Politically Induced Internal Trade Barriers in China *

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Abstract

Competition among subnational governments generates internal trade barriers, fragmenting markets within nominally integrated economies. In China's decentralized system, where provincial authorities evaluate city leaders on relative economic performance, politicians face incentives to maximize locally appropriable gains while minimizing spillovers to rivals. This domestic geopolitics creates systematic distortions in resource allocation. Exploiting exogenous variation in promotion incentives driven by the age of city party secretaries (1996–2018), I show that intensified within-province competition significantly reduces inter-city trade flows, dampens international exports, and restricts firm access to intermediate inputs. Under competitive pressure, politicians reallocate resources toward non-tradable sectors, specifically real estate, while underinvesting in connective infrastructure near jurisdictional borders. Individually rational responses to career incentives thus produce collectively suboptimal market fragmentation, demonstrating that internal trade costs are endogenous to political institutions.

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1 Introduction

Trade drives prosperity, yet it is fundamentally constrained by political institutions. While standard benchmarks predict that falling transport costs should compel convergence (McCallum, 1995), evidence reveals persistent fragmentation even within national borders (Young, 2000; Poncet, 2005). A burgeoning literature demonstrates that, internationally, trade flows are endogenous to geopolitical alignment; strategic divergence and political risk act as implicit barriers that segment global markets (Fajgelbaum et al., 2020; Caldara and Iacoviello, 2022; Kleinman et al., 2024). Whether analogous political forces generate 'internal geopolitical distance' between subnational governments remains an open question.

This paper establishes that bureaucratic promotion tournaments function as a distinct source of such distance, driving domestic fragmentation through strategic resource misallocation. I examine how yardstick competition (Shleifer, 1985; Besley and Case, 1995)—originally conceptualized for democratic settings—operates in hierarchical authoritarian systems, where it generates internal geopolitical distance by transforming neighboring jurisdictions into rivals rather than partners in integration.[1] Under intense competition and budget constraints, this relative evaluation induces politicians to strategically reallocate public resources toward non-tradable sectors, particularly real estate, that generate rapid and locally appropriable GDP gains.[2] This reallocation away from tradable industries and trade-facilitating infrastructure creates non-tariff barriers to inter-jurisdictional trade, sacrificing aggregate economic efficiency to maximize relative performance. The findings reveal a yet understudied drawback to certain forms of decentralized governance, contributing to our understanding of how institutional frameworks affect

[1]The mechanism differs from canonical yardstick competition in one important respect: while Shleifer (1985) emphasized voters comparing government performance, here upper-level governments conduct the comparison. Crucially, the distortions I document do not stem from "not correctly set incentives" but from a fundamental information constraint—upper-level governments cannot easily monitor cross-jurisdictional trade flows and spillovers, leading them to rationally evaluate officials on locally observable outcomes. This creates a systemic principal-agent problem where yardstick competition based on local performance metrics produces trade barriers as an equilibrium response.

[2]Politicians explicitly acknowledge this preference: "I sell land, I do real estate, today I build a park, tomorrow I build a center—it's all government investment. Once these investments go in, the KPI is completed and the GDP looks very pretty" (Voice of America Chinese, July 13, 2022, https://www.voachinese.com/a/6655247.html). Documented cases illustrate the pattern: Xiangtan's city party secretary launched 345 construction projects totaling 617 billion yuan (nearly five times annual fiscal revenue), explicitly stating his goal to "quickly show achievements" and secure vice-provincial promotion, resulting in 435 billion yuan debt and 33 unfinished projects (February 1, 2024, https://baijiahao.baidu.com/s?id=1789672752005565436&wfr=spider&for=pc). Similarly, Zhangzhou's city party secretary spent 2.11 billion yuan on six replica tourist stations and designed a 200-million-yuan opera house to create visible achievements "that attract attention" before superiors' visits; both projects were later abandoned (Central Commission for Discipline Inspection investigation, January 2024, https://news.sina.com.cn/c/2024-01-09/doc-inaawrkp5341897.shtml).

economic outcomes.[3]

China's institutional framework, which combines regional autonomy with centralized personnel control, provides an ideal setting for studying political economy and market integration. As documented by Maskin et al. (2000), Li and Zhou (2005), and Xu (2011), local politicians have autonomy in shaping economic policies similar to that in a democratic system, but their career prospects are not determined by voters. The promotion system operates within a strictly hierarchical structure, where politicians at each level are promoted by their immediate superiors.[4] In this promotion system, two key characteristics significantly influence evaluation: a politician's age and economic performance.[5][6] Consequently, politicians with similar characteristics face intense competition among their peers. When facing such competition under budget constraints, politicians strategically optimize their policy portfolios by reallocating scarce resources to maximize locally visible and appropriable economic gains within their evaluation period.

This evaluation system design reflects inherent information constraints in multi-tiered governance rather than policy mistakes. Upper-level governments cannot easily monitor or attribute bilateral trade flows between jurisdictions, while local GDP is readily observable through standardized reporting. Given limited administrative capacity, evaluation criteria rationally prioritize measurable local performance. When officials compete on such metrics, trade barriers emerge as equilibrium responses rather than policy failures. Section 2 details why this represents a second-best institutional solution.

I use plausibly exogenous variation in the intensity of inter-jurisdictional yardstick competition, measured through a novel proxy: the relative age differential between politi-

[3]The literature has identified other negative aspects of decentralized policy-making in multileveled government: suboptimal fiscal decisions (Oates and Schwab, 1988); tax policy distortions (Keen and Kotsogiannis, 2002); increased corruption (Fan et al., 2009); and populist tendencies (Acemoglu et al., 2013; Kishishita and Yamagishi, 2021).

[4]It is called the 'one-level-up' policy (Chen and Kung, 2019). For example, provincial-level organization departments, including the provincial governor, determine the appointments and promotions of city-level leaders.

[5]Several studies, e.g., Wang et al. (2020); Zeng and Zhou (2024), demonstrate that age serves as a crucial indicator for upper-level politicians when assessing local politicians' promotion potential. In the absence of electoral accountability, this age-based promotion system provides a standardized mechanism for screening and selecting politicians.

[6]Economic performance is measured by a jurisdiction's economic growth during a politician's tenure. As documented in Li and Zhou (2005), higher growth rates correlate with increased promotion probability.

cians and their peers.[7] First, age is one of the two important predictors for a politician's promotion as it may suggest the politician's potential in the context of China.[8] Second, using relative age differential rather than the absolute value of age can further represent the nature of yardstick political competition in the tournament-style promotion system, as politicians have to "win" promotion from peers.

