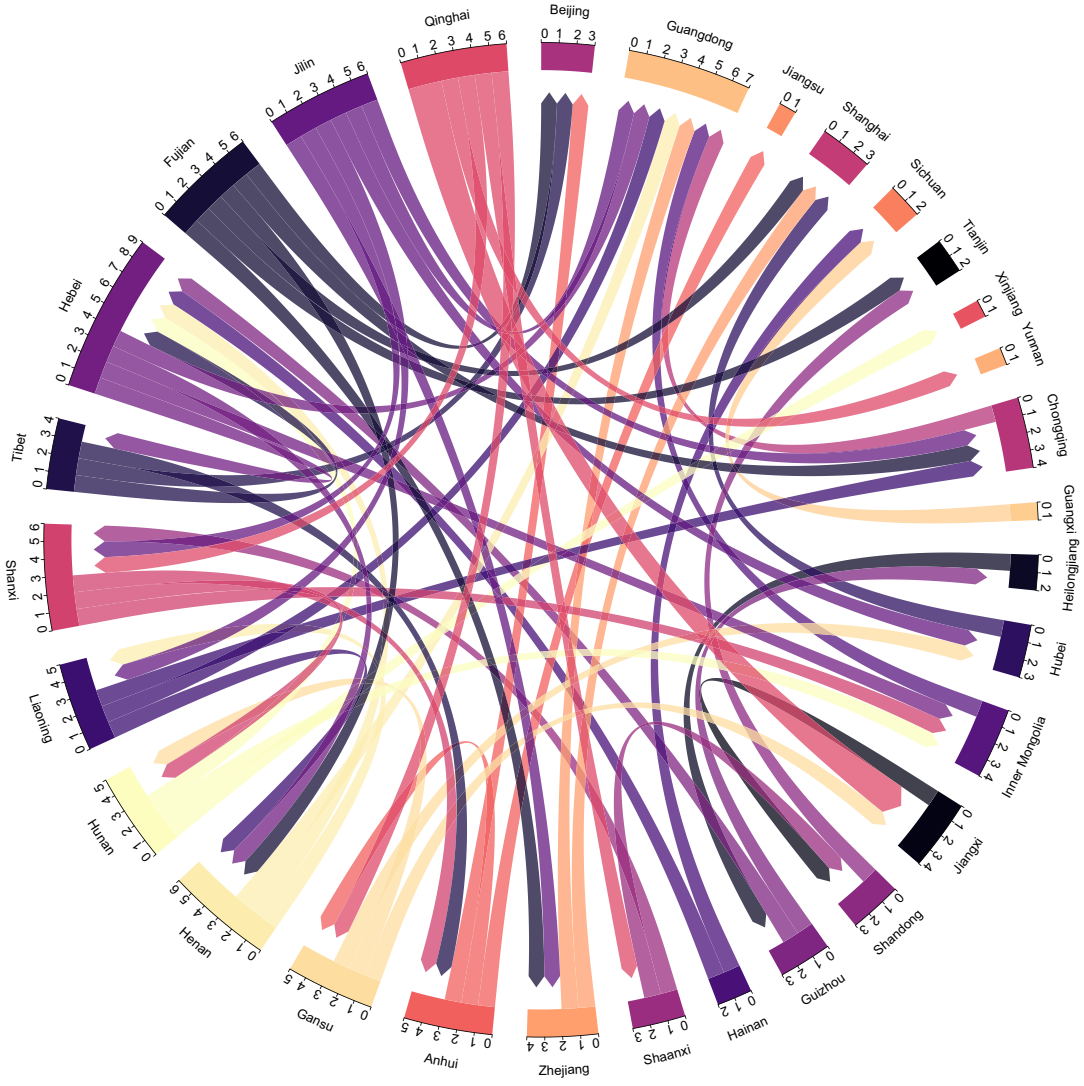

Fig. 1. Provinces Connected by Leadership Rotation. Note: This figure presents cross-province movements of top provincial politicians in China between 1999 and 2016. The arrows indicate the directions of movements. The data include both governor-to-secretary and secretary-to-secretary rotations.

This is the only publicly available dataset that records inter-provincial economic activities annually over an extended period of time. The railway is the second most commonly used cargo transportation method in China (next to road transportation). It accounts for about 13% of the total cargo freight and is highly correlated with the cargo volume from other means of transportation. We use the railway data to construct a panel of province dyads for 17 years. We include all possible combinations of province pairs in the panel, except for those with Tibet, which had very limited railway connection with the rest of China for much of the period covered by our data.

In addition to data on railway cargo, we also construct an original measure for the overall level of socioeconomic exchange between provinces. Our data source is the "major events" chapter of each province's annual yearbook. These chapters detail, in a chronological fashion, important political, economic, and social events that take place in a province, usually based on a synthesis of the entire year's provincial newspaper articles. Digital copies of these chapters were obtained from the *China National Knowledge Infrastructure* (CNKI) for the period between 2000 and 2016.

Finally, we also construct a third measure on the movement of business actors across provinces based on the establishment of RCoCs. RCoCs are voluntary associations formed by private entrepreneurs with common hometown origins; they serve as a relatively institutionalized platform for members to share information, seek legal and financial assistance, and organize other collective undertakings important for their business operations (Yu and Zhou, 2012).[6] Governments of host provinces also use RCoCs as a tool to attract investments and hence stimulate local economic growth. We collected information for all RCoCs through an extensive Internet search and recorded each one's year of establishment.[7] A total of 517 RCoCs were found during the period of our sample.

[6] For instance, private merchants from Zhejiang, a province known for its commercial activism, were pioneers in creating RCoCs during the 1990s when Zhejiang merchants expanded their businesses to the rest of the country.

[7] Each province can only establish one RCoC in another provinces. We also do not observe any closure of RCoCs once they are established.

3. The effects of provincial leadership rotation on trade

In this section, we first introduce the gravity framework, which has become the conventional approach for studying the determinants of trade flows (Berger et al., 2013). We then present and discuss our main findings followed by an event study and robustness checks.

3.1. Empirical framework

We rely on the gravity equation to estimate how provincial leadership rotation affects domestic trade across provinces in China. This framework has been widely used to study the impact of various types of bilateral trade frictions.[8] Our starting point, defined in Head and Mayer (2014) as the "naive gravity equation", takes the following form:

$$\log V_{AB,t} = c + \beta_A \log Y_{A,t} + \beta_B \log Y_{B,t} + \beta_X \mathbf{X}_{AB,t} + f_{AB} + year_t + \varepsilon_{AB,t}, \quad (1)$$

where V_{AB} is the trade flow from province A to province B, Y is the province's output measured by its GDP, $\mathbf{X}_{AB,t}$ is a vector of measures of bilateral trade frictions between A and B, and f_{AB} is the province-pair fixed effect, and $year_t$ is the year fixed effect. The province-pair fixed effect f_{AB} controls all time-invariant factors that affect domestic trade between provinces, such as distance, common language, cultural similarity, and their difference in economic development and political significance. In addition, including f_{AB} also addresses the concern that some share of cargo may be shipped to coastal provinces and then exported.

This "naive gravity equation" has been viewed as empirically successful in analyzing international trade flows, but the theoretical justifications of this setup have been questioned by recent works such as Anderson and van Wincoop (2003) and Head and Mayer (2014). In particular, this regression equation restricts the effects of third-party regions on $\log V_{AB,t}$ (the multilateral resistance term discussed in Anderson and van Wincoop, 2003) to be time-invariant. Therefore, we also consider the "structural gravity equation" in Head and Mayer (2014) to relax this restriction. This equation can be expressed as:

$$\log V_{AB,t} = c + \beta_X \mathbf{X}_{AB,t} + f_{AB} + f_{A,t} + f_{B,t} + \varepsilon_{AB,t}. \quad (2)$$

Including origin–year fixed effect $f_{A,t}$ and destination–year fixed effect $f_{B,t}$ fully captures the time-variant multilateral resistance terms.[9] In addition, this formulation is consistent with a large set of conventional trade models, as discussed in Head and Mayer (2014).

In this paper, the inter-provincial linkages established by cross-provincial leadership rotations will be modeled as factors of trade frictions and captured in $\mathbf{X}$. More precisely, we construct a binary variable $secretary_{AB,t}$ to indicate whether the provincial party secretary of province A at time t formerly worked in province B as secretary or governor. $governor_{AB,t}$ is defined analogously for governors. We also include lags and leads to address the possible delay and anticipation effect of the arrival of the new leader.

We interpret positive and significant coefficients of these linkage indicators as evidence that leadership rotations have an effect on inter-provincial trade. This interpretation rests on the assumption that provincial leadership rotations are orthogonal to the unobserved factors of the origin and destination provinces that can affect the bilateral trade flows. In other words, no variables that affect provincial trade flows can predict the destination of provincial leadership rotations. In addition to the anecdotal evidence discussed in Section 2.1, we also check whether measures of economic activities have any predictive power on the destination of the leadership rotation in Section 0.2 of the Appendix. The empirical results from various specifications all support this identification assumption.

As discussed in Baier and Bergstrand (2007) and Baier et al. (2014), using gravity equations to estimate the effect of policy changes on bilateral trade flows may create an endogeneity bias. In the context of this paper, it is possible that the dummies indicating rotation-induced linkages may be correlated with unobserved time-variant trade cost measures. To address this potential issue, we also present an alternative approach following the estimation strategy introduced in Baier et al. (2014). In particular, we consider the first-differencing specification:

$$\Delta_n \log V_{AB,t} = c + \beta_X(\Delta_n \mathbf{X}_{AB,t}) + f_{AB} + f_{A,t} + f_{B,t} + \varepsilon_{AB,t}, \quad (3)$$

where Δ_n refers to first-differencing over n years. This equation is obtained by first-differencing equation (2) and adding a pair fixed effect f_{AB}. Note that $f_{A,t}$ and $f_{B,t}$ here capture origin-specific and destination-specific *changes* over time. In addition, the pair fixed effect f_{AB} captures unobserved changes in bilateral trade frictions that evolve smoothly over time.

3.2. Benchmark results

The regression results for our benchmark analysis are displayed in Table 1. Column 1 reports estimates of equation (1). This "naive gravity equation" includes year and province-pair fixed effects, but does not capture the multilateral resistance terms. We focus on inter-provincial linkages created by the rotations of the provincial party secretary and governor, both contemporaneously and with a one-year lag. In total, there are eight linkage dummies in the regression represented in Column 1. We can see that the coefficient for the lagged party secretary's linkage $secretary_{AB,t-1}$ is positive and significant at the 10% level. The estimate is somewhat noisy, most likely because of the inclusion of its contemporaneous counterpart $secretary_{AB,t}$, which does not have a significant effect in itself but tends to increase collinearity. By contrast, none of the other three types of leader linkages (lagged or contemporaneous) pass the conventional threshold of statistical significance. This result suggests that the cargo flow from province A to province B will be significantly greater if province A's party secretary used to work as the party secretary or governor of province B, and the effect comes with a one-year lag. Interestingly, we do not find any consistently positive effect from linkages established by movements of governors. One reason could be that there are relatively few governor-to-governor rotations in our sample. However, this is also consistent with the general impression that the party secretary is the one with greater de facto power in the provincial leadership duo.[10]

In Column 2, we follow equation (2) and use origin–year and destination–year fixed effects to control for time-variant multilateral resistance terms as suggested by Anderson and van Wincoop (2003). In Column 3, we add one-year leads to investigate whether railway cargo flows "anticipate" leadership rotations. Lastly, in Column 4, we use PPML instead of OLS to address issues related to heteroskedasticity. Note that the dependent variable in Column 4 is $V_{AB,t}$ but not $\log V_{AB,t}$. In all regressions, $secretary_{AB,t-1}$ is the only variable that has a positive and significant coefficient at 10%. Other contemporaneous and lagged leadership rotation dummies all have insignificant coefficients in the first two columns. When leads are added in Column 3 and Column 4, a few other leadership rotation dummies become significant in one regression but do not exhibit any stable pattern. In Section.C.1 in the Appendix, we explore different combinations of lags and leads, and the significance of $secretary_{AB,t-1}$ remains robust at the 10% level or higher. Given these results, we will use the specification with one-year lag in the remainder of the empirical exercise.

