Mandarins Make Markets: Leadership Rotation and Inter-Provincial Trade in China*

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Abstract

The careers of many public officials span multiple localities, yet the economic impact of their inter-regional movements is not well understood. This paper focuses on the rotation of provincial leaders in China and studies its economic impact through regional integration. Estimation results using the gravity framework indicate that when a provincial leader is appointed to be the party secretary of a new province, the trade volume from the new province to the old province increases, but not vice versa. Additional analysis using two novel datasets that capture the intensity of inter-provincial socioeconomic activities in China corroborates 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 0.13%.

Keywords: regional integration, domestic trade, leadership rotation in China

JEL Codes: H70, O18, P25

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1 Introduction

Inter-regional rotation of personnel is common in the public sector. In the United States, for example, 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 career paths that spanned colonies in multiple 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 municipal-level and above political leaders in China since 1999, we use the gravity framework to estimate the effect of provincial leader 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. On the other hand, the rotation of provincial governors, who are in charge of local economic development but ranked lower than provincial party secretaries, does not generate any significant 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, Bergstrand and Feng 2014), and using various subsets of observations. We also find that this effect on inter-provincial trade is more salient when the party secretary of the new province used to hold a more senior position in the

previous province.

We then explore two novel datasets to further examine the effect of provincial leader rotation on inter-provincial socioeconomic activities in China. The first dataset is 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*. Moreover, we also study the establishment of regional chambers of commerce (RCoCs, hereafter), province-level institutions that aim to enhance business activities across regions. Using Cox proportional hazard models, we show that when the party secretary of province *A* used to work in province *B*, province *A* is more likely to set up an RCoC to accommodate merchants from province *B*. Similar to the results from the gravity estimations, the effects of provincial party secretaries on major event records and the establishment of RCoCs are significant in only one direction. In addition, we do not find any significant effect from provincial governors who used to work in other provinces.

Next, we investigate the mechanisms through which sub-national political leaders can affect economic activities in non-democratic regimes. In particular, there are two potentially relevant mechanisms that have been discussed extensively 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, Hsieh and Song 2014, 2019; Pei 2016). The other possibility is that politicians are driven by career incentives to promote local economic growth (Chen, Li and Zhou 2005; Li and Zhou 2005; Jia, Kudamatsu and Seim 2015; Persson and Zhuravskaya 2016). We find that the effect of provincial leader rotation on railway cargo flow is decreasing in the age of the rotating party secretary, but does not depend on whether the party secretary is found to be corrupt. This finding is more consistent with the career incentive mechanism, as age is a determining factor for promotion in China (Li and Zhou 2005; Yao and Zhang 2015). In addition, the direction of the effect (from the new province to the old province) found in our empirical analysis is also more

consistent with the the career incentive mechanism.

Lastly, we construct a multi-region, multi-sector, Ricardian trade model to quantify the general equilibrium effects of the provincial links associated with the cadre rotation system. 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. Inter-provincial connections through cadre rotation are modeled as uni-directional trade-cost reductions. We calibrate the model using data from 2012 and conduct two counterfactual exercises. In the first exercise, we remove the links between Chinese provinces established through cadre rotation and find that the increasing trade costs lead to an average welfare loss of 0.13%. Next, we also consider a hypothetical scenario in which all Chinese provinces are connected through the cadre rotation system in order to gauge the maximum possible welfare gain from this channel. In this case, trade reductions between all province pairs in China lead to a substantial welfare improvement of 16.75%.

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, Montalvo and Reynal-Querol 2011; Adolph 2013; Hodler and Raschky 2014; Yao and Zhang 2015). 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, Mayer and Ries 2010; Berger, Easterly, Nunn and Satyanath 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, hence filling the gap between the two areas of research.

This paper is also related to a growing number of studies on the interaction between the promotion tournament of government officials and economic growth in China. Among those focusing on province-level officials, Li and Zhou (2005) find that "the likelihood of promotion of provincial

leaders increases with their economic performance, while the likelihood of termination decreases with their economic performance". Xu, Wang and Shu (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, Luo and Chen (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. Our paper differs from the existing literature by analyzing the effect of cadre rotation on inter-provincial trade. Moreover, we also construct a quantitative trade model to compute the general equilibrium effects of cadre rotation in China, which is a novel contribution to this area of research.

Furthermore, our work 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, Du, Tao and Tong 2004; Poncet 2005; Lu and Tao 2009). However, while most studies consider political factors as one of the potential mechanisms, few actually 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. We provide empirical evidence that the rotation of political leaders can reduce inter-provincial trade frictions in China. In addition, our analysis using major event records and the establishment of RCoCs offers new angles through which to study inter-regional socioeconomic activities in China.

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 discusses potential mechanisms through which political leaders can affect inter-

provincial trade and other socioeconomic activities in China. Section 5 provides additional evidence using data from the major event records and the establishment of the RCoCs. In section 6, we construct and calibrate a quantitative trade model to quantify the welfare effects of leader rotation. The last section concludes with a summary.

2 Background and Data

In this section, we first briefly discuss the political structure and 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 Leader Rotation in China

China has a one-party political system and the highest decision making body is the Politburo Standing Committee (PSC) of the Communist Party. Each of the provinces (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 guarantee for bank financing, and protect investors' property rights against predation 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 Communist Party Committee one level higher.[1] At provincial level, for instance, the promotion of provincial leaders is determined by the PSC. This feature of political centralization and economic decentralization is referred to as a regionally decentralized authoritarian system by Xu (2011). Whereas the connection with higher ranked officials is an important determinant of promotion, the ability to promote local economic growth is also emphasized.[2] In addition, age is another crucial factor in determining an official's eligibility for promotion. The Central Organization Department actually specifies the maximum age of officials, and those who are above the maximum age limit set for their level will be forced to retire when their tenure is over.

Another distinctive feature of the Chinese political system is that provincial leaders are regularly rotated across different positions. This has been a long-standing practice that can be traced back to as early as the Qin Dynasty (221 to 206 BCE) (Zhao 2015). This practice distinguishes China from not only democracies, where politicians rarely change the constituencies they represent, but also many authoritarian/Communist regimes, where the frequency of inter-regional transfers is much lower (Rochlitz, Kulpina, Remington and Yakovlev 2015). Among officials who served as provincial party secretaries or governors between 1999 and 2014, all of them had worked in more than one province and about 42% of them had 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, whereas 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

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

[2]For example, Li and Zhou (2005) find that the likelihood of a provincial leader being promoted is positively correlated with economic performance. Our analysis also finds similar results.