Using plausibly exogenous competitive intensity and controlling for politician and city fixed effects, I find that a one standard deviation increase in this age differential (indicating reduced yardstick competition) corresponds to a 4.9% increase in total inter-city trade volumes, demonstrating measurable reduction in trade barriers arising from strategic resource allocation. The effect varies systematically across transportation modes: smallest for motorway trade (3.56%) and largest for waterway trade (9.8%), reflecting varying degrees of political control over different transport channels. Waterway transportation, subject to extensive government control over port infrastructure, proves most susceptible to career-driven manipulation, while railway and airway trade show non-significant effects as these primarily serve long-distance connectivity rather than regional spillovers central to intra-provincial competition.[9] Remarkably, political fragmentation extends beyond domestic markets, with international export values increasing by 4.9% when competition intensity decreases, suggesting strategic resource reallocation inadvertently undermines export performance. Furthermore, bilateral provincial trade flows confirm this mechanism, showing origin province competition effects significantly outweigh destination effects, demonstrating that politicians primarily control outbound trade policies through their resource allocation decisions.

I further examine how yardstick competition affects firms through inter-firm linkages. The analysis reveals that politically induced frictions propagate along potential produc-

[7]For example, the relative age of a city politician is calculated as the difference between the politician's age and the average age of all politicians in the same province at the same time. Politicians whose age is closer to the provincial average face more intense competition because they fall within the optimal age range for promotion, competing directly with numerous similarly positioned peers. Politicians who are significantly older or younger than the average face reduced competitive pressure: older politicians because they approach mandatory retirement with limited advancement opportunities, while younger politicians because they have extended time horizons before facing peak competitive pressure. This age-based variation is plausibly exogenous because politicians cannot manipulate their birth year, age cutoffs for promotion are institutionally determined rather than subject to individual choice, and changes in the age differential mainly stem from political turnover in other cities. Section 3.1 shows how I construct this measure.

[8]Chinese leadership has historically emphasized age considerations in political appointments. A notable example is Deng Xiaoping's 干部队伍年轻化 (cadre rejuvenation) policy in the 1980s, which called for the promotion of cadres who were revolutionary, younger, more educated, and more technically specialized. This focus on age in political appointments continued under subsequent leaders, with Hu Jintao advocating for the promotion of experienced older politicians, and Xi Jinping further emphasizing age as a criterion in politician selection. https://news.ifeng.com/mainland/200702/0210_17_75079_1.shtml https://www.gov.cn/xinwen/2018-07/08/content_5304620.htm Retrieved on 31 January, 2025.

[9]Winston (1993) documents how different modes of transportation are subject to different regulations.

tion and information networks, influencing connected enterprises beyond the politicians' immediate jurisdictions. I identify these linkages using two complementary approaches: firm-level similarity derived from large language model (LLM) embeddings and historical input-output (IO) relationships from provincial tables. The results show that intensified political competition in one city leads to adverse outcomes–such as reduced access to intermediate inputs, lower revenues, and decreased labor productivity–not only among firms within the city but also among economically connected firms elsewhere in the province. This micro-level evidence suggests that internal market fragmentation arises partly from negative externalities transmitted through existing economic networks.

I identify how yardstick competition fragments markets through strategic resource allocation that paradoxically enhances short-term local performance. The mechanism operates in two stages. First, I establish that competition drives superior economic outcomes: politicians facing intense competition outperform provincial peers by 2.3 percentage points in GDP growth (1 SD increase in competition), validating that tournament incentives generate genuine effort effects. Second, I demonstrate that politicians achieve these performance advantages by redirecting public resources toward real estate and local infrastructure that generate rapid, locally appropriable GDP gains, while reducing support for tradable manufacturing that creates spillovers benefiting rivals. This allocation pattern distorts production composition, reducing tradable capacity and lowering trade through supply-side production distortions.

I document this resource allocation mechanism across three policy margins. First, competition shifts industrial subsidies from tradable manufacturing toward real estate, enabling politicians to maintain superior GDP performance while constraining sectors that would enhance rivals' supply chains; this provides the first empirical evidence for the strategic substitution framework proposed by Becko and O'Connor (2024). Second, competition reduces investment in inter-city motorway networks that lower bilateral trade costs (Allen and Arkolakis, 2022); spatial analysis reveals this underinvestment concentrates precisely in border regions where spillovers to rival cities are largest, with no effects in interior areas, confirming politicians strategically target high-spillover locations. Third, competition reallocates land from industrial and logistics uses toward residential development, supporting real estate-driven GDP growth while constraining tradable sectors' capacity to expand through agglomeration economies.

This study relates to four strands of literature. First, I contribute to the political economy of trade. While seminal work (e.g., Grossman and Helpman 1995) and subsequent studies (Dollar and Kraay 2003; Levchenko 2007; Dutt and Mitra 2005; Dutt and Traca 2010; Head et al. 2010; Antràs and i Miquel 2011) establish the primacy of political factors and national institutions in shaping international trade, the role of subnational political dynamics in

generating internal economic frictions, particularly within large, decentralized nations, remains less understood. Existing studies on intra-national trade (e.g., Jiang and Mei 2020 on China) have not fully elucidated how specific subnational political frameworks systematically create internal non-tariff barriers. I address this gap by examining how career incentives within a decentralized authoritarian system of yardstick political competition among local politicians engender internal market fragmentation through strategic resource allocation. Broadly, I contribute to this strand of literature by demonstrating that intra-country trade costs are endogenous to the structure of political incentives facing subnational politicians, thereby establishing a novel micro-foundation for domestic trade frictions rooted in the strategic behavior of politically motivated local politicians competing for promotion under budget constraints.