Table 2 presents regression results following the first-differencing

[8] See Head and Mayer (2014) for a comprehensive review of gravity equations.

[9] We use the algorithm described in Correia (2016) for estimations with high dimensional fixed effects.

[10] For other studies that have found strong economic impacts by party secretaries, see Jiang and Zhang (2020); Persson and Zhuravskaya (2016).

Table 1
Gravity estimation using railway cargo data.

	Dependent variable: $logV_{AB,t}$			
	(1)	(2)	(3)	(4)
	$logV_{AB,t}$	$logV_{AB,t}$	$logV_{AB,t}$	$V_{AB,t}$
$secretary_{AB,t-1}$	0.149*	0.128*	0.125*	0.091*
	(0.084)	(0.069)	(0.070)	(0.047)
$secretary_{AB,t}$	0.023	0.034	0.018	0.041
	(0.086)	(0.068)	(0.033)	(0.031)
$secretary_{AB,t+1}$			0.042	0.298***
			(0.073)	(0.073)
$secretary_{BA,t-1}$	0.097	−0.020	−0.009	−0.049
	(0.073)	(0.055)	(0.054)	(0.054)
$secretary_{BA,t}$	0.012	0.022	−0.019	0.043
	(0.064)	(0.053)	(0.043)	(0.052)
$secretary_{BA,t+1}$			0.063	−0.042
			(0.049)	(0.060)
$governor_{AB,t-1}$	0.051	0.059	0.025	0.050
	(0.139)	(0.140)	(0.138)	(0.066)
$governor_{AB,t}$	0.012	−0.072	0.009	0.172***
	(0.097)	(0.079)	(0.074)	(0.056)
$governor_{AB,t+1}$			−0.121**	−0.015
			(0.056)	(0.062)
$governor_{BA,t-1}$	0.123	0.039	0.016	−0.260**
	(0.120)	(0.076)	(0.071)	(0.120)
$governor_{BA,t}$	0.009	−0.029	0.051	0.025
	(0.104)	(0.077)	(0.073)	(0.115)
$governor_{BA,t+1}$			−0.105	−0.127*
			(0.067)	(0.070)
$\log GDP_{A,t}$	0.777***			
	(0.133)			
$\log GDP_{B,t}$	1.045***			
	(0.139)			
Year FE	✓			
Pair FE	✓	✓	✓	✓
(A,t) and (B,t) FE		✓	✓	✓
Method	OLS	OLS	OLS	PPML
Adjusted R^2	0.92	0.95	0.95	0.98
Observations	14,790	14,790	13,920	13,471

Note: This table presents the gravity estimation of the effect of provincial leaders' trans-regional linkages on inter-provincial railway cargo. The dependent variable is logged railway cargo from province A to B. $secretary_{AB,t}$ is a binary indicator that takes the value of 1 if the incumbent provincial party secretary in province A at time t had prior leadership experience in province B. The notations for other independent variables can be interpreted in the same way. Standard errors clustered at province-pair level are in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

setup in equation (3). We follow Baier and Bergstrand (2007) and Baier et al. (2014) and choose $n = 5$.[11] Column 2 reports estimates of equation (3), whereas column 1 does not include the pair fixed effects. In both columns, $\Delta_5 secretary_{AB,t-1}$ has a positive and significant coefficient. Similar to the results presented in Table 1, none of the other three variables have significant coefficients.

To provide a more substantive interpretation of the result, we benchmark the effect of party secretaries with the effect of geographic distance in the gravity framework. We regress $\log V_{AB,t}$ on $\log(distance)$ after controlling for the multilateral resistance terms, and the coefficient of $\log(distance)$ is −1.64. In our dataset, the average geographic distance between two Chinese provinces is about 1420 km. Based on Tables 1 and 2, the estimated effects of the connection through party secretary rotation on the same outcome range from 0.125 to 0.176, which correspond to a 108- to 152-km reduction in distance.

Table 2
Gravity estimation in changes.

	Dependent variable: $\Delta_5 logV_{AB,t}$	
	(1)	(2)
$\Delta_5 secretary_{AB,t-1}$	0.176***	0.167***
	(0.062)	(0.060)
$\Delta_5 secretary_{BA,t-1}$	−0.032	−0.049
	(0.054)	(0.055)
$\Delta_5 governor_{AB,t-1}$	0.055	0.070
	(0.159)	(0.162)
$\Delta_5 governor_{BA,t-1}$	−0.022	−0.009
	(0.151)	(0.168)
Pair FE		✓
(A,t) and (B,t) FE	✓	✓
Adjusted R^2	0.47	0.62
Observations	10,440	10,440

Note: This table presents results of the gravity equation in five-year changes. Standard errors clustered at province-pair level are in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

[11] Our estimates are not sensitive to difference values of n. Figure A.1 in the Appendix illustrates the coefficient of $\Delta_n secretary_{AB,t-1}$ from using different values of n. With the exception of $n = 1$, the coefficient is always positive and statistically significant at 10% or higher.

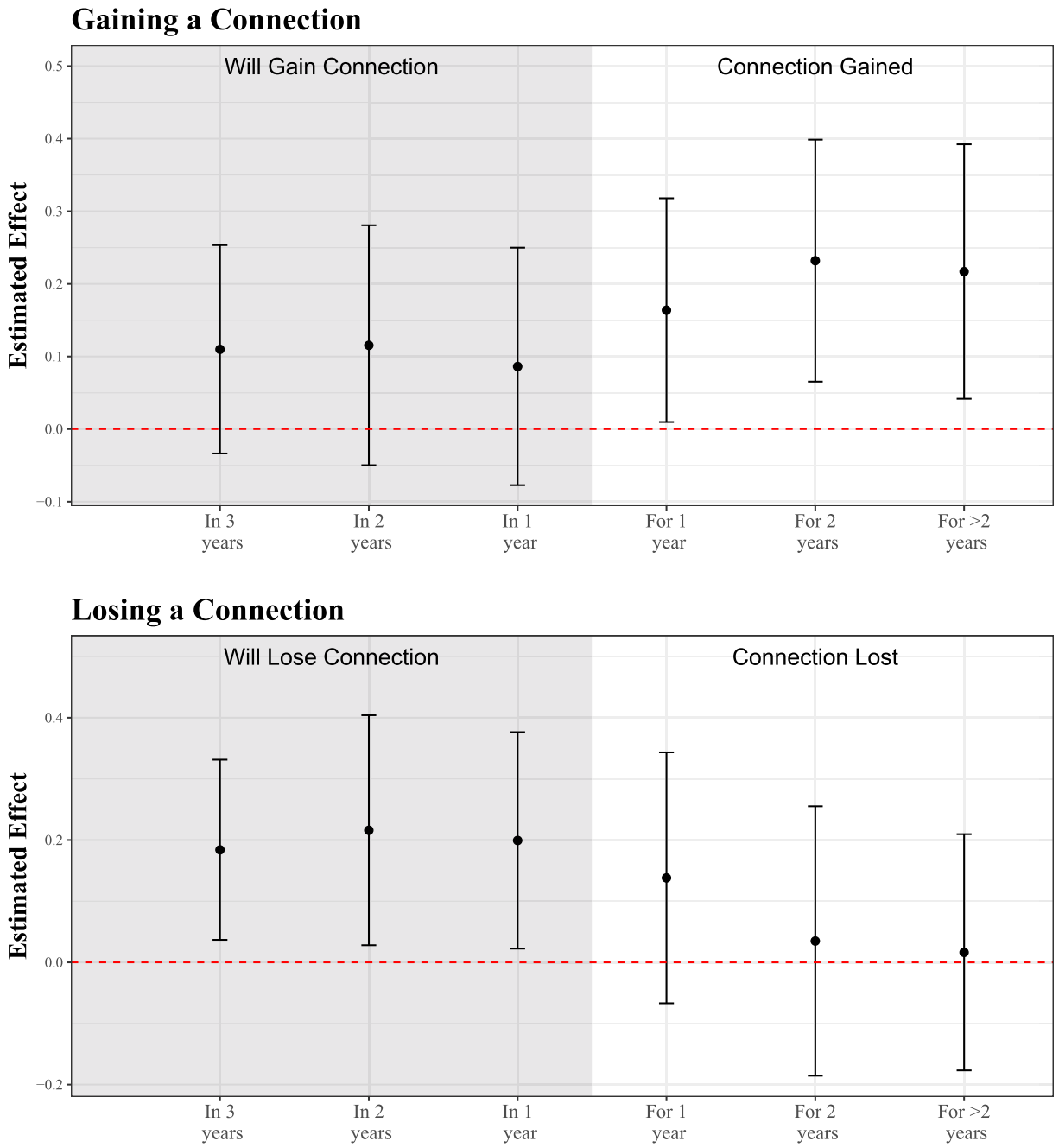

Fig. 2. Results from Event Studies. Note: The top panel of this figure depicts the estimates in the event study regression of linkage formation through provincial leader rotation, whereas the bottom panel depicts the estimates when such linkage breaks. 90% confidence intervals plotted with robust standard errors.

3.3. Results from an event-study approach

A central assumption for the validity of our research design is that the movements of provincial secretaries are orthogonal to the socioeconomic exchange between the origin and destination provinces. To evaluate this assumption empirically, we adopt an event-study approach to closely examine the change of inter-provincial trade volumes a few years before and after key leadership turnovers. Specifically, we focus on two types of events. One is two provinces A and B becoming connected when a new provincial secretary with past work experience in B is appointed in A (Event G), and the second is two provinces getting de-linked when a party secretary with work experience in both A and B is replaced by one without such experience (Event L).

We estimate two event-study regressions:

$$\log V_{AB,t+1} = \sum_{\tau=-3}^{+3} \delta_{\tau}^{G} \mathbb{1}\{t - G_{AB} = \tau\} + f_{AB} + f_{A,t} + f_{B,t} + \varepsilon_{AB,t} \quad (4)$$

$$\log V_{AB,t+1} = \sum_{\tau=-3}^{+3} \delta_{\tau}^{L} \mathbb{1}\{t - L_{AB} = \tau\} + f_{AB} + f_{A,t} + f_{B,t} + \varepsilon_{AB,t}. \quad (5)$$

G_{AB} and L_{AB} denote the years in which event G and L happened (between provinces A and B), respectively, and $\mathbb{1}$ is an indicator function that takes the value of 1 if a province pair is in the τth year relative to the event (G or L), and 0 otherwise. The results from the regressions are visualized in Fig. 2. The top panel shows the estimates around the time of forming a dyadic linkage. We can see that two provinces that will soon be connected through the rotation of a party secretary do not

Table 3
Robustness checks for gravity estimation.