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. In practice, moreover, 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 than many other less well endowed 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 provincial leader. First, in 2002, he moved from being provincial governor of Fujian to being provincial governor (and later provincial secretary) of neighboring Zhejiang province. Before Xi, no provincial leader in Fujian had ever made a similar lateral movement to Zhejiang;[3] Xi himself also described his transfer as "completely unexpected", as he had initially expected to be placed in the western provinces, where he had deeper personal and family connections (Weng 2005).

In 2007, Xi, who was then the party secretary of Zhejiang, experienced a second rotation—or plausibly a major but implicit promotion—to become the party secretary of Shanghai, a position widely regarded as a critical stepping stone to membership in the PSC. Although Xi was seen by many as a likely contender for a seat in the Politburo and eventually the PSC, no one was able to predict that his path to central leadership would run through Shanghai, until September 2006 when the position became vacated following the unexpected firing of the former Shanghai party boss,

[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) have seen the movement of more than one provincial leader.

Chen Liangyu (Jiang and Yang 2016). Moreover, it has also been noted that, even after the purge, the central leadership did not see Xi as the most preferred candidate, and his appointment was the result of a compromise between major political coalitions at the top (WikiLeaks 2006).

2.2 Data

The data on leaders are drawn from the China Political Elite Database (CPED)[4], a newly constructed database containing extensive biographical information on over 4,000 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 Internet sources. In this paper, we focus on the subset of officials in the database who served as the provincial secretary or governor between 1999 and 2012.

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 creates a major challenge. As documented in Yu (2013), existing studies focusing on domestic trade in China either use the inter-provincial input-output table that covers a very short time span or have 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*. 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), accounting for about 13% of the total cargo freight during the period of interest. Figure 1 plots the national-level aggregate cargo volumes by transportation method. We can see that the volume of railway cargo is highly correlated with both the total freight volume and the volume of road cargo.

In addition to data on railway cargo, we also construct a measure of the overall level of socioeconomic exchange between provinces from the "major event" chapter in the provincial annual

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

yearbooks. These chapters detail, in chronological fashion, important political, economic, and social events that take place in a province, usually based on syntheses of the entire year's provincial newspaper articles. The digital copies of these chapters are obtained from the *China National Knowledge Infrastructure* (CNKI) for the period between 2000 and 2012.

Finally, we also construct a third measure on the movement of business actors across provinces based on the timing for establishing RCoCs. RCoCs are voluntary associations formed by private entrepreneurs with common hometown origins; they serve as an 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).[5] Governments of host provinces also use RCoCs as a tool to attract investments and hence stimulate local economic growth. We collect information for all RCoCs through an extensive Internet search and record the year of establishment. Between 1999 and 2012, a total number of 517 RCoCs were established among 870 possible province pairs.

3 The Effects of Provincial Leader 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 robustness checks.

3.1 Empirical Framework

We rely on the gravity equation to estimate how provincial leader rotation affects domestic trade across provinces in China. This framework has been widely used to study the impact of various types of frictions of bilateral trade.[6] Our starting point, defined in Head and Mayer (2014)

[5]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.

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

as the "naive gravity equation", takes the following form:

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

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, and cultural similarity. 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:

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

Including origin-year fixed effect $f_{A,t}$ and destination-year fixed effect $f_{B,t}$ fully captures the time-variant multilateral resistance terms.[7] 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 information about provincial leader rotation will be modeled as factors of trade frictions and captured in $\mathbf{X}$. The key variables in the estimations are whether the party secretary or governor of the origin (destination) province used to work (as party secretary or governor) in the destination (origin) province. More precisely, we construct a dummy $sec_{AB,t-1}$ to indicate whether

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

the provincial party secretary of province A at time $t-1$ formerly worked in province B as secretary or governor. $gov_{AB,t-1}$ is defined analogously for governors. The variables are lagged by one period because of the likely delay between the arrival of the new leader and the realization of the effect on trade flows.

We interpret positive and significant coefficients of leader rotation dummies as evidence of the effect of provincial leader rotation on inter-provincial trade. This interpretation rests on the assumption that provincial leader rotation is orthogonal to the unobserved factors of the origin and destination provinces that affect the bilateral trade flow. In other words, no variables that affect provincial trade flows can predict the destination of provincial leader 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 leader rotation in Section A 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 leader rotation 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:

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

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. The dependent variable is the log of total volume railway cargo flow for all regressions. 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 can see that the coefficient of $sec_{AB,t-1}$ is positive and significant at the 5% level. On the other hand, none of the other three measures has a statistically significant coefficient. Hence, the cargo flow from province A to province B is relatively larger if province A's party secretary used to work as the party secretary or governor of province B.

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 use a two-year lag to show that our results are not an artifact of the chosen one-year lag. Lastly, in Column 4, we add the lagged dependent variable, $\log V_{AB,t-1}$, to the explanatory variables. In all regressions, $sec_{AB,t-1}$ is the only leader-rotation dummy with a positive and significant coefficient. Adding the lagged dependent variable in Column 4 decreases the size, but the coefficient of $sec_{AB,t-1}$ remains significant at 10%.

Table 2 presents regression results following the first-differencing setup in equation 3. We follow Baier and Bergstrand (2007) and Baier et al. (2014) and choose $n = 5$, although our estimates are not sensitive to difference values of n.[8] Column 2 reports estimates of equation 3, whereas column 1 does not include the pair fixed effects. In both columns, $\Delta_5 sec_{AB,t-1}$ has a positive and significant coefficient. Similar to the results presented in Table 1, none of the other three variables have significant coefficients.

[8]Figure A.1 in the Appendix illustrates the coefficient of $\Delta_n sec_{AB,t-1}$. In all cases, the coefficient is positive and statistically significant at 95%.

3.3 Robustness Checks

The results of additional regressions for robustness checks are presented in Table 3. In the first column, we exclude province pairs with coastal provinces as destinations. This is to address the concern that railway cargo transported to the coastal provinces may be exported. In Column 2, we exclude province-pairs with 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 3 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). We can see that in all three columns, $sec_{AB,t-1}$ remains statistically significant and the size of the coefficient does not vary substantially. None of the other three leader-rotation dummies, on the other hand, has a significant coefficient.

Column 4 excludes destination provinces in which the provincial party secretaries are also members of the current Politburo. These party secretaries enjoy a higher rank within the Chinese Communist Party compared to other provincial party secretaries and governors. In other words, even though the party secretaries have the same *de jure* rank in all provinces, these provinces and hence their party secretaries are *de facto* more prestigious than others. If the provincial leaders tend to rotate (or get promoted) to these regions and the economic fundamentals of these regions can generate more exports to other provinces, then positive coefficients of the leader rotation dummies may not be related to the effect of the leaders. Again, $sec_{AB,t-1}$ is the only leader-rotation variable with a positive and significant effect.