Second, this paper speaks to the literature on local protectionism and market fragmentation. While its detrimental welfare consequences are recognized (Young 2000; Donaldson 2015), and its prevalence documented in contexts like China (Young 2000; Bai et al. 2004; Poncet 2005; Bai and Liu 2019, Barwick et al. 2021). The most closely related paper to mine is Fang et al. (2025), who provide a rigorous political economy explanation for inefficient local protectionism under tournament-style competition in an autocracy. They establish that career-concerned local officials are systematically disincentivized to support firms from competing regions. As a result, local leaders distort resource allocation against firms from competing cities, generating local protectionism as an equilibrium outcome. My paper builds on this important foundation by providing complementary evidence on the specific channels through which these incentives operate. I demonstrate that yardstick competition induces a systematic reallocation of public resources away from tradable sectors and toward non-tradable activities with geographically confined benefits – a pattern that manifests across industrial policy spending, land provision, and infrastructure investment near jurisdictional borders. This strategic reallocation generates measurable internal trade barriers, with consequences that extend through firm networks to affect intermediate input access, productivity, and long-run city-level development.

Third, I contribute to the literature on politicians' career incentives and their policy choices. Building on foundational work on tournament theory (Lazear and Rosen 1981), research has extensively documented the impact of China's promotion tournament on economic growth (Li and Zhou 2005; Zhou 2007; Xu 2011; Liu 2005; Lu et al. 2022; Zeng and Zhou 2024) and other policy domains such as environmental regulation (He et al. 2020; Jia 2024). A key challenge in this literature is the causal identification of incentive effects. I address this by employing a novel identification strategy utilizing exogenous age differentials between competing politicians to proxy for career concerns. Substantively, I broaden the scope of this literature by demonstrating that these well-documented pro-

motion incentives critically shape internal trade and market integration through strategic resource allocation decisions, outcomes that have hitherto been underexplored in this context.

Fourth, this paper relates to the literature on yardstick competition. While such competition can be beneficial in democratic contexts by enhancing accountability and fostering policy innovation (Besley and Case 1995; Acemoglu and Robinson 2005; Acemoglu et al. 2019; Ferraz and Finan 2011; Persson and Tabellini 2009; Besley et al. 2010), its consequences are contingent on the broader institutional environment and may not extend to hierarchical, non-democratic systems with different accountability structures. In China's promotion tournaments, superiors evaluate local leaders based on relative metrics (Li and Zhou 2005). When policies entail inter-jurisdictional spillovers, this structure can incentivize politicians to strategically reallocate resources in ways that impede rivals' performance, even if detrimental to aggregate welfare, consistent with theories suggesting competition can exacerbate inefficiencies under certain conditions (Cox 2005; Padró i Miquel 2007). This study provides direct empirical evidence of these distortionary outcomes within an autocratic hierarchy. By demonstrating that intensified promotion competition, measured by the age differential metric, engenders greater market fragmentation through strategic resource reallocation under budget constraints, the findings reveal the paradoxical effects of performance benchmarking when coupled with career concerns absent democratic accountability. This challenges the notion that yardstick competition is inherently efficiency-enhancing (Besley et al. 2010) and shows its potential to undermine market integration in specific institutional settings.

The paper is organized as follows: Section 2 describes detailed background information on yardstick political competition and internal trade in China; Section 3 and Section 4 describe the data and identification strategy; Section 5 presents the baseline results; Section 6 presents additional results that further shed light on the mechanism; Section 7 concludes.

2 Background

2.1 Politician's Age and Career Prospects

The institutional setup for political advancement in China's multi-level administrative system is key to understanding local policy-making. Promotions follow a strict, top-down evaluation system under the 'one-level-up' policy, where higher-level politicians evaluate subordinates primarily on age and economic performance. Age is particularly dominant in promotion decisions (Wang et al., 2020), while economic performance includes GDP

growth (Jia et al., 2015) and infrastructure development (Wang et al., 2020).[10]

Age serves as a crucial promotion factor due to institutional features. First, the combination of local decision-making power and central control creates a tournament-like promotion system where age becomes an easily observable measure of future potential (Li and Zhou, 2005; Xu, 2011; Wang et al., 2020; Fang et al., 2025; Zeng and Zhou, 2024).[11] Second, mandatory retirement ages–60 years for prefecture-level cities and 65 years for province-level cities–impose strict career limits.[12] Without electoral accountability, age-based promotion offers a standardized method for comparing politicians across regions.

2.2 City Party Secretary and Within-province Competition

This study focuses on city party secretaries, who hold the highest political authority in city governance within the dual leadership structure alongside mayors. Party secretaries determine strategic priorities while mayors handle operations, highlighting the secretary's influential role in shaping local economic policies. City party secretaries face distinctive within-province competition. Their promotion opportunities are largely confined to provincial-level positions, creating vertical mobility constraints that differ from mayors, who enjoy more flexible career paths including potential promotion to secretary roles. This restriction intensifies competition among secretaries for limited higher-level positions–while provinces may contain over ten cities, available provincial positions are far fewer.[13]

Promotion data from 2004 to 2014 confirms this dynamic: only 2% of promoted secretaries moved to central government or other provinces, while 18% advanced to provincial-level positions. In contrast, mayors enjoyed promotion rates exceeding 50%. Given that economic performance factors into evaluation, party secretaries provide valuable insights into how promotion incentives shape behavior through yardstick competition.

The institutional structure of China's promotion system generates competitive rather than cooperative incentives among similarly aged secretaries. Provincial-level positions are strictly limited–typically fewer than a dozen slots for provinces containing 10–20

[10]While Chinese politicians may manipulate GDP growth for promotion, internal trade flows lack institutional salience and are not systematically monitored in cadre evaluations, making manipulation unlikely.

[11]Younger politicians may demonstrate higher ability by achieving the same rank as older peers in shorter time, while having more years for potential advancement.

[12]Politicians nearing these thresholds face reduced promotion chances and are often moved to ceremonial roles.

[13]While city administrative rank may correlate with promotion likelihood–with secretaries from provincial capitals or sub-provincial cities enjoying greater visibility–the inclusion of city fixed effects absorbs time-invariant differences in baseline promotion prospects across city tiers. The age differential measure captures relative competitive pressure among secretaries within the same province at the same time, conditional on this baseline heterogeneity.

cities–creating a zero-sum environment where one secretary's promotion reduces peers' chances. Unlike central-level appointments where factional balance and cohort coordination may operate, city party secretaries are explicitly evaluated on relative economic performance that directly benchmarks them against provincial peers (Li and Zhou, 2005). The "one-level-up" policy means secretaries compete for the attention of the same provincial organization department, which uses standardized age and performance criteria to rank candidates. These features ensure that age similarity intensifies rivalry rather than fostering collaboration. This study hypothesizes that secretaries adjust behavior based on age relative to provincial peers–those significantly younger or older face less intense competition, while those with similar ages compete most intensely for limited positions without age-based advantages. Figure A.1 shows the hypothesized non-linear relationship between politician age and trade volumes.