	(1) No DCM	(2) No Autonomous Prov	(3) No Prestigious Prov	(4) No Coal Prov	(5) No Coal Cargo	(6) No Iron Prov	(7) Alt Measure
$secretary_{AB,t-1}$	0.211**	0.140*	0.158**	0.164*	0.122*	0.140*	
	(0.085)	(0.075)	(0.075)	(0.097)	(0.070)	(0.078)	
$secretary_{BA,t-1}$	0.013	0.038	0.019	0.090	−0.035	−0.014	−0.006
	(0.075)	(0.064)	(0.080)	(0.073)	(0.057)	(0.066)	(0.061)
$governor_{AB,t-1}$	0.042	0.023	0.006	−0.124	−0.140	0.012	0.003
	(0.192)	(0.141)	(0.142)	(0.169)	(0.123)	(0.163)	(0.130)
$governor_{BA,t-1}$	−0.016	0.021	0.043	−0.012	−0.090	0.040	0.026
	(0.146)	(0.098)	(0.147)	(0.140)	(0.087)	(0.130)	(0.095)
$secretary_{AB,t-1}(alt)$							0.084**
							(0.040)
Adjusted R^2	0.95	0.96	0.96	0.95	0.94	0.95	0.95
Observations	11,050	11,050	11,832	10,353	14,788	13,311	14,790

Note: This table presents the robustness checks of the gravity estimation. The first three columns exclude province-pairs with directly-controlled municipalities, autonomous provinces, and prestigious provinces, respectively. Column 4 and 6 exclude main coal- and iron-producing provinces. Column 7 uses a less stringent measure of the connection associated with the rotation of provincial party secretaries. The dependent variable for Column 5 is the log of volume of railway cargo excluding coal transported from province A to province B at year t. For all other columns, the dependent variable is $\log V_{AB,t}$. All regressions include origin-year, destination-year, and province-pair fixed effects. Standard error clustered at province-pair level in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

exhibit significantly different levels of trade volume than other province pairs until the linkage actually materializes. Furthermore, the bottom of Fig. 2 suggests that the trade volume reverts back to normal in about two years after the two provinces are de-linked due to the departure of a connecting party chief.[12] These patterns suggest that the effects we are capturing are highly specific to the presence or absence of individual leaders who function as a bridge between provinces.

3.4. Robustness checks

We conduct a series of additional regressions to check the robustness of our benchmark analysis. The regression results are presented in Table 3. In the first column, we exclude province pairs that involve Direct-Controlled Municipalities (DCMs hereafter). The four DCMs in China (Beijing, Shanghai, Tianjin, and Chongqing) are province-level cities, so their geographical size and population are much smaller. Column 2 excludes autonomous regions, which are provinces with a significant share of minority ethnic groups. Excluding the DCMs and autonomous regions addresses the concern that province-level politicians appointed to these provinces may have specific patterns or specific policy goals (boosting economic activities among the ethnic groups, for example). Column 3 excludes destination provinces in which the provincial party secretaries are also members of the current Politburo. These party secretaries enjoy a higher political rank within the political system compared to other provincial party secretaries and governors. We can see that in all three columns, $secretary_{AB,t-1}$ remains statistically significant. None of the other three leader-rotation dummies, on the other hand, has a significant coefficient.

In China, the shipment of coal and iron ore makes up a substantial share of the railway cargo. We use regressions illustrated by Columns 4 to 6 to rule out the possibility that our main results are driven solely by changes in cargo flows of these two commodities. In Column 4, we exclude the top ten coal-producing provinces as the origin of cargo flow. In Column 5, we use the log of total volume of railway cargo minus coal as the dependent variable. In Column 6, we exclude observations with the top three provinces ranked by iron ore extraction as the origin.[13] Again, $secretary_{AB,t-1}$ remains statistically significant at 10% in all three regressions, and the other three linkage dummies do not have a significant coefficient.

In Column 7, to partly deal with the issue that only a small proportion of the observations record party secretaries rotating from the destination province to the origin province, we introduce an alternative measure of inter-provincial linkage with an expanded definition. This variable $secretary_{AB,t-1}(alt)$ takes the value of 1 as long as the party secretary of province A used to work in province B as a member of the provincial party standing committee.[14] From Column 7, we can see that the coefficient of $secretary_{AB,t-1}(alt)$ is still positive and significant at 5%, but with a smaller magnitude. This result is expected: members of the provincial standing committee are not as senior as party secretaries and governors and hence are less likely to build extensive local networks that can later be used to influence inter-provincial trade flows. However, since $secretary_{AB,t-1}(alt)$ records more leadership rotations across provinces, the resulting standard error is smaller than regressions with $secretary_{AB,t-1}$ in Table 1.

4. Trade creation or trade diversion?

In this section, we further explore the potential mechanisms behind our main results. Specifically, we are interested in understanding whether the observed increase in trade between linked provinces is due to trade creation or trade diversion. Trade creation refers to the scenario in which leadership rotations help to reduce trade frictions faced by firms in linked provinces. Alternatively, it is also possible that the party secretary arbitrarily increases the cost of exporting to all provinces except for those where he/she used to work, creating a scenario of trade diversion. We start by analyzing whether relocating provincial leaders will also affect railway cargo between other province pairs. We then provide additional evidence on the trade-boosting effects

[12] This result partially addresses the worry that unobserved policies from the central government may lead to both a relocation of the party secretary and the increase in trade flow. If this is the case, the positive effect on trade flow should not disappear after the end of the connection.

[13] We only exclude the top three because iron ore production in China is highly concentrated, with Liaoning, Hebei, and Sichuan accounting for almost half of the national production.

[14] The party standing committee in each province usually consists of 12 members, with the most senior two being the party secretary and the governor (always the first-ranked deputy party secretary). Summary statistics of the two measures of inter-provincial linkage are presented in Table A.1 in the Appendix.

of provincial leader rotation by analyzing two other complementary data sources. Results from both analyses support our findings in Section 3 and are consistent with the trade creation effect of provincial leader rotations.

4.1. Railway cargo flows to other provinces

The regression results presented in Section 3 are about the relative differences between provinces connected through leader rotation and unconnected provinces. Therefore, from those results we could not distinguish whether the effect of provincial party secretary rotation is due to trade creation or trade diversion. On one hand, if the provincial party secretary in province A used to work in province B, this connection could reduce the trade frictions faced by firms in province A when exporting to province B. On the other hand, it is also possible that the provincial party secretary arbitrarily increases the trade cost of exporting to other provinces, hence diverting trade from province A to province B. Both theories are consistent with the results presented in Section 3, yet their welfare effects are different: trade creation improves welfare by reducing frictions, whereas trade diversion generates distortions that reduces welfare.

To distinguish between the two mechanisms, we include in our regressions another dummy $secretary_{AO,t-1}$, which takes the value of 1 if province A has secretary-based linkage with any province O other than B in year t, and 0 otherwise.[15] Focusing on the effect of provincial party secretary rotation, the naive gravity equation now becomes:

$$\log V_{AB,t} = c + \beta_1 secretary_{AB,t-1} + \beta_2 secretary_{AO,t-1} + \beta_A \log Y_{A,t} + \beta_B \log Y_{B,t} + f_{AB} + year_t + \varepsilon_{AB,t},$$

whereas the structural gravity equation becomes

$$\log V_{AB,t} = c + \beta_1 secretary_{AB,t-1} + \beta_2 secretary_{AO,t-1} + f_{AB} + f_A + f_{B,t} + \varepsilon_{AB,t}.$$

In other words, β_1 captures the effect of the connection between province A and province B through the rotation of the party secretary in A as in the previous section, whereas β_2 captures the average effect of the connection between province A and other (non-B) provinces on railway cargo flows from A to B. Note that the fixed effects in the naive gravity equation is the same as in (1). However, because of the way we construct $secretary_{AO,t-1}$, we can only include the origin fixed effect f_A instead of the origin–year fixed effect f_{At} in the structural gravity equation.

The regression results are presented in Table 4. Column 1 follows the setup of naive gravity equation, Column 2 follows the structural gravity equation, and Column 3 uses PPML instead of OLS. In all three regressions, $secretary_{AO,t-1}$ is insignificant and the magnitude of the coefficient is much smaller compared to that of $secretary_{AB,t-1}$.[16] These results suggest that when A and B are connected through leader rotation, railway cargo flows from A to other provinces do not experience any significant change. We consider the results as evidence against the potential mechanism of trade diversion.

4.2. Major event records

Next, we move to analyzing each province's major event records for evidence of trade creation associated with provincial leadership rotations. As discussed in Section 2, the major event records document important political, economic, and social events that take place in a province in each year. We construct a variable, $Mentioning_{AB,t}$, to capture the total number of times the name of province B appears in the "major events" chapter of province A's official yearbook in year t. In addition to this count variable, we also construct several binary indicators to denote whether there is any mention of specific kinds of inter-provincial events, including business, government exchange, culture and sports, and joint transportation infrastructure projects. Similar to the analysis in previous sections, we focus on whether inter-provincial linkages established by provincial leaders' rotations have any effect on these outcomes.

Table 4
Trade creation or trade diversion.

Dependent variable:	(1) $logV_{AB,t}$	(2) $logV_{AB,t}$	(3) $V_{AB,t}$
$secretary_{AO,t-1}$	−0.016	0.001	0.038
	(0.020)	(0.018)	(0.029)
$secretary_{AB,t-1}$	0.158	0.164*	0.324**
	(0.097)	(0.093)	(0.128)
$\log GDP_{A,t}$	0.784***		
	(0.133)		
$\log GDP_{B,t}$	1.045***		
	(0.139)		
Year FE	✓		
Pair FE	✓	✓	✓
A and (B,t) FE		✓	✓
Method	OLS	OLS	PPML
Adjusted R^2	0.92	0.93	0.97
Observations	14,790	14,790	14,432

Note: All regression include $secretary_{BA,t-1}$, $governor_{AB,t-1}$, and $governor_{BA,t-1}$. $secretary_{AO,t-1}$ measures potential trade diversion effect of the linkage between province A and some other province on the railway cargo flow from province A to province B. Standard error clustered at province-pair level in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The results for the major event records are presented in Table 5. In Column 1, we follow the naive gravity equation and include pair and year fixed effects. Among the four dummies indicating rotation-induced linkages, only $secretary_{AB,t}$ has a positive and statistically significant coefficient at 5%. In other words, the effect of inter-provincial leadership linkages on $Mentioning_{AB,t}$ is again directional and only exists for party secretaries. Note that the effect of the rotation on major events is immediate. In Column 2, we further include the leadership linkage dummies with one-year lag, and $secretary_{AB,t}$ is still the only one with a significant coefficient. This is different from the effect on railway cargo flows illustrated in Section 3: When the party secretary of the origin province used to work in the destination province in year t, the railway cargo flow will increase in $t+1$. This difference in timing seems sensible: After a leadership rotation, it will take more time for the firms to reorganize their supply and sales networks (reflected in cargo trade) than to change other kinds of activities (joint conferences and official visits, for example) recorded in the major event records. In Column 3, we follow the structural gravity equation and use $f_{A,t}$ and $f_{B,t}$ to control for multilateral resistance terms. In Columns 4 and 5, we use a negative binomial regression instead of OLS. In all regressions, the coefficient of $secretary_{AB,t}$ is still positive and significant at 5%. By contrast, none of the other three types of leader-based linkages seem to have a stable and significant coefficient.