In Column 5, 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 leader rotation. This dummy $sec_{AB,t-1}(alt)$ indicates whether the party secretary of the origin province used to work as a member of the party standing committee in the destination province. The party standing committee in each province usually consists of 12

members, the most senior two of which are always the party secretary and the governor. From Column 5, we can see that the coefficient of $sec_{AB,t-1}(alt)$ is still positive and significant, but with a smaller magnitude. This result is expected: members of the standing committee are not as senior as party secretaries and governors and hence are less powerful in influencing the trade flow.

We also investigate whether there are changes in trade flows before and after the connection of provinces through the leader rotation ($sec_{AB,t-1} = 1$). In particular, we estimate a dynamic specification that includes a range of dummies for whether two provinces have been connected in the past or will be connected in the future. The resulting coefficients are plotted in Figure 2, in which the circles indicate the value of coefficients and the vertical bars indicate the 90% confidence interval. We can see that there is no statistically significant change in trade flows before the leader rotation. In addition, the increase in trade flows quickly disappears after the end of the connection. 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.

4 Mechanisms

In this section, we further explore the underlying mechanisms that can explain the results presented in Section 3. In particular, we want to understand what drives the provincial secretaries to promote trade with the provinces they used to work in. We hypothesize that there are two plausible motivations. First, a large body of research suggests that government officials in China face strong career incentives generated by the cadre promotion system (Xu 2011). Economic performance, in particular, is a key determinant of career advancement for sub-national leaders (Chen et al. 2005; Li and Zhou 2005; Jia et al. 2015; Persson and Zhuravskaya 2016). To the extent that the increase in exports to other provinces adds to local GDP figures, it is in the interest of provincial leaders to help their current provinces expand trade relations (export in particular) with other provinces. Moreover, existing studies have documented that local protectionism is prevalent in China (Young

2000; Bai et al. 2004; Poncet 2005; Lu and Tao 2009; Xu and Cao 2017). The provincial party secretaries, motivated to boost local GDP growth, will utilize their connections in the provinces where they used to work in order to reduce trade frictions on exports to these destinations.

Second, it is also plausible that the observed effect of leader rotation on inter-provincial trade is primarily due to provincial leaders' efforts to seek rents from their political power. It is well known, for example, that private entrepreneurs in China often seek to establish patron–client connections with political figures in order to gain special favors or political protection (Wank 1996; Bai et al. 2014; Pei 2016). When a provincial leader is relocated, the connected agents from the private sector may follow their patron and expand business activities in the new province. The mass media in China has often reported such rent-seeking behavior, most of which is related to corrupt officials.

Our estimates presented in Section 3 appear to be more consistent with the career incentive hypothesis, although we cannot rule out the rent-seeking mechanism. In particular, the regression results show that whenever a party secretary is relocated from province B to province A, the trade flow from province A to province B increases, but not vice versa. Since the connected business professionals are from province B, the rent-seeking mechanism implies that trade flow should also increase in the other direction.

To further examine these two potential mechanisms, we construct several variables to approximate provincial leaders' career incentives and rent-seeking. For career incentives, we analyze the interaction between $sec_{AB,t-1}$ and $age_{A,t-1}$, the age of the rotated party secretary. Age is a decisive factor of Chinese officials' promotion prospects (Tsai and Dean 2014), and older leaders typically have much more limited upward potential than younger leaders. As a result, we should expect the effect of leader rotation on trade to be most salient among younger leaders if career incentives play an important role. For rent-seeking incentives, we create an indicator $corrupt_{A,t-1}$ for whether the incumbent provincial secretary is later investigated for corruption. In addition, we also include a dummy $home_{AB,t-1}$ that indicates whether the party secretary of province A was born in province B. Both measures are expected to be positively correlated with the magnitude of rent-seeking.

Estimation results are reported in Table 4. The first three columns include each interaction term

individually, whereas the last column includes all three of them. In all regressions, the coefficient of $sec_{AB,t-1}$ is positive and significant at 90%. Note that the coefficient of the interaction between $sec_{AB,t-1}$ and $home_{AB,t-1}$ is not statistically different from zero in Column 1 or Column 4. Moreover, the coefficient of the interaction with $corrupt_{A,t-1}$ is negative in both Column 2 and Column 4, and is significant at 90% in Column 2. These estimates do not support the rent-seeking mechanism. On the other hand, the coefficient of the interaction between $sec_{AB,t-1}$ and $age_{A,t-1}$ is negative and significant at 90% in both columns. This result is consistent with the career incentive hypothesis: older party secretaries are less likely to get promoted, hence they are less incentivized to promote trade and boost local GDP.[9]

5 Supplementary Evidence

In this section, we provide additional evidence on the trade-boosting effects of provincial leaders by analyzing two other complementary data sources. First, we analyze how leadership rotation affects the official inter-provincial activities using data from the major event records. Next, data on the establishment of RCoCs are used to examine the role of provincial leader rotation in shaping the flow of merchants. Results from both analyses support our findings in Section 3.

5.1 Major Event Records

We analyze the major event records from each province and focus on whether the number of entries related to other provinces are correlated with provincial leader rotations. As discussed in Section 2, the major event records document, in a chronological fashion, important political, economic, and social events that take place in a province in China. 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. The regression results using $Mentioning_{AB,t}$ as the

[9] The fact that younger officials have a larger impact on trade also challenges the rent-seeking hypothesis, as older officials are typically more interested in personal enrichment given their weak upward potential. Anecdotes suggest that many officials only start to accept bribes a few years before retirement. See, for example, http://opinion.cctv.com/2018/01/02/ARTIq1d7xJkR18R7ZACvh4DL180102.shtml.

dependent variable are presented in Table 5. Similar to the analysis in previous sections, we focus on whether the dummies indicating leader rotation have any predictive power in the dependent variable.

In Column 1, we follow the naive gravity equation and include pair and year fixed effects. Among the four dummies indicating leader rotation, only $sec_{AB,t}$ has a positive and statistically significant coefficient at 95%. In other words, the effect of provincial leader rotation 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 leader rotation dummies with one-year lag, and $sec_{AB,t}$ is still the only one with a significant coefficient. This is different from the effect on railway cargo flow 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 appears sensible: it takes more time for the firms to respond to the leader rotation than to other kinds of activities (joint conference and official visits, for example) recorded in major events 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 $sec_{AB,t}$ is still positive and significant at 90%. By contrast, none of the other three leader-rotation dummies has a stable and significant coefficient.