2.3 City Trade, Spillover, and Local Protectionism

In China's institutional context, trade volumes between cities via motorway and waterway transportation serve as important indicators of local protectionism, particularly across internal administrative boundaries. These modes, used primarily for shorter distances unlike airway and railway transportation, are particularly useful for studying protectionist behaviors from within-province competition.

City party secretaries can implement protectionism through direct and indirect methods. Direct actions are most visible in waterway and railway sectors, where local politicians exercise significant regulatory control. Even in road transportation, secretaries can impose local tolls and administrative fees.[14]

Indirect methods are equally critical, driven by strong yardstick competition incentives. Competition motivates secretaries to strategically reduce subsidies to tradable sectors, preferring non-tradable sectors like real estate that generate locally-confined benefits without enhancing rival jurisdictions' performance. This strategic focus on minimizing positive spillovers is supported by evidence that trade activity correlates with beneficial economic outcomes in nearby cities (see Table B.3). Politicians possess additional policy instruments including land provision manipulation, road infrastructure development, and trade policy emphasis. These tools, explored in Section 6.2, collectively enable strategic management of inter-jurisdictional economic interactions for political advantage. Figure A.2 illustrates the proposed causal pathway.

[14]Truck tolls in China differ widely across provinces and by charging method: some use weight, others axle or distance. Despite the nationwide ETC rollout in 2020, provincial autonomy means a loaded truck can still pay far more than an empty one, and similar routes can carry different costs across regions.

3 Data

In this section, I present the data construction, sources, and key trends in the data. Other data descriptions can be found in Appendix C.

3.1 Yardstick Competition Measured by Politician Age Differential

This study utilizes biographical data for city party secretaries, including start age, education, and promotion history.[15] The key measure to capture yardstick political competition intensity is the 'Politician Age Differential.'

I calculate this measure using Equation 1:

$$\text{Politician Age Differential}_{i,c,t} = \left|\text{Start Age}_{i,c} - \text{Average Start Age}_{p,t}\right| \tag{1}$$

where i, c, p, and t represent the politician, city, province, and year, respectively. Start $\text{Age}_{i,c}$ is the age of politician i when they began their term in city c. Average Start $\text{Age}_{p,t}$ is the average starting age of other city party secretaries within the same province during year t.

The effectiveness of this measure depends on two characteristics. First, empirical evidence (see Figure 1) demonstrates that this age differential successfully predicts promotion likelihood. Second, the variation in age differentials must be independent of other factors that could influence protectionist policies.

The measure is designed to mitigate endogeneity concerns through three mechanisms. First, it relies on politicians' ages at the *beginning* of their terms rather than during tenure, ensuring the measure remains uncorrelated with short-term economic performance (Wang et al., 2020). Second, the primary variation source stems from routine political turnover, representing an external shock to competitive pressure.[16] Third, the analysis incorporates politician fixed effects to control for strategic assignment possibilities.

3.2 City Trade Volumes and Export Value

The primary outcome variables are city-level trade volumes and export values sourced from the Chinese City Statistical Yearbook, spanning 1996 to 2018. Trade volumes encompass transportation across four modes: motorway, waterway, railway, and airway (measured in tons), while export values capture international trade flows (measured in USD). These indicators primarily reflect domestic trade patterns and regional commerce

[15] I do not use mayors as the main research subjects because mayors do not face within-province yardstick political competition as aforementioned. I use city mayors for the falsification test.

[16] Political turnover among rivals (rivals' age) is unlikely to correlate with unobservable local characteristics affecting trade volumes. Jiang and Mei (2020) argue that political turnover in China is plausibly exogenous.

within China's borders. The analysis includes only cities with complete and consistent data coverage throughout the entire study period.

3.3 Summary Statistics

Table B.4 presents summary statistics for the primary variables employed in this analysis, spanning the period from 1996 to 2018, covering 289 cities. The data are organized across six panels, encompassing trade, politician characteristics, economic indicators, firm-level variables, city-sector aggregates, and firm registration data.

Panel A reports statistics for trade and transportation variables based on 4,819 city-year observations. The logarithm of total trade volume exhibits a mean of 8.628 with a standard deviation of 1.032. Among transportation modes, motorway trade demonstrates the highest average volume at 8.441, followed by railway (6.157) and waterway (5.977) transportation. Airway trade volume shows a mean of -1.095, consistent with its more specialized nature and limited geographic coverage. International export values average 6.445 in logarithmic terms across 3,638 observations.

Panel B documents politician characteristics, revealing an average age differential of 4.213 years between local officials and regional benchmarks. Politicians commence their tenure at an average age of 50.46 years and maintain an average tenure duration of 2.892 years. Panel C indicates that regional GDP averages 15.56 in logarithmic terms across all observations.[17]

Panels D and E present firm-level characteristics and city-sector aggregates respectively, with detailed statistics provided in the table. Panel F encompasses firm registration statistics from 5,967,624 observations, indicating average logarithmic firm entries of 1.705, with 48.3% classified as tradable enterprises and 4.2% as real estate firms.

4 Empirical Strategy

4.1 Empirical Strategy

To test whether age differential affects trade volumes, I estimate the following equation:

$$Y_{c,t} = \alpha_0 + \alpha_1 \text{Politician Age Differential}_{i,c,t} + X'_{i,c,t} + \delta_c + \sigma_i + \tau_t + \epsilon_{c,t} \tag{2}$$

where subscripts i, c, and t denote politician, city, and year, respectively. $Y_{c,t}$ is the logarithm of trade volumes (via road, waterway, train, airway, total, and export value) in city c and

[17] Figure A.5 shows distributions for the Politician Age Differential and main outcome variables.

year t. The key independent variable, Politician Age Differential$_{i,c,t}$, measures the absolute difference between a city leader's age and the average age of other city leaders in the same province, as defined in Equation 1. The vector $X'_{i,c,t}$ includes time-varying controls for politician characteristics (age, rivals' age) and city attributes (GDP). δ_c denotes city fixed effects;[18] σ_i denotes politician fixed effects;[19] τ_t denotes year fixed effects. $\epsilon_{c,t}$ is the error term. Standard errors are clustered at the province-year level due to variations in age differential stemming from political turnover within provinces.