We then identify different types of events based on an extensive keyword search.[17] We categorize the entries of the major event records into four groups: business, inter-governmental exchange, transportation, and sports and culture. Table 6 reports the regression results using the same setup as Column 3 in Table 5. Column 1 of Table 6

[15] This approach is similar to Berger et al. (2013), which examines whether the increase in imports from the United States after CIA interventions is due to trade creation or trade diversion.

[16] Note that $secretary_{AB,t-1}$ also becomes insignificant in Column 1, but the p-value is a very close 0.102.

[17] The details of the keyword list and related examples can be found in Section D of the Appendix.

Table 5
Major event records.

	Dependent variable: Counts of B in A's Record				
	(1)	(2)	(3)	(4)	(5)
$secretary_{AB,t}$	0.184***	0.175**	0.152***	0.401***	0.386**
	(0.059)	(0.080)	(0.053)	(0.140)	(0.177)
$secretary_{BA,t}$	0.067	0.071	0.068	0.117	0.158
	(0.064)	(0.096)	(0.044)	(0.132)	(0.187)
$governor_{AB,t}$	0.081	0.172	0.050	0.299	0.372
	(0.085)	(0.163)	(0.121)	(0.388)	(0.421)
$governor_{BA,t}$	0.101	0.060	0.057	0.107	−0.002
	(0.144)	(0.215)	(0.104)	(0.234)	(0.380)
$secretary_{AB,t-1}$		0.027			0.033
		(0.071)			(0.187)
$secretary_{BA,t-1}$		−0.031			−0.118
		(0.080)			(0.190)
$governor_{AB,t-1}$		−0.146			−0.262
		(0.137)			(0.502)
$governor_{BA,t-1}$		0.160			0.194
		(0.191)			(0.355)
$\log GDP_{A,t}$	−0.021	−0.020		−0.031	−0.012
	(0.082)	(0.089)		(0.072)	(0.075)
$\log GDP_{B,t}$	−0.003	−0.028		0.664***	0.668***
	(0.073)	(0.077)		(0.063)	(0.065)
$\log POP_{A,t}$	−0.213*	−0.273**		−0.209**	−0.217**
	(0.112)	(0.127)		(0.085)	(0.088)
$\log POP_{B,t}$	0.909***	0.941***		−0.642***	−0.631***
	(0.163)	(0.178)		(0.066)	(0.068)
Method	OLS	OLS	OLS	NB	NB
Year FE	✓	✓	✓	✓	✓
Pair FE	✓	✓		✓	✓
(A,t) and (B,t) FE			✓		
Observations	11,256	10,584	13,328	10,720	10,036

Note: This table reports regression results using each province's major event record. The dependent variable is the total number of times the name of province B appears in the "major events" chapter of province A's official yearbook in year t. The first three columns are OLS regressions whereas the last two are negative binomial regressions. Standard error clustered at province-pair level in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 6
Major event records by categories.

	(1) Total Counts	(2) Business	(3) Government	(4) Transportation	(5) Sports & Culture
$secretary_{AB,t}$	0.152***	0.098***	0.043*	0.002	0.026
	(0.053)	(0.037)	(0.024)	(0.014)	(0.027)
$secretary_{BA,t}$	0.068	0.049	0.025	−0.010	0.031
	(0.044)	(0.034)	(0.031)	(0.022)	(0.027)
$governor_{AB,t}$	0.050	0.028	0.009	−0.008	−0.056
	(0.121)	(0.042)	(0.054)	(0.031)	(0.066)
$governor_{BA,t}$	0.057	−0.059	0.001	−0.100*	0.002
	(0.104)	(0.069)	(0.087)	(0.054)	(0.068)
Adjusted R^2	0.62	0.41	0.31	0.31	0.37
Observations	13,328	13,328	13,328	13,328	13,328

Note: The dependent variable in Column 1 is total counts. From Column 2 to Column 5, the dependent variable is the total number of times of province B appears in entries that belong to a certain category in province A's major event record at year t. All regressions include origin-year, destination-year, and province-pair fixed effects. Standard error clustered at province-pair level in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

uses total counts as the dependent variable and is included for comparison purposes. From Column 2 to Column 5, the dependent variable is $Mentioning^{C}_{AB,t}$, the total number of times the name of province B appears in entries that belong to category C in the "major events" chapter of province A's official yearbook in year t. We can see that the coefficient of $secretary_{AB,t}$ is positive and significant if the mentions are related to business or inter-governmental exchange, whereas other linkage dummies do not have significant coefficients in any regression. As expected, mentions related to sports and culture do not change significantly when a provincial party secretary is relocated from province B to province A. Interestingly, mentions related to transportation, such as high-speed rail, highway, and civil aviation, also do not change significantly with the presence or absence of an inter-provincial leadership linkage. This is probably because large infrastructure projects related to transportation are often planned and implemented at the national level. It thus appears that the positive effect of leadership linkage on railway

Table 7
Establishment of Regional Chambers of Commerce.

	Event: A establishing RCoC to host merchants from B			
	(1)	(2)	(3)	(4)
$secretary_{AB,t}$	0.664***	0.567**	0.618**	0.494**
	(0.245)	(0.239)	(0.255)	(0.242)
$secretary_{BA,t}$	0.181	0.490	0.147	0.451
	(0.299)	(0.307)	(0.300)	(0.312)
$governor_{AB,t}$	−0.300	0.437	−0.373	0.363
	(0.644)	(0.421)	(0.660)	(0.435)
$governor_{BA,t}$	0.668	1.145**	0.659	1.115**
	(0.412)	(0.547)	(0.419)	(0.566)
$\log GDP_{A,t}$	−0.073		−0.111	
	(0.053)		(0.198)	
$\log GDP_{B,t}$	0.879***	0.875***	1.218***	1.311***
	(0.062)	(0.060)	(0.202)	(0.215)
$logV_{AB,t}$	0.061*	0.272***	0.160	0.391**
	(0.036)	(0.052)	(0.138)	(0.192)
$logV_{BA,t}$	−0.043	−0.111**	−0.334**	−0.551***
	(0.039)	(0.046)	(0.152)	(0.184)
$\log dist_{AB}$	−0.199**	−0.229**	−0.214**	−0.273**
	(0.099)	(0.113)	(0.099)	(0.115)
contiguous	−0.058	−0.176	−0.062	−0.175
	(0.149)	(0.156)	(0.151)	(0.159)
time-variant controls				
$\log GDP_{A,t}$			0.005	−0.001
			(0.018)	(0.042)
$\log GDP_{B,t}$			−0.033*	−0.042**
			(0.019)	(0.020)
$logV_{AB,t}$			−0.009	−0.011
			(0.013)	(0.017)
$logV_{BA,t}$			0.027**	0.039**
			(0.013)	(0.016)
Stratified by A		✓		✓
χ^2	282.09	400.87	303.42	1960.73
Observations	10,463	10,463	10,463	10,463

Note: This table report estimates of the establishment of regional chambers of commerce using a Cox hazard model. An event is defined as the origin province setting up an regional chamber of commerce to host merchants from the destination province at time *t*. Standard error clustered at province-pair level in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

cargo flows is at least partly due to an increase in business and inter-governmental activities, which could potentially reduce trade frictions between connected provinces.

4.3. Regional chambers of commerce

In addition to the major event records, we also examine how provincial leadership rotation promotes inter-provincial business activities through the establishment of RCoCs. RCoCs are voluntary associations formed by private entrepreneurs with common hometown origins. Typically, members of an RCoC use this platform to share information, seek legal and financial assistance, and organize other collective undertakings important for their business operations (Yu and Zhou, 2012). These functions can often help to lower trade frictions between provinces.

Since a province usually only establishes one RCoC in another province, survival models are the most appropriate for this kind of time-to-event analysis. The model we use here is the Cox proportional hazard model, a semi-parametric model that does not require us to specify the hazard function. Let λ denote the hazard function, then λ takes the following form:

$$\lambda(t, X_{1t}, X_2) = \lambda_0(t)\exp(X_{1t}\cdot\beta_1 + X_2\cdot\beta_2), \quad (6)$$

where X_{1t} and X_2 are time-varying and time-independent covariates, respectively. Our goal is to use this hazard model to examine whether inter-provincial leadership linkage affects the probability of setting up an RCoC. The regressions represented by the first and third columns are also stratified according to the origin province. Column 2 is not stratified, so we also control for the origin province's GDP and total population.

Table 7 displays the regression results related to the RCoC data. In all four estimations, an event is defined as province *A* establishing an RCoC to host merchants from province *B* at year *t*. The first two columns represent Cox hazard models with time-independent effects only, while the last two columns include controls with time-dependent effects. Column 1 and Column 3 are not stratified, whereas Column 2 and Column 4 are stratified by the province in which the RCoC was established. In all four columns, the dummy indicating that province *A*'s party secretary used to work in province *B* has a positive and significant coefficient. The other three dummies of leadership linkage do not exhibit any stable pattern. In other words, if the party secretary in province *A* used to work as party secretary in province *B*, province *A* is more likely to set up an RCoC to boost economic activities associated with merchants from province *B*. In addition, in all four specifications, province A is more likely to set up an RCoC to host merchants from province B if *A* is closer and *B* is more developed economically.

Estimation results presented in this section not only corroborate the results of the gravity regressions in Section 3, but also provide plausible explanations as to why the rotation of provincial party secretaries can affect domestic trade flows. The analysis of the major event records implies that such rotation leads to more socioeconomic activities between the origin and destination provinces of the rotation, especially activities related to business and inter-governmental exchange.

Moreover, the relocation of a party secretary also increases the probability of establishing an RCoC, a major role of which is precisely to facilitate inter-provincial business activities. Analysis of both the major event records and the RCoCs finds a directional pattern that is consistent with the results of the gravity regressions in Section 3.

Existing studies suggest that there may be two possible channels through which political leaders may be incentivized to influence economic activities in the context of China. The first one is rent-seeking: political leaders offer preferential treatments to connected merchants for both financial or other forms of return (Bai et al., 2014, 2019; Pei, 2016; Nian and Wang, 2019). The other possibility is that politicians are driven by career incentives to promote local economic growth (Chen et al., 2005; Li and Zhou, 2005; Jia et al., 2015; Persson and Zhuravskaya, 2016). To distinguish between the roles of these two channels would be an interesting extension. However, we have not been able to find definitive and direct evidence in favor of one channel over the other, partly because of the relatively small number of province-level rotations. We leave this question for future researchers to explore.[18]

5. Quantitative trade model

The preceding analyses show that cross-provincial linkages established by provincial party secretaries' rotations have a discernible impact on inter-provincial economic activities. A question that remains is: what are the exact welfare consequences of rotating top provincial leaders? To answer this question, we first construct a multi-region, multi-sector Ricardian trade model that captures economic activities between Chinese provinces and Rest of World. The model also incorporates input-output linkages like in Caliendo and Parro (2015) to capture both the direct and indirect effects of trade cost changes. We then calibrate the model using data from 2012 so that the effect of provincial leadership rotation on domestic trade flows matches with the empirical results in Section 3. We find that, if provincial leadership rotations affect domestic trade only through trade creation, connecting two provinces through provincial leader rotation is equivalent to an ad valorem trade cost reduction of 3.9%. In addition, removing the factual inter-provincial links leads to an average welfare loss of 0.03%. Whereas we find no evidence of trade diversion in the empirical analysis, this scenario is also considered in the counterfactual exercise in this section.