5.2 Regional Chambers of Commerce

We also examine how provincial leader rotation promotes inter-provincial business activities through establishing RCoCs. Since each province is only allowed to establish one chamber of commerce in another province, many survival models in statistics can be applied to this time-to-event analysis. The model we use here is the Cox proportional hazard model, which is a semi-parametric model that does not require us to specify the hazard function. An event is defined as the origin province setting up an RCoC in the destination province at time t. Let λ denote the hazard

function, then λ takes the following form:

$$\lambda(t, X_{1t}, X_2) = \lambda_0(t) \exp(X_{1t} \cdot \beta_1 + X_2 \cdot \beta_2), \tag{4}$$

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 provincial leader rotation affects the probability of setting up an RCoC. The regressions represented by the first and the 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 6 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. 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 leader rotation do not exhibit any stable pattern. In other words, if the party secretary in province A used to work as party secretary in 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 B is more likely to set up an RCoC in province A if A is closer and B is more developed economically.

Estimation results presented in Table 5 and Table 6 not only corroborate the results of the gravity regressions in Section 3.2, but also provide plausible explanations as to why the rotation of provincial party secretaries can affect domestic trade flows. The analysis of major event records implies that such rotation leads to more socioeconomic activities between the origin and destination province of the rotation, which can in turn reduce trade frictions. Moreover, the relocation of a party secretary also increases the probability of establishing an RCoC, and one major role of an RCoC is precisely to facilitate inter-provincial business activities. In addition, the 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 3.2.

6 Quantitative Trade Model

The preceding analyses show that the rotation of provincial leaders has a discernible impact on the inter-provincial economic activities. A question that remains is: what are the welfare consequences of the inter-provincial links associated with cadre rotation? To answer, 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 and perform two counterfactual exercises. In the first exercise, removing the factual inter-provincial links leads to an average welfare loss of 0.13%. Secondly, in the hypothetical scenario in which all Chinese provinces are connected through the cadre rotation system, trade reductions between all province pairs in China lead to a substantial welfare improvement of 16.75% relative to the factual equilibrium.

6.1 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:

$$c_n^j = \Upsilon_n^j w_n^{\gamma_n^j} \prod_{k=1}^{J} (P_n^k)^{\gamma_n^{k,j}}, \tag{5}$$

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 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 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 k_{ni}^j. One unit of a tradable intermediate good ω^j produced in country i is available in country n at unit price $c_i^j k_{ni}^j / z_i^j(\omega^j)$. The price of ω^j in country n is given by $p_n^j(\omega^j) = \min_i\{c_i^j k_{ni}^j / z_i^j(\omega^j)\}$. For non-tradables, assume $k_{ni}^j = \infty$ 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

$$P_n^j = A^j \left[\sum_{i=1}^{N} \lambda_i^j (c_i^j k_{ni}^j)^{-\theta_j} \right]^{-1/\theta_j}, \tag{6}$$

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 $\pi_{ni}^j = X_{ni}^j / X_n^j$ denote country n's share of expenditure on sector j goods from country i. Using the properties of the Frechét distribution,

we have

$$\pi_{ni}^{j} = \frac{\lambda_i^j (c_i^j k_{ni}^j)^{-\theta^j}}{\sum_{h=1}^{N} \lambda_h^j (c_h^j k_{hi}^j)^{-\theta^j}} \tag{7}$$

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

$$X_n^j = \sum_{k=1}^{J} \gamma^{j,k} \sum_{i=1}^{N} X_i^k \pi_{in}^k + \alpha_n^j I_n, \tag{8}$$

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 $D_n^j = \sum_{i=1}^{N} M_{ni}^j - \sum_{i=1}^{N} E_{ni}^j$, where $M_{ni}^j = X_n^j \pi_{in}^k$and $E_{ni}^j = X_i^j \pi_{in}^j$. Lastly, the definition of trade deficit gives

$$\sum_{j=1}^{J} \sum_{i=1}^{N} X_n^j \pi_{ni}^j - D_n = \sum_{j=1}^{J} \sum_{i=1}^{N} X_i^j \pi_{in}^j. \tag{9}$$

We can substitute (8) into (9) to derive the labor market clearing condition:

$$w_n L_n = \sum_{j=1}^{J} \gamma_n^j \sum_{i=1}^{N} X_i^j \pi_{in}^j \tag{10}$$

Given parameters L_n, D_n, λ_n^j, and k_{ni}^j, an equilibrium is a wage vector w_n and price P_n^j that satisfies equilibrium conditions (5), (6), (7), (8), and (10). Using the "exact hat algebra" technique popularized by Dekle, Eaton and Kortum (2007), we can express the equilibrium conditions in

changes:

$$\hat{c}_n^j = (\hat{w}_n)^{\gamma_n^j} \prod_{k=1}^{J} (\hat{P}_n^k)^{\gamma_n^{k,j}} \tag{11}$$

$$\hat{P}_n^j = \left[\sum_{i=1}^{N} \pi_{ni}^j (\hat{k}_{ni}^j \hat{c}_i^j)^{-\theta_j} \right]^{-1/\theta_j} \tag{12}$$

$$\hat{\pi}_{ni}^j = \left(\frac{\hat{c}_i^j \hat{k}_{ni}^j}{\hat{P}_n^j} \right)^{-\theta^j} \tag{13}$$

$$X_n^{j'} = \sum_{k=1}^{J} \gamma_n^{j,k} \sum_{i=1}^{N} X_i^{k'} \pi_{in}^{k'} + \alpha_n^j I_n' \tag{14}$$

$$\hat{w}_n = \sum_{j=1}^{J} \gamma_n^j \sum_{i=1}^{N} \frac{X_i^{j'} \pi_{in}^{j'}}{w_n L_n}, \tag{15}$$

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 (11)-(15). Compared to the original set of equilibrium conditions, now we only need data on bilateral trade shares π_{ni}^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.

6.2 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), and details on how this dataset is constructed can be found in Mi, Meng, Zheng, Shan, Wei and Guan (2018).[10] 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_{ni}^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

[10] 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.