The coefficient of interest is α_1, which captures the effect of Politician Age Differential on trade volumes and export value. A positive coefficient would indicate that larger age differentials are associated with higher trade volumes, supporting the hypothesis that intense yardstick political competition (smaller age differentials) leads politicians to engage in local protectionism. Conversely, when politicians face less direct competition from age-similar peers, they may pursue policies that facilitate inter-regional trade.

4.2 Identification Assumptions

The identification strategy assumes that, conditional on city fixed effects, politician fixed effects, year fixed effects, and time-varying controls, variation in Politician Age Differential is exogenous to unobserved factors affecting city-level trade volumes.

Plausibly Exogenous Variation Age differential variation primarily stems from the staggered rotation of city party secretaries across the province and politicians' start ages. When a peer politician in another city is replaced, the focal politician's relative age position changes—not due to any action in the focal city or changes in its economic conditions, but due to bureaucratic turnover elsewhere. These rotations follow institutional rules (fixed term lengths up to five years, with average tenure spanning 2 to 3 years) and are governed by the Central Organization Department based on province-wide personnel considerations largely orthogonal to local trade conditions. The resulting variation in age differentials is therefore plausibly exogenous.

Fixed Effects as Additional Safeguard To ensure that results are not driven by strategic assignment or selection, I include politician fixed effects and city fixed effects. These absorb any time-invariant differences across politicians or cities that might correlate with both

[18] I control for city fixed effects to account for unobserved city-specific factors that may influence both age differential and trade.

[19] I control for politician fixed effects to account for unobserved politician-specific characteristics that might be correlated with both age differentials and trade outcomes.

age differential and trade outcomes. With these fixed effects, identification relies solely on within-politician variation in relative age position over time.

Balance Tests Figure A.4 shows no statistically significant correlation between age differential and observable characteristics including politician education, STEM background, tenure, or city attributes like population, GDP, and firm counts after including fixed effects. This supports the assumption that age differential does not proxy for other trade-related factors.

5 Results

5.1 Validating Age Differential as a Competition Measure

To validate that age differential correlates with career prospects and within-province competition intensity, I analyze how age differential affects politician career outcomes using the following specification:

$$1(\text{Politician Career Prospect})_{i,c} = \sum_j \alpha_j \text{Signed Age Differential Bin}_{j,i,c} + X'_{i,c} + \delta_c + \sigma_t + \epsilon_{i,c} \tag{3}$$

The dependent variable captures two career outcomes: (1) Promotion, an indicator for whether politician i in city c is promoted following their tenure; and (2) Transfer/Retirement, an indicator for whether the politician is transferred or retired. Demotion serves as the reference category. The key explanatory variable represents discrete bins of the signed age gap (politician's age minus provincial average), with the $[-1, 1]$ year range as the reference category; negative values indicate younger than peers, positive values indicate older. I use binned age differentials in Equation 3 to visualize the non-linear relationship across the age distribution in Figure 1; Tables B.1 and B.2 present regressions using a continuous measure. Controls include individual characteristics, city-level variables, connections to provincial politicians, city fixed effects, and tenure start year fixed effects. Standard errors are clustered at the city level.

Figure 1 presents the relationship between signed age differential bins and career prospects. The youngest politicians (relative to peers) exhibit the highest promotion probability, while the oldest have the lowest. Tables B.1 and B.2 present corresponding regressions: a one-year increase in signed age differential reduces promotion probability by 3.3 percentage points (Table B.1, column 4) and increases transfer/retirement probability by 3.9 percentage points (Table B.2, column 4). These effects are attenuated for a higher city tier, e.g., deputy-level cities, consistent with Wang et al. (2020).

Importantly, Figure 1 reveals that politicians within approximately ± 3 years of the provincial average face similar career pressures—younger politicians compete for promotion while older politicians strive to avoid elimination. This symmetry justifies using the *absolute* age differential $|\text{Age} - \text{Avg Age}|$ in the main trade regressions: politicians closer to the peer average (smaller absolute gap) face stronger yardstick competition, while those further from the average (larger absolute gap) face weaker pressure regardless of direction. The signed measure validates that career stakes exist on both sides of the age distribution; the absolute measure captures the intensity of competitive pressure that drives protectionist responses.

5.2 Yardstick Competition and City Trade Volumes

In this subsection, I estimate Equation 2 to examine the age differential effect on city trade volumes.

5.2.1 Politician Age Differential and City Trade Volumes

Table 1 reports the baseline regression results examining the impact of Politician Age Differential on various measures of city trade volumes, in line with incentive frameworks from the political-tournament literature (Maskin et al., 2000; Li and Zhou, 2005; Xu, 2011; Jia et al., 2015). Panel A presents estimates for total city trade volumes across five progressively stringent specifications. Column (1) employs city fixed effects and year fixed effects as the baseline specification. Column (2) augments this with politician and city characteristics. Column (3) adds politician fixed effects to control for time-invariant politician-specific factors. Column (4) further incorporates province-year fixed effects to absorb province-specific time trends. Column (5) implements city-politician fixed effects to account for within-politician variation across different postings. The coefficient on Politician Age Differential remains consistently positive and statistically significant at the 1 percent level across all specifications. Under the most comprehensive specification in Column (5), the estimated coefficient of 0.011 indicates that a one standard deviation increase in Politician Age Differential corresponds to a 4.9 percent increase in total trade volumes.[20] I also visualize the province-specific estimates of competition on trade in Figure 2 to demonstrate that the positive relationship holds broadly across provinces.[21]

[20] The standard deviation of Politician Age Differential is 4.457 years, yielding the calculation: $0.011 \times 4.457 = 0.049$.

[21] Figure 2 plots each province's predicted trade volume against its average yardstick competition level. The positive slope (0.021) is statistically significant and holds across diverse provincial contexts—from coastal provinces like Guangdong and Zhejiang to inland provinces like Gansu and Sichuan—suggesting that the mechanism operates throughout China's varied regional economic environments.

The magnitude of this effect is economically substantial and comparable to findings in Li and Zhou (2005), and is consistent with evidence that promotion incentives near age thresholds raise reported GDP growth by about 3.4 percentage points (Zeng and Zhou, 2024), suggesting that political competition represents a significant factor in economic policy implementation. My results further show a yardstick competition nature of the promotion system.