5.1. Setup

The economy consists of N provinces in China and one Rest of World. Each location has J sectors. Locations are denoted by i and n, whereas sectors are denoted by j and k. The preferences of the households are given by

$$u(C_n) = \prod_{j=1}^{J} (C_n^j)^{\alpha_n^j}, \qquad \text{where } \sum_{j=1}^{J} \alpha_n^j = 1.$$

A continuum of intermediate goods $\omega^j \in [0,1]$ is produced in each sector j. The production of each ω^j requires two types of inputs: labor and composite intermediate goods. Let $z_n^j(\omega^j)$ denote the efficiency of producing intermediate ω^j in country n. The production function of ω^j can then be written as:

$$q_n^j(\omega^j) = z_n^j(\omega^j)[l_n^j(\omega^j)]^{\gamma_n^j} \prod_{k=1}^{J} [m_n^{k,j}(\omega^j)]^{\gamma_n^{k,j}},$$

where l_n^j is labor and $m_n^{k,j}(\omega^j)$ is the composite intermediate good from sector k used for the production of intermediate good ω^j. The parameter $\gamma_n^{k,j}$ is the share of materials from sector k used in the production of intermediate good ω^j, with $\sum_{k=1}^{J} \gamma_n^{k,j} = 1 - \gamma_n^j$ being the share of value added. Both value-added shares and intermediate goods shares vary across countries and sectors.

Production of intermediates is at constant returns to scale and the market is perfectly competitive. Firms price at unit cost $c_n^j / z_n^j(\omega^j)$, where c_n^j denotes the cost of an input bundle:

$$c_n^j = \Upsilon_n^j w_n^{\gamma_n^j} \prod_{k=1}^{J} (P_n^k)^{\gamma_n^{k,j}}, \tag{7}$$

where P_n^k is the price of a composite intermediate good from sector k, and $\Upsilon_n^j \equiv \prod_{k=1}^{J} (\gamma_n^{k,j})^{-\gamma_n^{k,j}} (\gamma_n^j)^{-\gamma_n^j}$ is a constant.

Producers of composite intermediate goods in sector j, country n supply Q_n^j at minimum cost by purchasing ω^j from the lowest cost suppliers across the regions. The production function is given by:

$$Q_n^j = \left[\int r_n^j(\omega^j)^{1-1/\sigma^j} d\omega^j \right]^{\sigma_j/(\sigma_j-1)},$$

where σ^j is the elasticity of substitution within sector j and $r_n^j(\omega^j)$ is the demand for intermediate goods ω^j from the lowest cost supplier. Solving the cost minimization problem of the composite good producer gives:

$$r_n^j(\omega^j) = \left(\frac{p_n^j(\omega^j)}{P_n^j} \right)^{\sigma^j} Q_n^j,$$

where $P_n^j = \left[\int p_n^j(\omega_j)^{1-\sigma^j} d\omega^j \right]^{1/(1-\sigma^j)}$ is the price of the composite intermediate good and $p_n^j(\omega^j)$ denotes the lowest price of intermediate good ω^j across all locations n. Composite intermediate goods from sector j are used as materials for the production of intermediate good ω^k in the amount $m_n^{j,k}(\omega^k)$ in all sectors k, and as final goods in consumption C_n^j. Hence, the market clearing condition for the composite intermediate good in sector j is

$$Q_n^j = C_n^j + \sum_{k=1}^{J} \int m^{j,k}(\omega^k) d\omega^k.$$

Trade in goods across locations is costly, and the iceberg trade cost of sector j good imported by country n from country i is represented by κ_{in}^j.[19] One unit of a tradable intermediate good ω^j produced in country i is available in country n at unit price $c_i^j \kappa_{in}^j / z_i^j(\omega^j)$. The price of ω^j in country n is given by $p_n^j(\omega^j) = \min_i \{ c_i^j \kappa_{in}^j / z_i^j(\omega^j) \}$. For non-tradables, assume $\kappa_{in}^j = \infty$ so that $p_n^j(\omega^j) = c_n^j / z_n^j(\omega^j)$.

Assume the productivity of ω^j in country n is the realization of a Frechét distribution with location parameter $\lambda_n^j > 0$ and shape parameter θ^j. Following the interpretation of Eaton and Kortum (2002), a higher λ_n^j represents absolute advantage, whereas a smaller θ^j implies a higher dispersion of productivity and hence comparative advantage. We assume that the distributions of productivities are independent across goods, sectors, and countries, and $1 + \theta^j > \sigma^j$. Given these assumptions, the price of the composite intermediate good is

$$P_n^j = A^j \left[\sum_{i=1}^{N} \lambda_i^j (c_i^j \kappa_{in}^j)^{-\theta_j} \right]^{-1/\theta_j}, \tag{8}$$

[18] Shi et al. (2019) provide some evidence for the rent-seeking mechanism. They find that the effect of prefecture-level leadership rotation on cross-regional investments is stronger in high-rent sectors, and that the survival rate of connected firms is higher than unconnected ones as long as the former's political patron is still in the locality.

[19] Note that in Caliendo and Parro (2015), the iceberg trade cost of sector j good imported by country n from country i is denoted by κ_{ni}^j. We use κ_{in}^j instead so that the notations of origin and destination are consistent with the empirical analysis in this paper.

where A^j is a constant. For non-tradable sectors, we have $P_n^j = A^j \lambda_n^{j-1/\theta_j} c_n^j$ because of infinite trade costs. The consumer price index is $P_n = \prod_{j=1}^J (P_n^j/\alpha_n^j)^{\alpha_n^j}$.

Total expenditure in sector j is given by $X_n^j = P_n^j Q_n^j$. Let $\pi_{in}^j = X_{in}^j/X_n^j$ denote country n's share of expenditure on sector j goods from country i. Using the properties of the Frechét distribution, we have

$$\pi_{in}^j = \frac{\lambda_i^j (c_i^j \kappa_{in}^j)^{-\theta^j}}{\sum_{h=1}^N \lambda_h^j (c_h^j \kappa_{ih}^j)^{-\theta^j}}, \tag{9}$$

In equilibrium, X_n^j is the sum of expenditure on composite intermediate goods by firms and the expenditure by households. In other words, we have

$$X_n^j = \sum_{k=1}^J \gamma^{j,k} \sum_{i=1}^N X_i^k \pi_{ni}^k + \alpha_n^j I_n, \tag{10}$$

where household income I_n satisfies $I_n = w_n L_n + D_n$. D_n represents country n's national deficit and is the sum of sectoral deficits, so $D_n = \sum_{k=1}^J D_n^k$. Sectoral deficits are defined by $D_n^j = \sum_{i=1}^N M_{in}^j - \sum_{i=1}^N E_{in}^j$, where $M_{in}^j = X_n^j \pi_{in}^j$ and $E_{in}^j = X_i^j \pi_{ni}^j$. Lastly, the definition of trade deficit gives

$$\sum_{j=1}^J \sum_{i=1}^N X_n^j \pi_{in}^j - D_n = \sum_{j=1}^J \sum_{i=1}^N X_i^j \pi_{ni}^j. \tag{11}$$

We can substitute (10) into (11) to derive the labor market clearing condition:

$$w_n L_n = \sum_{j=1}^J \gamma_n^j \sum_{i=1}^N X_i^j \pi_{ni}^j. \tag{12}$$

Given parameters L_n, D_n, λ_n^j, and κ_{in}^j, an equilibrium is a wage vector w_n and price P_n^j, which satisfies equilibrium conditions (7), (8), (9), (10), and (12). Using the "exact hat algebra" technique popularized by Dekle et al. (2007), we can express the equilibrium conditions in changes:

$$\hat{c}_n^j = (\hat{w}_n)^{\gamma_n^j} \prod_{k=1}^J (\hat{P}_n^k)^{\gamma_n^{k,j}} \tag{13}$$

$$\hat{P}_n^j = \left[\sum_{i=1}^N \pi_{in}^j (\hat{\kappa}_{in}^j \hat{c}_i^j)^{-\theta_j} \right]^{-1/\theta_j} \tag{14}$$

$$\hat{\pi}_{in}^j = \left(\frac{\hat{c}_i^j \hat{\kappa}_{in}^j}{\hat{P}_n^j} \right)^{-\theta^j} \tag{15}$$

$$X_n^{j\prime} = \sum_{k=1}^J \gamma_n^{j,k} \sum_{i=1}^N X_i^{k\prime} \pi_{ni}^{k\prime} + \alpha_n^j I_n' \tag{16}$$

$$\hat{w}_n = \sum_{j=1}^J \gamma_n^j \sum_{i=1}^N \frac{X_i^{j\prime} \pi_{ni}^{j\prime}}{w_n L_n}, \tag{17}$$

where $I_n' = \hat{w}_n w_n L_n + D_n$. This equilibrium in changes is defined by $\hat{w}_n$ and $\hat{P}_n^j$ that satisfy equations (13)-(17). Compared to the original set of equilibrium conditions, now we only need data on bilateral trade shares π_{in}^j, the share of value added in production γ_n^j, value added $w_n L_n$, the share of intermediate consumption $\gamma_n^{k,j}$, and sectoral productivity dispersion θ^j.

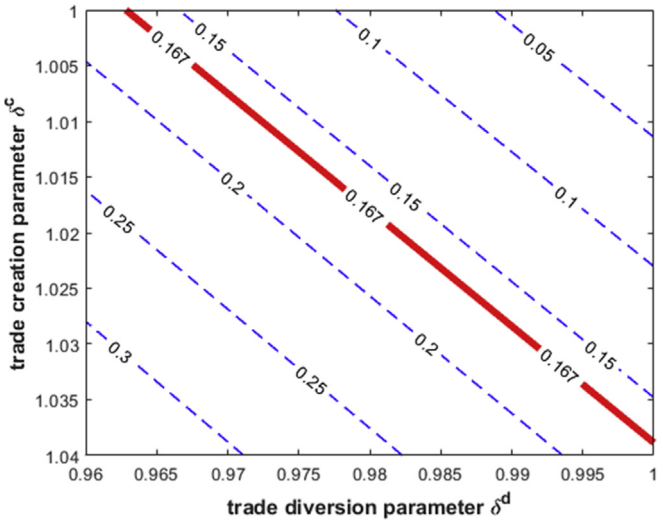

Fig. 3. Coefficient of the Leadership Rotation Given δ^c and δ^d. Note: This figure plots the coefficient of the provincial linkage variable using various values of (δ^c, δ^d). The red line highlighted in the figure represents the targeted value from the empirical analysis. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

5.2. Data and calibration

We rely on the Chinese multi-regional input-output (MRIO) table for 2012 to obtain trade data between Chinese provinces. The MRIO table provides inter-regional and inter-sectoral economic flows among 30 economic sectors in China's 30 regions (excluding Tibet). Details on how this dataset is constructed can be found in Mi et al. (2018).[20] We further merge the sectors into three main sectors: agriculture, manufacturing, and services. The service sector is assumed to be non-tradable, whereas the other two are tradable. Relying on the procedure discussed in Caliendo and Parro (2015), we can back out the required trade shares π_{in}^j, the share of value added γ_n^j, value added $w_n L_n$, and the share of intermediate consumption $\gamma_n^{k,j}$. We choose the productivity dispersion θ^j for agriculture and manufacturing to be 9.11 and 4, respectively, following the estimation in Caliendo and Parro (2015) and Simonovska and Waugh (2014). Trade flows of Rest of World are obtained from the World Input Output Database, whereas the input-output linkage follows the calibration in Fan (Forthcoming).