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 leader rotation. In particular, let $d_{ni} = \{0, 1\}$ denote whether the provincial party secretary of province i used to work in province n and assume $k^j_{ni}(d_{ni} = 0) = \delta k^j_{ni}(d_{ni} = 1)$. We need to calibrate δ, which is the ad valorem equivalent of the effect of leader rotation on inter-provincial trade costs. To do so, we first identify the 17 province pairs with $d_{ni} = 1$. Figure 3 shows the number of such links each provincial party secretary has and the respective connected provinces. Next, starting with an arbitrary guess on δ, we compute $\hat{k}_{ni}$ and hence the counterfactual trade volume changes that satisfy (11)-(15) until the counterfactual trade flows are consistent with the regression results in Section 3.2.[11] In our most conservative setup, $\delta = 0.31$, which implies that changing from $d_{ni} = 1$ to $d_{ni} = 0$ will increase the direction-specific trade cost between two provinces by 31%.

6.3 Counterfactual Exercises

With the calibrated model, we first compute the trade flow 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 31%. Trade frictions between other provinces as well as to and from Rest of World remain unchanged. The percentage welfare changes for each province are illustrated in Figure 4. In the counterfactual equilibrium, only two provinces (Jiangsu and Zhejiang) enjoy an increase in welfare, whereas all other provinces incur a welfare loss as great as 1.01%. Notice that neither Jiangsu nor Zhejiang has a connected party secretary or is connected to party secretaries in other provinces. In other words, they benefit from the trade diversion due to the increased trade costs between the affected provinces, albeit only

[11] See Section C in the Appendix for more details of the calibration.

to a small extent. On the other hand, 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. Overall, the average welfare loss for all regions in this counterfactual scenario is 0.13%.

To check whether the 17 connected province pairs and hence the welfare changes incurred by removing such connections are representative, we randomly draw 17 province pairs 500 times and compute the prospective welfare changes when the factual connections are replaced by the random draws. Our results show that, over the 500 draws, more than 95% of them result in an average welfare change of less than 0.5%. We take this result as evidence that the 17 observed province pairs connected through provincial leader rotation in the factual equilibrium are not qualitatively different from other possible province pairs.

Finally, we also quantify the welfare changes in another counterfactual scenario in which all provinces in China are connected through provincial leader rotation. We understand that such a scenario is unlikely under the current political regime in China, but computing the welfare consequences in this case can be helpful to quantify the theoretical upper bound of the effect of this mechanism. As shown in Figure 5, when all provinces in China are connected through provincial leader rotation, all provinces enjoy a substantial welfare improvement from 6.6% to 25.6%. The welfare of Rest of World also improves by 5.2%. Overall, the average welfare gains of the whole economy is 16.75%. As expected, coastal provinces only experience modest welfare gains since they tend to engage more in international trade. On the other hand, inland provinces rely on domestic trade to a larger extent and hence benefit more from reductions in inter-provincial trade frictions.

7 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 discretion 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, North and Weingast 1990). This paper emphasizes an understudied aspect of political institutions: the inter-regional rotation of public officials and its economic impact within countries through regional integration. In particular, we explore the role of political leaders on 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 flow 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. Our finding is more consistent with the hypothesis that politicians are driven by career incentives to promote local economic growth. 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.

This paper suggests a new channel through which political leaders can influence economic activities: by reducing trade frictions between provinces and promoting regional integration. What we find 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 with firms can reduce frictions across establishments or departments.

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Appendix

A Identification Strategy and Leader Rotation

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.1. 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.1 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.[12] 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.

Columns 4 to 6 of Table A.1 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.

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

The regression results show that, conditional on a rotation taking place, none of the variables are correlated with the destination of the rotation.

B Coefficients of $\Delta_n sec_{AB,t-1}$

Figure A.1 plots the coefficient of $\Delta_n sec_{AB,t-1}$ 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 five values of n, the coefficient is significant at 95%.

C Calibrating δ

To calibrate δ, we identify the province pairs with $d_{ni} = 1$ in 2011 and iterate with different $\hat{k}_{ni}^{j}$ for these pairs until the resulting counterfactual trade flows are consistent with the regression results. We pick the most conservative regression result, Column 4 of Table 1, which indicates that railway cargo volumes for these province pairs in 2012 are 6.5% more compared to those with $d_{ni} = 0$ in 2011. In other words, if we let Ω denote the set of province pairs with $d_{ni} = 1$ in 2011 and $X_{ni\in\Omega}$ and $X_{ni\notin\Omega}$ denote the average trade flow of the province pairs in the treatment and control groups respectively, the calibrated δ should satisfy the following equation:

$$\frac{X_{ni\in\Omega}(d_{ni} = 0, ni \in \Omega)}{X_{ni\in\Omega}(d_{ij} = 1, ni \in \Omega)} = \frac{1}{1 + 0.065} \frac{X_{ni\notin\Omega}(d_{ni} = 0, ni \in \Omega)}{X_{ni\notin\Omega}(d_{ij} = 1, ni \in \Omega)}.$$

We experiment with different values of δ ranging from 0.01 to 0.50, and the above equation is satisfied when $\delta = 0.31$. In other words, to generate our targeted regression result, switching from $d_{ni} = 0$ to $d_{ni} = 1$ reduces $\hat{k}_{ni}^{j}$ by 31% for all tradable sectors.