Panel B analyzes motorway trade volumes, where coefficients remain positive and significant across specifications, though smaller in magnitude (3.56 percent increase under Column 5). This finding aligns with evidence that highway-driven market access fosters trade integration Faber (2014), while also revealing how politicians strategically manipulate this policy instrument in response to competitive pressures.

Panel C examines waterway trade, revealing the largest effect with a 9.8 percent increase. This substantial impact reflects the high degree of government control over waterway and port infrastructure, as documented by the institutional evolution and planning of China's port/IWT system (Notteboom and Yang, 2017), making waterway systems particularly responsive to local officials' strategic decisions.

Remarkably, Panel D shows that international export value increases by 4.9 percent when domestic competition intensity decreases. While politicians may not be incentivized to restrict exports directly, their fragmentation of internal markets creates unintended spillovers that damage export competitiveness. This suggests that local protectionism's costs extend far beyond domestic efficiency – it inadvertently undermines the very export performance that politicians seek to boost. I explore multiple channels through which this occurs in the later sections.

The differential effects across transportation modes reveal that politicians strategically target policy instruments where they exercise greater control and where impacts on competitors are more direct. This selective intervention is consistent with theoretical and empirical accounts of China's political tournament system.

Column (6) provides a falsification test by analyzing the behavior of city mayors, who operate under different institutional constraints and career incentives than party secretaries. While city party secretaries face intense, geographically-constrained competition within their province, mayors have more flexible career paths. For instance, mayors can be promoted to party secretary positions in other cities, meaning they do not compete in the same closed tournament as secretaries. This institutional difference implies that the within-province yardstick competition, as measured by relative age, should not significantly influence mayors' policy decisions regarding trade.

The results confirm this prediction. When the same specification is run using the age differential among city mayors, the estimated coefficients are statistically indistinguishable

from zero and economically negligible across all trade categories. This null result for mayors provides strong evidence for the proposed mechanism. It demonstrates that the link between relative age and trade policy is not a general phenomenon related to age itself, but is specific to the institutional context of the party secretaries' promotion tournament. The absence of an effect for mayors, who face different career incentives, helps to isolate the paper's central mechanism.

Multiple robustness tests confirm these findings. First, placebo tests show no effects using cross-provincial age differentials (Table B.11) or long-distance trade flows (Table B.12), neither of which should respond to within-province competition. Second, results are robust to alternative specifications (Table B.15), a regression discontinuity design exploiting discontinuous age changes (Section G.4), and an instrumental variable strategy using lagged competition intensity (Table G.2). Third, alternative competition measures based on education or tenure show weaker effects, confirming that age-based competition drives the results (Appendix G.8). Finally, provincial-level analysis using inter-provincial railway trade (Appendix G.1) yields consistent findings. Notably, trade-reducing effects originate primarily from competition intensity in the exporting region, indicating that politicians strategically erect barriers to boost local performance relative to rivals.

5.2.2 Event-study: Similar-Age Competitor Turnover

To validate causal interpretation and address endogeneity concerns, I examine dynamic effects using an event-study specification that traces the impact of the arrival of a similar-age competitor over time:

$$Y_{c,t} = \sum_{\substack{k=-4 \\ k\neq 0}}^{4} \beta_k \text{Competitor Political Turnover}_{i,c,t+k} + \delta_c + \sigma_i + \tau_t + \epsilon_{c,p,t} \tag{4}$$

where k indexes periods relative to the turnover of a similar-age competitor (within ± 3 years) in another city within the same province.[22] The specification includes four leads ($k \in \{-4, -3, -2, -1\}$) and four lags ($k \in \{1, 2, 3, 4\}$), with $k = 0$ serving as the reference period (omitted). I control for city, politician, and year fixed effects, with standard errors clustered at the province-year level.

The inclusion of leads requires that similar-age competitor turnover is strictly exogenous, that current shocks to trade outcomes do not affect the timing of turnover events in other cities. This assumption is plausible in the Chinese institutional context because the timing of bureaucratic rotations is governed by the centralized personnel system and determined by factors such as term limits, promotions to provincial positions, and retire-

[22] According to Figure 1, the competition is the most intense for competitors within 3 years older (younger).

ment ages. These rotation decisions are made at the provincial or central level and are unlikely to respond to trade conditions in any single city. Under this assumption, the lead coefficients ($\beta_{-4}, \beta_{-3}, \beta_{-2}, \beta_{-1}$) serve as a placebo test for pre-trends: if the relationship reflects causal effects of yardstick competition, changes in trade should follow, not precede, the turnover of similar-age competitors.

Figure 3 presents the event-study results for key trade outcomes. The pre-treatment period ($t-4$ to $t-1$, shown in blue) exhibits coefficients close to zero and statistically insignificant, confirming the absence of pre-trends. Following the turnover event, coefficients in the post-treatment period ($t+1$ to $t+4$, shown in red) become positive and statistically significant, with the effect persisting throughout the four-year window. The pre-treatment average across periods $t-4$ to $t-1$ and the post-treatment average across $t+1$ to $t+4$ are displayed as dashed lines, clearly illustrating the shift in trade outcomes following similar-age competitor turnover. This pattern suggests baseline estimates are not driven by reverse causality or omitted variables, and supports a causal interpretation of yardstick competition effects.

5.3 Yardstick Competition and Potential Supply Chain Disruption

In this section, I examine the effect of Politician Age Differential on firm outcomes, especially those connected via business networks.

5.3.1 Local and Spillover Effects of Politician Age Differential on Firms

I hypothesize that yardstick competition can influence economic outcomes not only through direct trade flows from focal firms but also by affecting the underlying structure of inter-city economic linkages. Intense competition may incentivize politicians to underinvest in policies that foster beneficial network spillovers, thereby impacting firms embedded within these networks. I hypothesize that stronger yardstick political competition (i.e., a smaller age differential) negatively impacts the economic performance of firms reliant on inter-regional network ties due to increased local protectionism and reduced positive externalities.

To test this hypothesis, I construct a firm-level panel dataset combined with information on inter-firm business network connections. Firm-level data are sourced from the Annual Survey of Industrial Firms (ASIF), a widely used database covering Chinese manufacturing enterprises. Following Brandt et al. (2017), the sample spans 2000–2007, excluding post-2007 data due to known quality concerns.