To perform counterfactual exercises using the quantitative trade model constructed, we also need to calibrate how trade costs are affected by the provincial leadership rotation. Although we find no evidence of trade diversion in the empirical analysis, we allow this possibility in the quantitative exercise. In particular, let $d_{in} = \{0,1\}$ denote whether the provincial party secretary of province i used to work in province n. We further assume that $\kappa_{in}^j(d_{in}=0) = \delta^c \kappa_{in}^j(d_{in}=1)$ and $\kappa_{im}^j(d_{in}=0) = \delta^d \kappa_{im}^j(d_{in}=1)$ $\forall m \neq n$. Superscripts c and d of parameter δ represent trade creation and diversion, respectively. For example, the provincial party secretary in Chongqing used to work in Liaoning. This connection may reduce the trade cost from Chongqing to Liaoning (trade creation) or increase the trade cost from Chongqing to other provinces in China (trade diversion). In other words, the connection between province i and province n through leadership rotation does not

[20] We acknowledge that the MRIO table from Mi et al. (2018) is constructed from the provincial input-output tables using the gravity model. Unfortunately, we are not aware of any other source that provides inter-provincial trade data in China. The measurement errors introduced are alleviated to some extent when we merge 30 sectors into three main sectors.

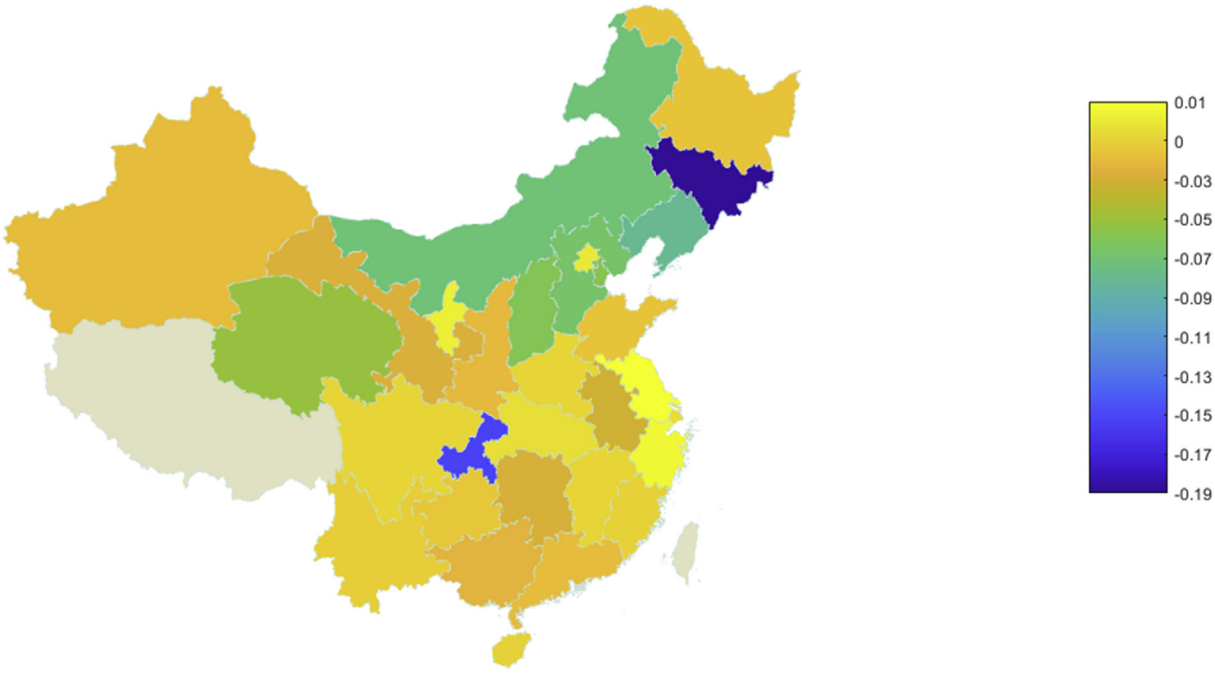

Fig. 4. Percentage Welfare Changes with Trade Creation Only. Note: This figure presents the percentage welfare changes of Chinese provinces in the counterfactual equilibrium in which the 17 connected province pairs are broken. In this scenario, the linkage between provinces through provincial leader rotation only has a trade creation effect.

only affect κ_{in}^{j} but also affects trade costs between province i and other provinces. Trade creation of the provincial leadership rotation requires $\delta^c > 1$, whereas trade diversion requires $\delta^d < 1$.

To calibrate δ^c and δ^d, we first identify the 17 province pairs with $d_{in} = 1$ in 2011. For each possible value of (δ^c, δ^d), we can solve for the counterfactual equilibrium in which the connected province pairs in the factual equilibrium are no longer connected. This is done by computing $\widehat{\kappa}_{in}^{j}$ for the 17 province pairs given (δ^c, δ^d), and then solving the system of equation (13)—(17). Next, we run the following regression equation using the change of log trade flow for both the treated province pairs and other provinces pairs relative to the factual equilibrium:

$$\Delta \log V_{in} = c + \beta \Delta d_{in} + f_n + f_i + \varepsilon, \tag{18}$$

where $V_{in} = X_{in}^{1} + X_{in}^{2}$ is the total trade flow from province i to province n since the service sector is non-traded. This regression equation can be thought of as the cross-sectional version of equation (3). For each counterfactual equilibrium corresponding to a specific pair of (δ^c, δ^d), we can conduct the counterfactual exercise with connections being removed and run this regression to generate a coefficient β.

We experiment with different values of (δ^c, δ^d), and the resulting coefficients are presented in Fig. 3. We can see that, as expected, the estimated coefficient is increasing in δ^c and decreasing in δ^d. In addition, the contour lines representing the same value of coefficients are almost linear. We match β estimated in equation (18) with the coefficient in column 2 of Table 2, which indicates that the change in railway cargo volumes for the connected province pairs are 16.7% more compared to those with $d_{in} = 0$. The corresponding contour line highlighted in Fig. 3 shows that $\delta^c = 1.039$ if there is no trade diversion, whereas $\delta^d = 0.963$ if there is no trade creation.

5.3. Counterfactual exercise: Trade Creation Only

With the calibrated model, we first explore the effect of leadership rotation in the benchmark case in which there is only a trade creation effect. In other words, we compute the trade flows and welfare changes in the counterfactual scenario in which the 17 connected province pairs in the factual equilibrium are no longer connected and hence experience a uni-directional increase in trade cost by 3.9%. Trade frictions between other provinces as well as to and from Rest of World remain unchanged. The percentage welfare changes in each province are illustrated in Fig. 4. In the counterfactual equilibrium, almost all provinces incur a welfare loss as a result of higher trade frictions between the previously connected provinces. The two provinces that experience the largest welfare loss are Jilin (0.19%) and Chongqing (0.15%), both of which are connected to other provinces through leadership rotations in the factual equilibrium. Meanwhile, the exports and imports of the Chinese provinces decrease by less than 0.1%, and the welfare of Rest of World actually does not change significantly. Overall, the average welfare loss for all Chinese provinces in this counterfactual scenario is 0.03%.

Next, we explore whether the 17 connected province pairs in the factual equilibrium reflect the welfare-maximizing objective of the Chinese central government. To do so, we first compute the counterfactual equilibrium in which the 17 connected province pairs are removed. Next treating this counterfactual equilibrium as a new "factual" equilibrium, we randomly draw 17 province pairs 1000 times and compute the corresponding welfare changes relative to the new "factual" equilibrium.[21] For each random draw, we can calculate the average welfare change of the 30 Chinese provinces (weighted by expenditure), and the resulting histogram is presented in Fig. 5. We can see that the welfare improvement brought about by the 17 factual province pairs is close to the left end of the distribution. It appears that the leadership rotations that connect these province pairs in 2011 are not driven by the welfare

[21] Note that because of the discrete nature of this policy, we cannot apply the method of mathematical programming with equilibrium constraints (MPEC) used in Ossa (2014), Mei (2019), and Mei (2020) to compute optimal leadership rotations.

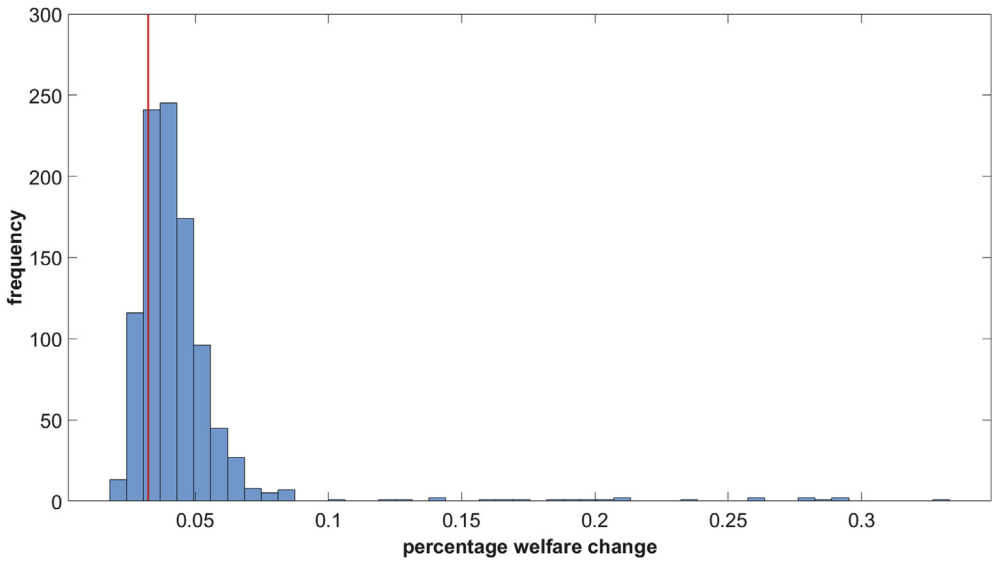

Fig. 5. Randomly Generated Connected Province Pairs with Trade Creation. Note: This figure plots the average welfare improvement of Chinese provinces by randomly drawing 17 province pairs 1000 times. The calculated welfare improvement is relative to the counterfactual equilibrium in which the 17 province pairs connected in reality are removed. The red vertical line represents the average welfare improvement from connecting 17 factual province pairs. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