Figures and Tables

Figure 1: Comparing Trends in Cargo Volume By Transportation Method

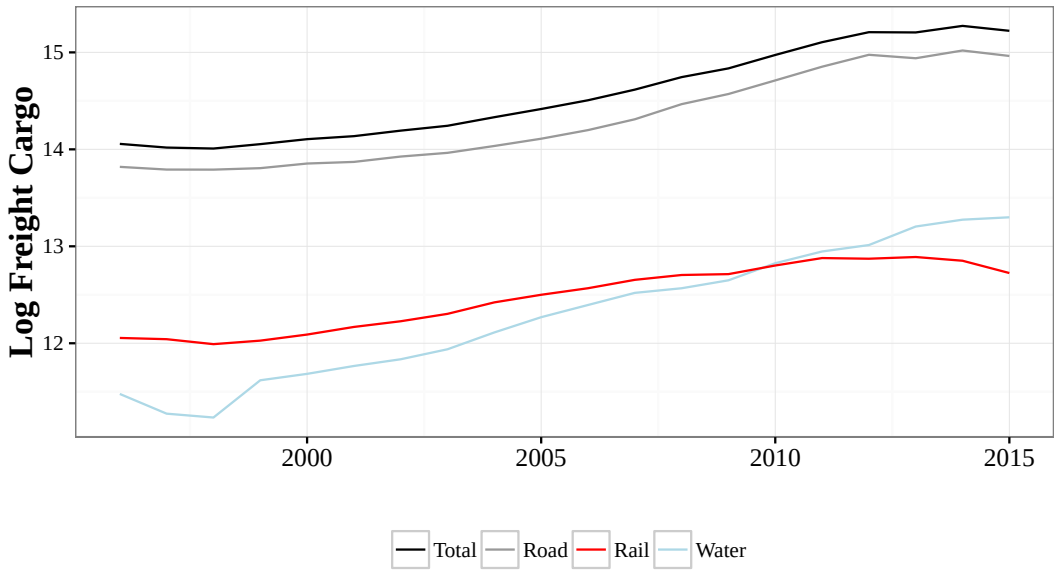

Figure 2: Dynamic Effects of Provincial Secretary's Rotation

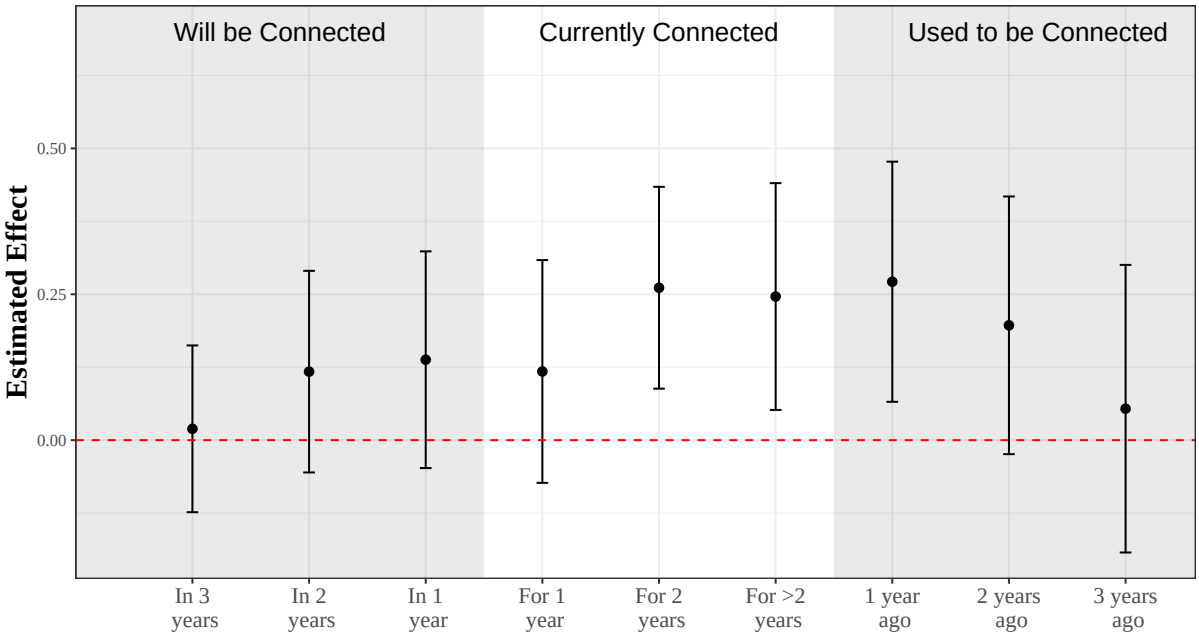

Figure 3: Provincial Leaders with Experience in Other Provinces

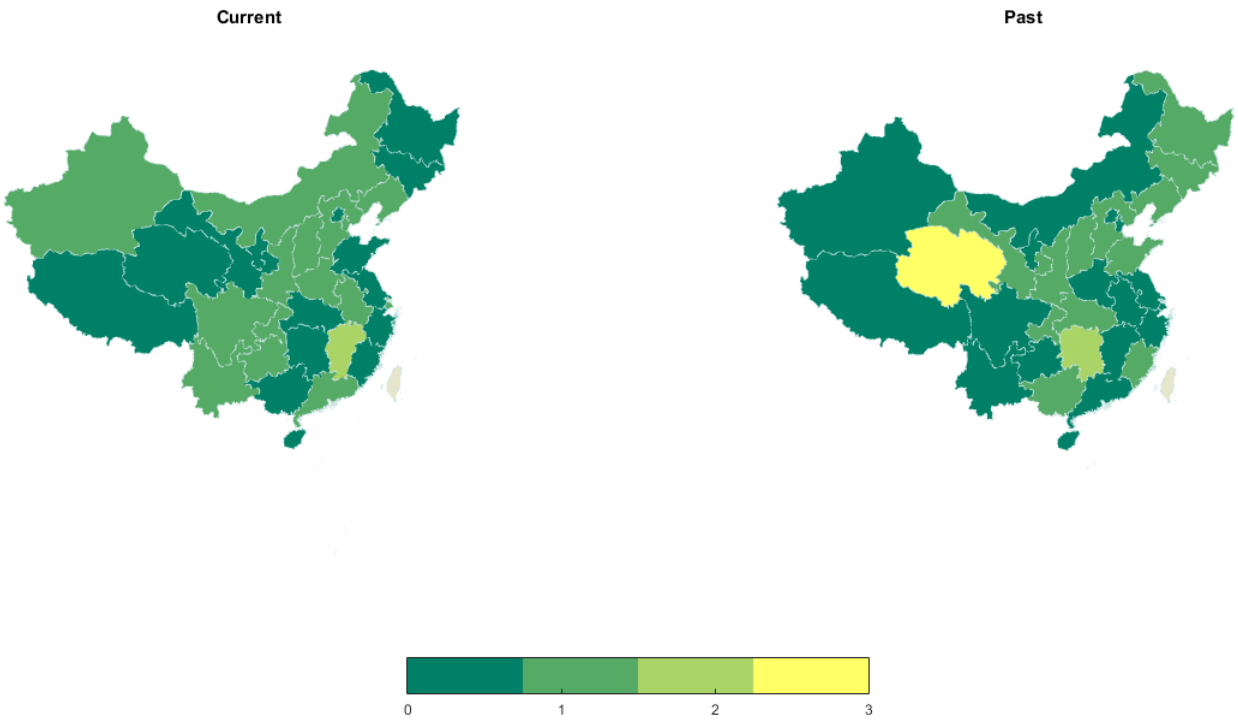

Figure 4: Percentage Welfare Changes Without Connected Province Pairs

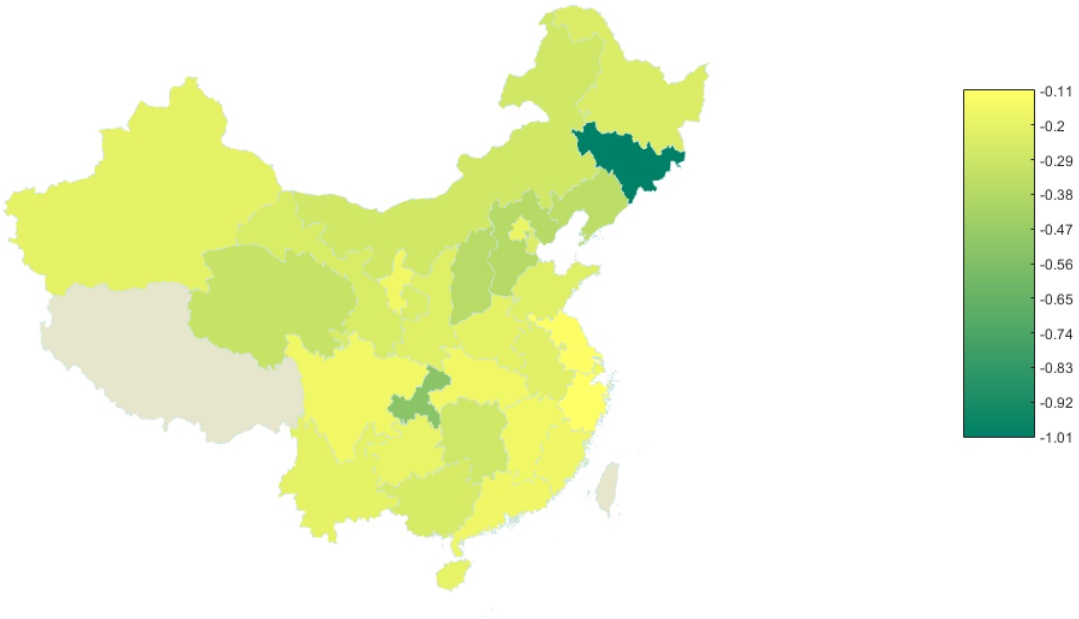

Figure 5: Percentage Welfare Changes When All Provinces Are Connected

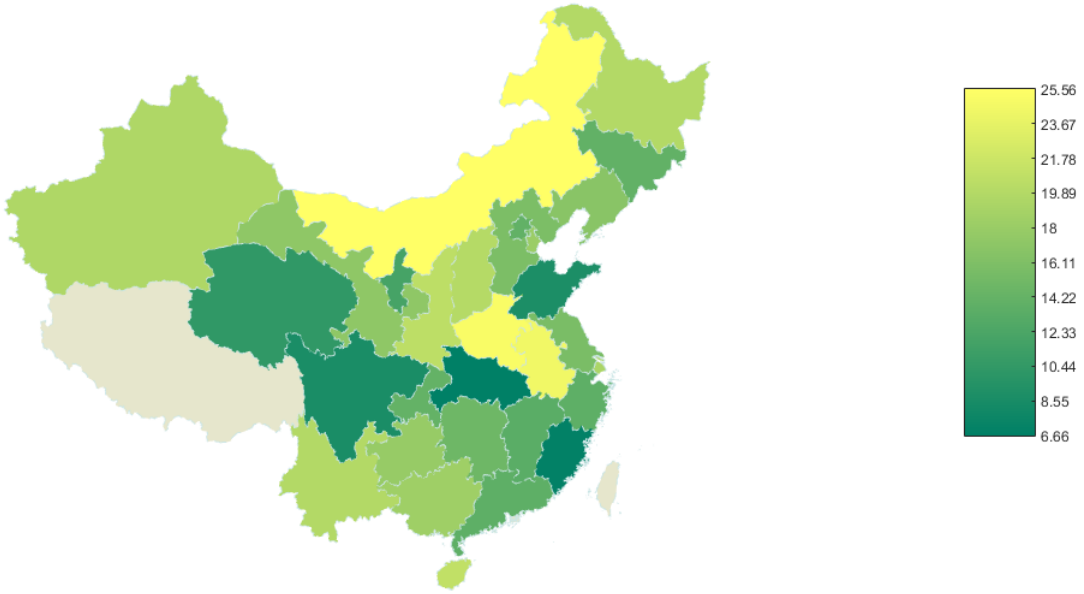

Figure A.1: Coefficients of $\Delta_n sec_{AB,t-1}$

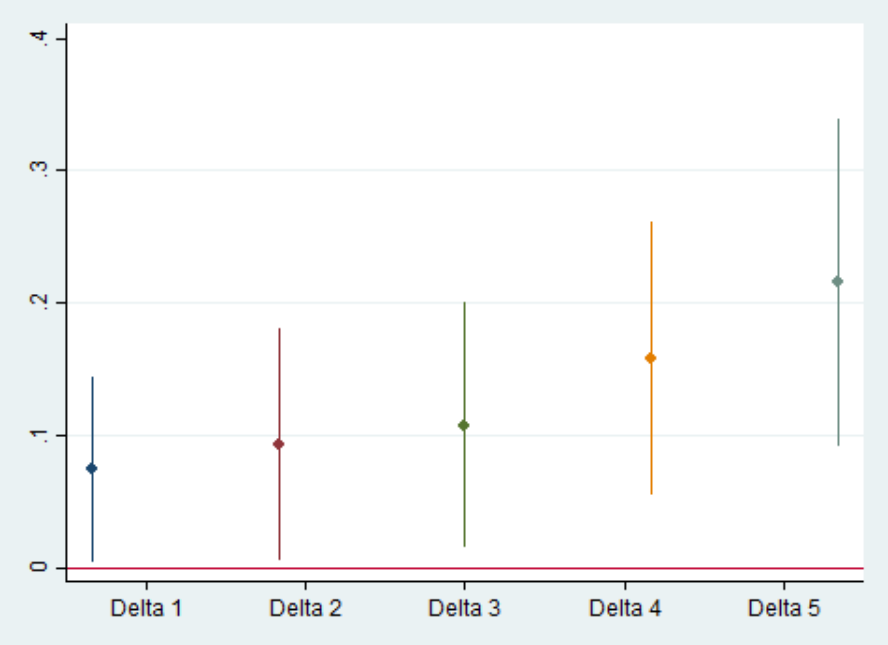

Table 1: Gravity Estimation Using Railway Cargo Data

	Dependent variable: $logV_{AB,t}$			
	(1)	(2)	(3)	(4)
$sec_{AB,t-1}$	0.256**	0.200**		0.065*
	(0.101)	(0.078)		(0.035)
$sec_{BA,t-1}$	0.110	0.000		-0.025
	(0.089)	(0.061)		(0.026)
$gov_{AB,t-1}$	0.029	0.037		0.058
	(0.120)	(0.139)		(0.079)
$gov_{BA,t-1}$	0.005	-0.018		-0.019
	(0.176)	(0.110)		(0.064)
$sec_{AB,t-2}$			0.173**	
			(0.087)	
$sec_{BA,t-2}$			-0.067	
			(0.056)	
$gov_{AB,t-2}$			0.050	
			(0.151)	
$gov_{BA,t-2}$			-0.118	
			(0.119)	
$\log GDP_{A,t}$	0.888***			
	(0.134)			
$\log GDP_{B,t}$	0.660***			
	(0.142)			
$\log V_{AB,t-1}$				0.717***
				(0.023)
Year FE	✓			
Pair FE	✓	✓	✓	✓
(A,t) and (B,t) FE		✓	✓	✓
Adjusted R^2	0.94	0.96	0.96	0.98
Observations	12180	12180	11310	12180