I employ two complementary approaches to identify firms connected via business networks. The first approach follows Breitung and Müller (2025) and uses LLM-based

similarity scores to establish links between firm pairs. Specifically, for each pair of firms i and j, I compute similarity based on shared characteristics—including detailed industry classification, primary business activities, and main products—that are indicative of potential supply chain or other economic relationships.[23] To focus on strong potential connections, I impose a high similarity threshold of 95%.[24] Table D.1 in the Appendix provides illustrative examples of matched firm pairs. Section D describes the construction of this text-based business network in detail.

The second approach uses province-specific Input-Output (IO) tables to identify sectoral connectedness within each province, serving as a complementary measure of business linkages. The detailed construction of the IO-based connectedness measure is presented in Appendix E.

The empirical strategy estimates the impact of yardstick political competition faced by the politician in firm i's city on the economic outcomes of the connected firm j located in a different city. I estimate the following equation:

$$Y_{j,s,c_j,t} = \beta_0 + \beta_1 \text{Politician Age Differential}_{i,c_i,t} + \mathbf{X}'_{j,s,c_j,t} + \delta_{pair} + \sigma_i + \tau_{s,t} + \gamma_{c_j,t} + \epsilon_{j,s,c_j,t} \tag{5}$$

where $Y_{j,s,c_j,t}$ represents firm outcomes (e.g., log intermediate inputs, log revenue) for the connected firm j in sector s and city c_j at year t. The key independent variable is Politician Age Differential$_{i,c_i,t}$ for the politician governing firm i's city c_i at year t. Note that c_i and c_j denote distinct cities: c_i is the focal city where political competition is measured, and c_j is the connected city where firm j's outcomes are observed. $\mathbf{X}'$ includes time-varying controls for firm j. The specification incorporates firm-pair fixed effects (δ_{pair}) to control for time-invariant characteristics of each specific firm linkage, politician fixed effects (σ_i) for the politician in city c_i, sector-year fixed effects ($\tau_{s,t}$), and connected-city-year fixed effects ($\gamma_{c_j,t}$). Standard errors are clustered at the province-year level, corresponding to the level of variation in the primary independent variable. The coefficient of interest, β_1, captures the effect of yardstick political competition in city c_i on its network partners in city c_j.

For direct effects on the focal firm i, I estimate an analogous specification where firm i is both the focal and outcome unit. In this case, the firm-pair fixed effect collapses to a firm fixed effect, and the outcome variables measure firm i's own performance: intermediate inputs, revenue, revenue per worker, and profit (all in logarithmic form).

[23] I use the pretrained `all-MiniLM-L12-v2` model to convert combined text descriptions of firms from the year 2000 data into numerical embeddings. These embeddings serve as the primary input for calculating cosine similarity between firms.

[24] Breitung and Müller (2025) use a 99% similarity threshold to determine global firm networks. In this study, I adopt a lower threshold of 95% to capture the closer business relationships that exist among firms within the same province.

The estimation results, presented in Table 2, provide empirical support for the hypothesis that yardstick political competition negatively impacts firms, both directly and by fragmenting inter-city network connections. Columns (1)-(4) report direct effects on the focal firm i. A larger Politician Age Differential (indicating weaker competition) is associated with significantly better performance. Specifically, a one standard deviation increase in age differential correlates with a 5% increase in log intermediate good inputs, a 2.4% increase in log profits, a 3.5% increase in log revenue, and a 3.5% increase in log revenue per worker for firm i.[25] This suggests that reduced competitive pressure allows politicians to adopt local policies or foster an economic environment more conducive to the success of firms within their own jurisdiction, potentially including reduced barriers to inter-city exchange.

Columns (5)-(8) report spillover effects on connected firms (firm j), estimated using Equation (5). The results demonstrate that the impacts extend beyond the focal city. A larger age differential in city c_i is associated with significant increases in the connected firm j's log intermediate good inputs, log profits, log revenue, and log revenue per worker, although the estimated coefficients are slightly smaller than for firm i, which is natural due to spillover effects. These findings indicate that when city party secretaries face less intense competition, firms connected to their city via business networks experience economic benefits, likely resulting from policies that facilitate stronger inter-city linkages and improve access to inputs, leading to increased revenue and productivity. Conversely, intense yardstick political competition generates negative externalities—stemming from choices like underinvestment in shared infrastructure, government spending, and imposing trade frictions—that propagate through these economic networks, hindering the performance of linked firms. I also conduct a robustness test using Provincial Input-Output Linkage in 1997 (prior to the sample period) and find similar results, as shown in Table B.10.

To isolate the proposed mechanism, I conduct a placebo test (Table B.14) examining whether the age differential of the politician in city c_i affects connected firms (firm j) located in bordering cities but in *different* provinces. Since the theoretical mechanism hinges on competition *within* the province driving fragmentation, no significant effect should appear across provincial boundaries. Indeed, the results show no significant impact. This strengthens the interpretation that the observed network effects are driven by the specific within-province yardstick competition dynamics central to this study, rather than by unobserved confounding factors or broader economic trends. Taken together, the results for both focal and connected firms, combined with the supporting placebo test, provide robust evidence that yardstick political competition significantly impacts firm performance di-

[25]The standard deviation of Politician Age Differential in the firm i dataset is 2.192. For connected firms, the standard deviation of Politician Age Differential is 1.986.

rectly and indirectly through the fragmentation of inter-city economic networks, consistent with politicians strategically managing spillovers under career concerns.

5.3.2 Disruption of Supply Chain: Competitors versus Suppliers/Partners

The preceding analysis established that the intensity of yardstick political competition generates spillover effects impacting firms connected through business networks. This section examines these network effects more deeply by distinguishing between different types of inter-firm relationships. Specifically, I investigate whether the impact of competition in city c_i on a connected firm j varies depending on whether firm j is primarily a potential competitor or a potential supplier/partner to firms in city c_i. The underlying hypothesis is that the mechanisms of local protectionism induced by intense competition might disproportionately affect vertical supply chain linkages compared to horizontal competitive relationships.

To explore this heterogeneity, I categorize the firm pairs identified through network analysis (as described in Section 5.3.1) into two groups: potential competitors (characterized by high similarity in products and business activities) and potential suppliers/-partners (representing likely vertical or collaborative links).[26] I then re-estimate the core specification from Equation 5 separately for each group, examining the effect of the Politician Age Differential in city c_i on the performance outcomes of firm j. The results are presented in Table 3.