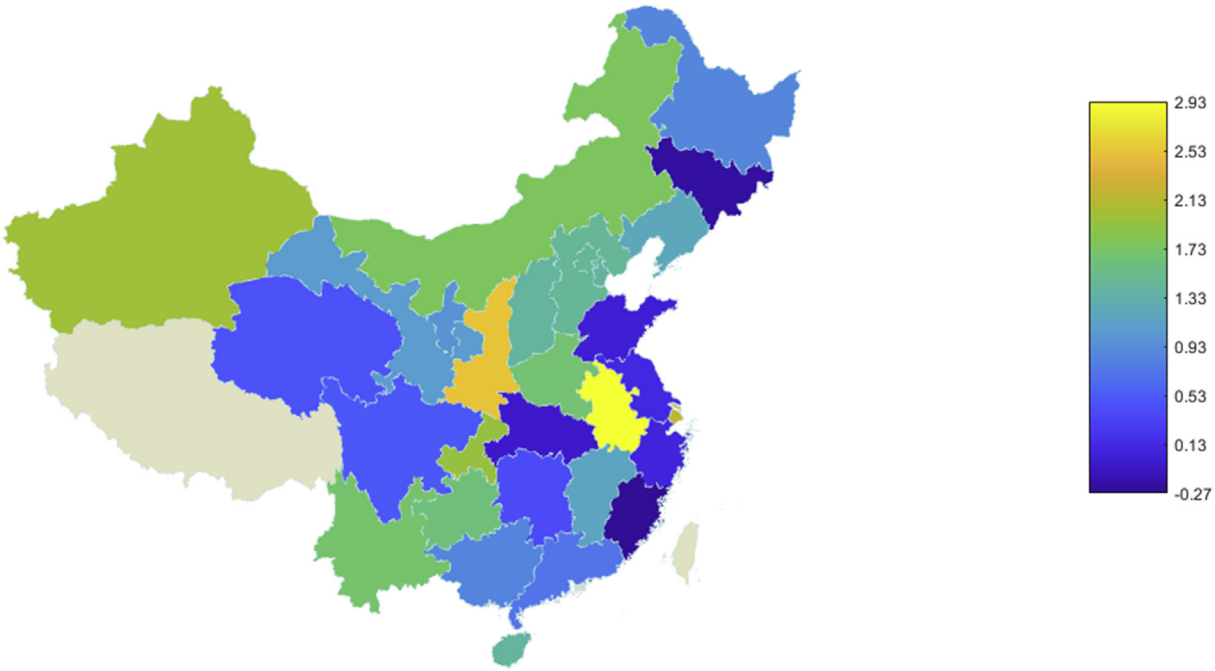

Fig. 6. Percentage Welfare Changes with Trade Diversion Only. Note: This figure presents the percentage welfare changes of Chinese provinces in the counterfactual equilibrium in which the 17 connected province pairs are broken. In this scenario, the linkage between provinces through provincial leader rotation only has a trade diversion effect.

maximizing objective of the central government in China.[22]

5.4. Counterfactual exercise: trade creation and trade diversion

After analyzing the benchmark case in which only trade creation is considered, we move on to analyze the case of trade diversion. In this scenario, we set $\delta^c = 1$ and $\delta^d = 0.963$. The percentage welfare changes in each province in the counterfactual equilibrium in which the 17 province pairs disconnect are shown in Fig. 6. Note that in this case, most provinces in China experience an improvement in welfare. The rationale behind this is straightforward: in this trade diversion scenario, removing the connection between the 17 provinces decreases the uni-directional trade costs from the origin of these pairs to all other provinces. Moreover, note that the magnitude of welfare changes shown in Fig. 6 is larger than those in Fig. 4. This is also expected, because each connected province pair only reduces the uni-directional trade cost between that pair in the trade creation case, but increases the trade cost of the other 28 province pairs in the trade diversion case.

We also consider scenarios in which provincial leadership rotations lead to both trade creation and trade diversion. In other words, after analyzing the welfare changes in the two cases representing the two ends of the red line in Fig. 3, we want to also study how the results change along that line. The average and range of welfare changes of

[22] We also conduct the same exercise in the trade diversion scenario in the Appendix. Again, there is no clear evidence of welfare-maximizing objective when leadership rotations create trade diversion only. See Section E in the Appendix for more details.

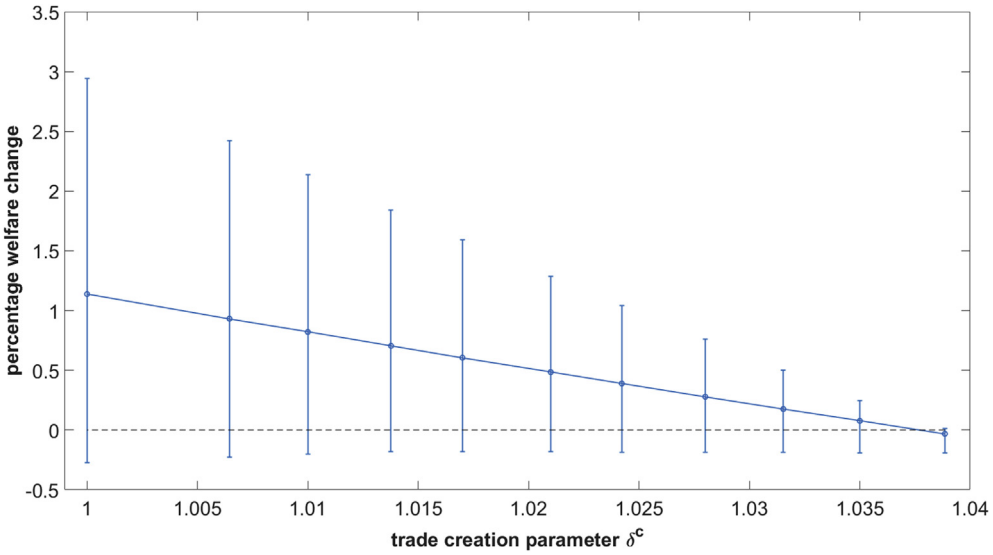

Fig. 7. Percentage Welfare Changes with Both Trade Creation and Trade Diversion. Note: This figure plots the average and range of welfare changes in Chinese provinces as a result of removing provincial linkages for different values of δ^c and δ^d. $\delta^c = 1$ means there is only trade diversion and $\delta^c = 1.039$ means there is only trade creation.

Chinese provinces in the counterfactual equilibrium are presented in Fig. 7. The two ends of the plot represent the case with only trade diversion depicted in Fig. 6 and the case with only trade creation depicted in Fig. 4, respectively. We can see that, as δ^c increases, the welfare improvement in Chinese provinces gradually shrinks in magnitude. Also note that both the range and average of welfare change in the trade diversion only scenario ($\delta^c = 1$, $\delta^d = 0.963$) are much larger than those in the trade creation scenario ($\delta^c = 1.039$, $\delta^d = 1$). This is because of the way we define trade creation and diversion in the model: when the connection between province i and n is broken, only κ^j_{in} increases in the case of trade creation. However, κ^j_{im} decreases $\forall m \neq n$ in the case of trade diversion.

6. Conclusion

Political institutions are widely viewed as an important determinant of a country's economic performance, yet our understanding of the underlying mechanisms is still relatively limited. Most of the existing research in the political economy literature focuses on two roles of institutions: to constrain the discretionary power of the political sovereignty (North and Weingast, 1989; Gehlbach and Keefer, 2011, 2012; Weingast, 1995) and to establish trust and reputation among peer economic actors (Milgrom et al., 1990). This paper examines the economic impact of a less well studied aspect of political institutions: the cross-regional rotation of public officials. In particular, we explore the effects of political leaders on domestic trade by using the cadre rotation system in China. Regression results show that when a provincial party secretary is relocated to a new province, the volume of railway cargo flows from the new province to the old province increases, but not vice versa. Complementary analyses using major event record data and the establishment of RCoCs corroborate this result. We also construct a multi-sector, multi-region, general equilibrium trade model to quantify the welfare effects of the inter-provincial links associated with the cadre rotation. Whereas we do not find any evidence of trade diversion, we consider both scenarios in the quantitative exercise.

This paper suggests a new channel through which political leaders can influence economic activities: by reducing trade frictions between provinces and promoting regional integration. Our findings can be thought of as new evidence linking domestic trade barriers to government activities. Moreover, one can also link this paper to studies on firm structure. It would be interesting to examine whether similar rotation of personnel within firms can reduce frictions across establishments or departments.

CRediT authorship contribution statement

Junyan Jiang: Conceptualization, Methodology, Formal analysis, Data curation, Writing - original draft, Writing - review & editing, Visualization. **Yuan Mei:** Conceptualization, Methodology, Formal analysis, Data curation, Writing - original draft, Writing - review & editing, Visualization.

Appendix

A. Summary Statistics of Leader Rotation

Column 1 of Table A.1 reports the total number of provincial party secretaries and governors in out dataset. Column 2 and 3 report the mean and standard deviation of their respective term lengths. The following two columns record the number of times a provincial party secretory or governor worked as party secretory or governor in other provinces. In the last three columns, we present the number of times a provincial party secretary or governor worker as a member of provincial standing committee in other provinces, which corresponds to the measure $secretary_{AB,t-1}(alt)$ used on Column 7 of Table 3.

Table A.1
Summary Statistics

	Total	Term Length		Rotation (Leader)		Rotation (Committee)		
		Mean	SD	Once	Twice	Once	Twice	Thrice
Party Secretary	115	3.9	2.1	37	7	59	18	1
Governor	146	3.6	1.9	3	0	56	1	0

B. Identification Strategy and Leadership Rotations

The identification assumption of the gravity regressions is that the rotation of provincial party secretaries is orthogonal to economic fundamentals that affect bilateral trade flows. We conduct various tests to check the validity of this assumption, and the results are presented in Table A.2. For all six regressions, the dependent variable is an event dummy that indicates whether the party secretary of the origin province moves to the destination province the following year. The standard errors are clustered at party secretary level. We also control for the level and growth of GDP, total population, railway cargo volume, distance, and contiguity whenever possible.

The first three columns of Table A.2 are logit regressions that make use of the full sample. Both Column 1 and Column 2 include year fixed effect, but Column 2 excludes DCM observations. Column 3 introduces a party secretary fixed effect by grouping together observations for each party secretary.[23] Note that while in some regressions the GDP or GDP growth rate of the origin province is significant, none of the variables related to the destination of the rotation are significant. The volume of railway cargo flow, distance and contiguity are also insignificant in all three regressions. In other words, even though the economic performance of the party secretary's current province may have some predictive power on when he or she will rotate, no variable can predict which province will be the destination of the rotation.