Standard error clustered at province-pair level in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Gravity Estimation in Changes

	Dependent variable: $\Delta_5 logV_{AB,t}$	
	(1)	(2)
$\Delta_5 sec_{AB,t-1}$	0.215***	0.183***
	(0.063)	(0.061)
$\Delta_5 sec_{BA,t-1}$	-0.016	-0.016
	(0.060)	(0.070)
$\Delta_5 gov_{AB,t-1}$	0.035	0.031
	(0.189)	(0.214)
$\Delta_5 gov_{BA,t-1}$	-0.076	-0.054
	(0.156)	(0.177)
Pair FE		✓
Adjusted R^2	0.40	0.64
Observations	7830	7830

Both regressions include origin-year and destination-year fixed effects to capture multilateral resistance terms. Standard error clustered at province-pair level in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Robustness Checks for Gravity Estimation

	Dependent variable: $logV_{AB,t}$				
	(1) No Coast Prov	(2) No DCM	(3) No Autonomous Prov	(4) No Prestigious Prov	(5) Alt Measure
$sec_{AB,t-1}$	0.158*	0.267***	0.172**	0.212***	
	(0.093)	(0.089)	(0.081)	(0.080)	
$sec_{BA,t-1}$	-0.024	0.005	0.019	-0.018	-0.004
	(0.077)	(0.071)	(0.068)	(0.076)	(0.061)
$gov_{AB,t-1}$	-0.083	0.078	0.032	0.045	0.029
	(0.198)	(0.177)	(0.146)	(0.141)	(0.135)
$gov_{BA,t-1}$	0.112	-0.084	-0.031	-0.010	-0.016
	(0.094)	(0.186)	(0.115)	(0.192)	(0.111)
$sec_{AB,t-1}(alt)$					0.098**
					(0.045)
Adjusted R^2	0.96	0.96	0.96	0.96	0.96
Observations	9338	9100	9100	9744	12180

Standard error clustered at province-pair level in parentheses. All regressions include f_{AB}, f_{At}, and $f_{B,t}$ fixed effects.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Evaluating Mechanism: Motivation

	Dependent variable: $logV_{AB,t}$			
	(1)	(2)	(3)	(4)
$sec_{AB,t-1}$	0.149**	0.241***	1.963*	1.898*
	(0.063)	(0.085)	(1.073)	(1.041)
$sec_{AB,t-1} \times home_{AB,t-1}$	0.862			0.856
	(0.622)			(0.566)
$sec_{AB,t-1} \times corrupt_{A,t-1}$		-0.272*		-0.153
		(0.162)		(0.140)
$sec_{AB,t-1} \times age_{A,t-1}$			-0.030*	-0.029*
			(0.018)	(0.018)
Adjusted R^2	0.96	0.96	0.96	0.96
Observations	12180	12180	12180	12180

All regressions include origin-year and destination-year fixed effects as well as province-pair fixed effects. Standard error clustered at province-pair level in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Major Event Records

	Dependent variable: Count of B appearing in A's record				
	(1)	(2)	(3)	(4)	(5)
$sec_{AB,t}$	0.157**	0.177*	0.121*	0.344**	0.398*
	(0.069)	(0.092)	(0.064)	(0.163)	(0.214)
$sec_{BA,t}$	0.076	0.073	0.063	0.146	0.179
	(0.067)	(0.105)	(0.053)	(0.140)	(0.219)
$gov_{AB,t}$	0.153	0.280	0.126	0.507	0.602
	(0.119)	(0.188)	(0.145)	(0.458)	(0.456)
$gov_{BA,t}$	0.158	0.220	0.126**	0.196	0.277
	(0.131)	(0.149)	(0.056)	(0.238)	(0.391)
$sec_{AB,t-1}$		-0.029			-0.132
		(0.077)			(0.231)
$sec_{BA,t-1}$		-0.015			-0.086
		(0.086)			(0.222)
$gov_{AB,t-1}$		-0.199			-0.540
		(0.155)			(0.704)
$gov_{BA,t-1}$		0.011			-0.041
		(0.170)			(0.382)
$\log GDP_{A,t}$	-0.038	-0.029		-0.180**	-0.154**
	(0.081)	(0.089)		(0.076)	(0.078)
$\log GDP_{B,t}$	0.016	-0.008		0.604***	0.601***
	(0.074)	(0.079)		(0.065)	(0.067)
$\log POP_{A,t}$	-0.352***	-0.437***		-0.136	-0.157*
	(0.118)	(0.136)		(0.090)	(0.092)
$\log POP_{B,t}$	0.865***	0.890***		-0.610***	-0.600***
	(0.166)	(0.176)		(0.069)	(0.071)
Method	OLS	OLS	OLS	NB	NB
Year FE	✓	✓	✓	✓	✓
Pair FE	✓	✓		✓	✓
(A,t) and (B,t) FE			✓		
Observations	10476	9855	10476	10059	9426

Standard error clustered at province-pair level in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Establishment of RCoCs

	Event: B establishing RCoC in A			
	(1)	(2)	(3)	(4)
$sec_{AB,t}$	0.664***	0.567**	0.618**	0.494**
	(0.245)	(0.239)	(0.255)	(0.242)
$sec_{BA,t}$	0.181	0.490	0.147	0.451
	(0.299)	(0.307)	(0.300)	(0.312)
$gov_{AB,t}$	-0.300	0.437	-0.373	0.363
	(0.644)	(0.421)	(0.660)	(0.435)
$gov_{BA,t}$	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)
tvc				
$\log GDP_{A,t}$			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)
$logV_{BAt}$			0.027**	0.039**
			(0.013)	(0.016)
Stratified by A		✓		✓
χ^2	282.09	400.87	303.42	1960.73
Observations	10463	10463	10463	10463

Standard error clustered at dyad level in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.1: 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

Standard error clustered at province-pair level in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$