Table A.2
Evidence on Exogeneity of Leadership Rotation

	Dependent variable: Party secretary moving from A to B at t+1					
	(1)	(2)	(3)	(4)	(5)	(6)
$\log GDP_{A,t}$	−0.455	−0.096	−1.351**			
	(0.428)	(0.921)	(0.614)			
$\log GDP_{B,t}$	0.550	0.160	0.684	0.571	0.549	0.018
	(0.425)	(0.613)	(0.453)	(0.456)	(0.437)	(0.016)
$\log pop_{A,t}$	0.229	−0.559	0.132			
	(0.413)	(1.056)	(0.962)			
$\log pop_{B,t}$	−0.055	0.460	−0.198	−0.115	−0.150	−0.008
	(0.511)	(0.806)	(0.516)	(0.541)	(0.528)	(0.019)
A's % ΔGDP	14.202**	18.420**	17.254*			
	(6.718)	(8.156)	(9.326)			
B's % ΔGDP	−8.534	−10.778	−13.474	−8.434	−8.260	−0.263
	(10.306)	(12.342)	(8.221)	(10.735)	(10.313)	(0.307)
$\log V_{AB,t}$	−0.041	0.141	0.024	0.048	0.096	0.004
	(0.211)	(0.258)	(0.196)	(0.155)	(0.231)	(0.007)
$\log dist_{AB}$	−0.524	−0.442	−0.559	−0.580	−0.616	−0.021
	(0.501)	(0.756)	(0.533)	(0.764)	(0.828)	(0.028)
contiguous	−0.717	−0.723	−0.795	−0.958	−1.030	−0.036
	(0.872)	(0.857)	(0.862)	(0.858)	(0.850)	(0.028)
Sample	full	full	full	rotating	rotating	rotating
Method	logit	logit	FE logit	logit	FE logit	LPM
FE	year	year	party sec	year	party sec	year & party sec
Adjusted R^2	0.08	0.09	0.11	0.04	0.05	
Observations	7830	5850	4234	551	551	551

Note: The dependent variable is an event dummy that indicates whether the party secretary of the origin province moves to the destination province at year $t + 1$. The first three columns use the full sample, whereas the last three only include dyadic observations in which the party secretary of the origin province rotates to another province at year $t + 1$. Standard error clustered at province-pair level in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

[23] In Column 3 and Column 5, year fixed effect are highly collinear with the party secretary fixed effect and are dropped automatically.

Columns 4 to 6 of Table A.2 use a different setup to examine whether measures of economic activities have predictive power conditional on rotation. Only dyadic observations with a rotation of the party secretary from the origin province in the next year are included. For this reason, variables related to origin provinces are dropped. The logit regression in Column 4 includes year fixed effects, whereas that in Column 5 groups together observations of each party secretary. Column 6 represents a linear probability model that features both year and party secretary fixed effects. The regression results show that, conditional on a rotation taking place, none of the variables are correlated with the destination of the rotation.

C. Robustness

C.1. Different Lags and Leads

Table A.3 displays the gravity estimations with various lags and leads. All regressions include origin-year, destination-year, and province-year fixed effects. Regressions shown in Column 1 to Column 3 include the contemporaneous dummy $secretary_{AB,t}$ and its lags for up to three years, whereas the other three columns also include leads. We can see that for all six columns, $secretary_{AB,t-1}$ is significant at 10% and the value of the coefficient is relatively stable. On the other hand, the contemporaneous dummy $secretary_{AB,t}$ and other lags and leads are insignificant in all six regressions.

Table A.3
Gravity Estimation with Different Lags and Leads

	Dependent variable: $\log V_{AB,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$secretary_{AB,t}$	0.037	0.041	0.037	0.017	0.005	−0.000
	(0.068)	(0.072)	(0.075)	(0.033)	(0.032)	(0.037)
$secretary_{AB,t-1}$	0.126*	0.065*	0.074**	0.124*	0.082**	0.121**
	(0.069)	(0.036)	(0.036)	(0.070)	(0.037)	(0.050)
$secretary_{AB,t-2}$		0.070	0.010		0.115	0.038
		(0.070)	(0.043)		(0.077)	(0.043)
$secretary_{AB,t-3}$			0.067			0.033
			(0.070)			(0.088)
$secretary_{AB,t+1}$				0.045	0.010	0.024
				(0.073)	(0.038)	(0.049)
$secretary_{AB,t+2}$					0.066	0.080
					(0.081)	(0.061)
$secretary_{AB,t+3}$						−0.034
						(0.059)
Adjusted R^2	0.95	0.95	0.95	0.95	0.96	0.96
Observations	14,790	13,920	13,050	13,920	12,180	10,440

Note: All regressions include origin-year, destination-year, and province-pair fixed effects. Standard error clustered at province-pair level in parentheses.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

C.2. Coefficients of $\Delta_n secretary_{AB,t-1}$

Figure A.1 plots the coefficient of $\Delta_n secretary_{AB,t-1}$ for different values of n. The regression is the same as the one in Column 1 of Table 2. We can see that for all but one values of n, the coefficient is significant at 95%. When $n = 1$, the coefficient is significant at 90%.

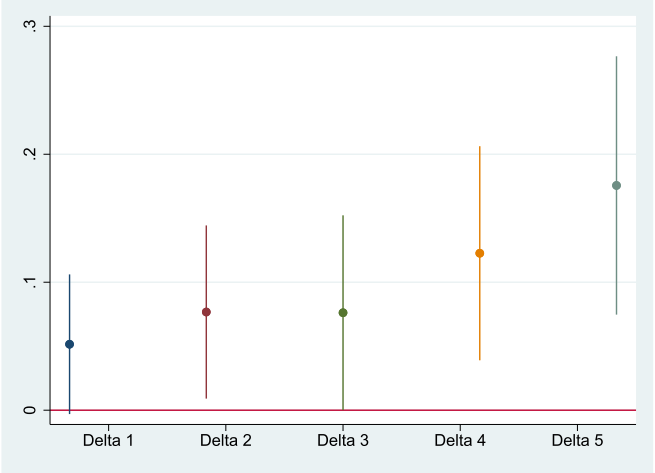

Fig. A.1 Coefficients of $\Delta_n secretary_{AB,t-1}$.

D. Additional Details about Big Events Data

D.1. Keywords

- Business: 投资 investment, 总投资 total investment, 集团 business group, 企业 firm, 公司 company, 项目签约, sign a deal 博览会 expo, 交易会 trade conference, 招商引资 attracting business, 企业代表 firm representative, 企业家代表 entrepreneur delegate, 总经理 general manager, 董事长 chair of the board, 总裁 CEO, 商业 business
- Inter-governmental exchange: 政府代表团 government delegation, 党政代表团 party and government delegation, 政协考察团 CPPCC delegation, 学习考察 study and inspect, 我省考察 to study and inspect in our province, 考察期间 during inspection, 战略合作 strategic partnership
- Sports: 锦标赛 tournament, 冠军 championship, 亚军 runner-up, 季军 third place, 金牌 gold medal, 银牌 silver medal, 铜牌 bronze medal, 运动员 athlete
- Culture: 文物 cultural relics, 文化 culture, 艺术 art, 演出 show, 表演 performance, 剧院 theater, 演员 actor, 电视 TV, 电影 movie
- Transportation: 列车 train, 高铁 high-speed rail, 民航 civil aviation, 公路 road, 特快 express rail, 直飞 direct flight, 铁路 railway

D.2. Examples

Business On June 17 and 18, provincial party secretary Meng Jianzhu and governor Huang Zhiquan met with a group of distinguished entrepreneurs from Zhejiang who came to Jiangxi for business negotiations. 17–18 日,省委书记孟建柱,省长黄智权在南昌会见了到籁洽淡合作的浙江省知名企业家代表团一行 (Jiangxi Yearbook, 2002).

Inter-governmental exchange On May 9th, the Liaoning Party–Government Delegation, which came to Sichuan to inspect the partner assistance work, met with senior staff in the Sichuan government and signed an strategic agreement. Provincial party secretary of Sichuan, Liu Qibao, and provincial party secretary of Liaoning, Wang Min, attended the conference and delivered keynote speeches. 5 月9 日, 来川考察对口援建工作、推动川辽合作的辽宁省党政代表团, 在成都与四川省举行经济社会发展情况交流会并签署战略合作协议。四川省委书记、省人大常委会主任刘奇葆, 辽宁省委书记、省人大常委会主任王眠出席情况交流会并作重要讲话 (Sichuan Yearbook, 2010).

Sports The 2006 College Student Rock-Climbing Tournament was held in Guizhou. Athletes from Jiangxi has won both the championship and the second place. 2006 年中国梵净山东太杯首届全国大学生攀岩精英挑战赛在贵州举行江西省选手包揽冠亚军 (Jiangxi Yearbook, 2006).

Culture The Enterprise Information Publication Center of the National Bureau of Statistics held a publication conference on “the report on the largest 500 Chinese business groups of 2001”. The Hunan Publication Group was ranked 263 out of the 500 firms, and the first of all firms in the area of culture and arts. 国家统计局中国行业企业信息发布中心在北京举行 “2001 年中国最大500 家企业集团信息发布会”。湖南出版集团列500 强第263 位, 为全国文化艺术类排名第一 (Hunan Yearbook, 2001).

Transportation The Beijing-Shanghai High Speed Rail has officially started operation. The total length of the railway is 1318 km, connecting seven provinces and municipalities, including Beijing, Tianjin, Hebei, Shandong, Anhui, Jiangsu, Shanghai, and 24 train stations. The shortest run is 4 h and 48 min 京沪高速铁路正式通车运营。 京沪高速铁路自北京南站至上海虹桥站， 全长 1318 公里，途经北京、天津、河北、山东、安徽、江苏、上海 7 个省、市， 沿途 24 个站， 最短行车时间为 4 小时 48 分钟 (Shanghai Yearbook, 2011).

E. Randomly Generated Connected Province Pairs with Trade Diversion

The average welfare changes of the 30 Chinese provinces (weighted by expenditure) of the randomly generated province pairs when leadership rotations only result in trade diversion are presented in Fig A.2. The procedure is exactly the same as the one described in Section 5.3. Note that in the trade diversion case, randomly generating provincial pairs connected through leadership rotation will lead to a welfare loss relative to the “factual equilibrium” with no connected provinces. Compared to Fig. 5, the distribution of welfare changes shown in Fig A.2 is less concentrated. Moreover, the average welfare loss associated with the 17 factual province pairs smaller in magnitude is than the mean welfare loss of the 1000 random draws but still within the 75% percentile.

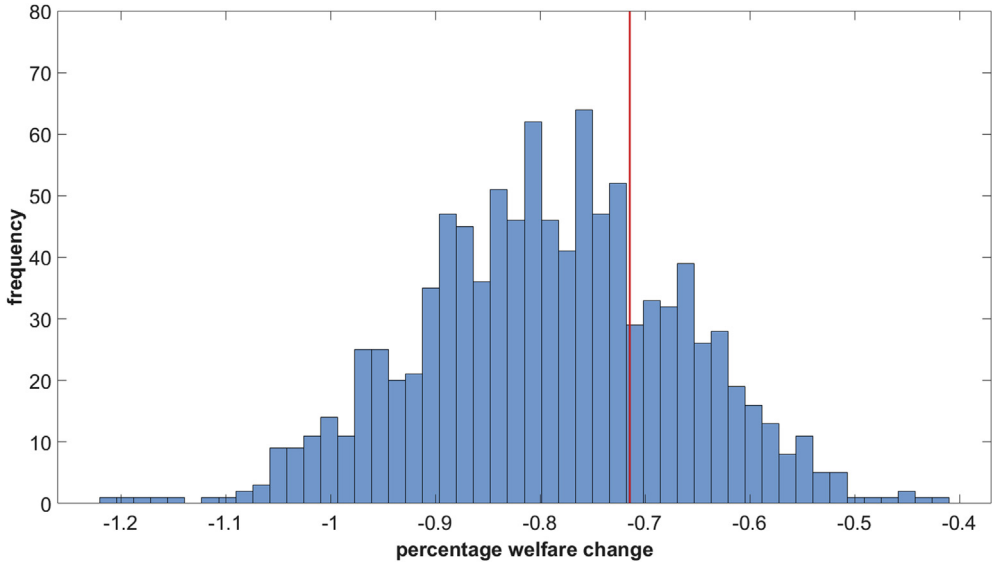

Fig. A.2 Randomly Generated Connected Province Pairs with Trade Diversion.

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