Panel A of Table 3 displays the estimation results for firm pairs classified as potential suppliers or partners. In this group, a larger Politician Age Differential in city c_i (indicating weaker yardstick competition) is associated with statistically significant improvements in the performance of the connected firm j. Specifically, the coefficients are positive and significant for intermediate good inputs, revenue, and revenue per worker. The coefficient for Log(Profits) is positive but does not reach statistical significance. These findings imply that when yardstick competition is less intense in city c_i, its potential suppliers or partners in city c_j experience tangible benefits, notably in terms of access to intermediate inputs and overall revenue generation.

Conversely, Panel B presents the results for firm pairs identified as potential competitors. The coefficients associated with the Politician Age Differential are consistently small and statistically insignificant across all four outcome variables: Log(Intermediate Good Inputs),

[26]For potential competitors, if firms have very similar products and business activities and comparable firm scale (based on firm assets, revenue, profits and other financial status) but are located in different cities, they are classified as potential competitors operating in the same market segment. I use LLM to match their business activities and product information, which helps identify firms with highly comparable industry classifications, product offerings, and target customer bases, making them direct rivals in their respective local markets. Detailed classification can be found in Appendix F.

Log(Profits), Log(Revenue), and Log(Revenue per Worker). This lack of significance suggests that the intensity of political competition faced by the politician in city c_i does not translate into discernible positive or negative performance impacts for its potential competitor firms located in city c_j, at least through the network channels captured here.

Comparing the results across Panel A and Panel B reveals a clear distinction. The economic consequences of yardstick political competition, as transmitted through inter-city firm networks, appear to primarily manifest in relationships involving suppliers and partners, rather than direct competitors. Intense competition (smaller age differential) seems to impede economic activity within these vertical or collaborative chains more substantially than it affects parallel competitors. This suggests that the strategic trade barriers or reduced inter-regional cooperation resulting from political pressures may be particularly detrimental to the functioning of supply networks and partnerships connecting different jurisdictions. This finding refines our understanding of the market fragmentation mechanism, indicating that politically induced frictions disproportionately disrupt established inter-firm dependencies along the value chain.

5.3.3 Heterogeneity by Firm Supply-Chain Position: Upstream vs. Downstream

This subsection examines how yardstick competition affects firm performance differentially across the value chain. I estimate the direct effects specification (as described in Section 5.3.1) at the firm level, focusing on firm i's own performance across four key metrics: intermediate inputs, revenue, revenue per worker, and profit (all in logarithmic form). A positive coefficient indicates that weaker competition (larger age differential) correlates with improved firm outcomes.

I organize firms by their position in supply chains: upstream and midstream producers of intermediate goods including Manufacturing and Processing sectors, downstream producers of final goods including Products and Textiles, and resource-based firms in Natural Resources, alongside the Full Sample and the broader Tradable sector classification. Figure 4 presents the estimated coefficients for each category across the four outcome variables (Panels a-d).

Across the Full Sample and Tradable sector, weaker yardstick competition associates with statistically significant increases in all performance measures, confirming that firms benefit when local political incentives generate fewer inter-jurisdictional frictions. The effects are particularly pronounced for upstream and downstream producers embedded in complex value chains.

The heterogeneity by supply chain position reveals substantial variation in responses to political competition. Manufacturing firms, representing key upstream and midstream suppliers, exhibit the largest and most precisely estimated gains in intermediate input

utilization (Panel a) and revenue generation (Panel c). Processing firms demonstrate similarly robust positive effects across all outcomes. Downstream categories including final Products and Textiles also benefit significantly, showing positive and statistically significant coefficients for revenue, productivity, and profitability (Panels b-d). In contrast, Natural Resource firms display negligible and statistically insignificant responses across all measures.

The differential responses across supply chain positions reflect distinct economic channels through which political frictions affect firm performance. Political barriers that impede inter-jurisdictional coordination disrupt sequential production processes through both cost-side and demand-side mechanisms. Downstream firms face cost-side exposure as final goods producers depend critically on timely access to diverse intermediate inputs sourced from multiple jurisdictions. Political frictions increase delivered input costs, elevate supply volatility, and reduce operational efficiency. When competition intensity weakens and such frictions diminish, downstream firms expand input procurement (Panel a) and scale production, generating higher revenue, labor productivity, and profits.

Upstream firms experience demand-side exposure as intermediate goods suppliers depend on purchasing capacity from downstream customers operating across administrative boundaries. Political barriers that constrain downstream activity translate into reduced orders and lower capacity utilization for upstream producers. Relaxing these constraints expands market access and increases sales volumes, consistent with the substantial revenue gains observed for Manufacturing and Processing sectors.

The results in Figure 4 demonstrate that sectors embedded in multi-jurisdictional value chains capture the largest benefits when political competition weakens and supply chain frictions diminish. Resource extraction activities, characterized by greater location specificity and lower input-output intensity, remain relatively insulated from these political dynamics and consequently exhibit muted responses. These differential impacts across supply chain positions provide compelling evidence that value chain integration constitutes a primary channel through which local political incentives shape firm performance and economic outcomes.

5.3.4 Economic Costs of Yardstick Competition on Firms

I evaluate the welfare consequences of yardstick competition-induced market fragmentation through multiple channels. I analyze both the direct and indirect effects on producer efficiency and long-term economic growth.

Yardstick competition-induced protectionism creates uneven economic impacts across firms in different sectors. Using firm-level data from Table 2, I demonstrate that intense yardstick political competition disproportionately benefits local non-tradable firms while

harming both local tradable firms and non-local producers.

Among manufacturing firms, a one standard deviation decrease in Politician Age Differential reduces intermediate input availability by 5%.[27] This reduction translates to a total factor productivity (TFP) decline of approximately 1.2% through production function estimation, assuming imperfect substitution conditions and constant labor and capital inputs (Halpern et al., 2015).[28] The welfare implications of reduced intermediate inputs vary significantly by sector, as shown in Table B.7.

The resulting market fragmentation induces production reallocation from efficient producers toward less efficient local producers, as firms producing intermediate inputs are, on average, more productive than the local non-tradable firms that benefit from protection.[29]

To calculate this GDP impact, I utilize China's 2000 Input-Output table and apply the following methodology:

$$\text{GDP Impact} = \sum_{s=1}^{S} \text{TFP Loss}_s \times \text{GDP Share}_s \tag{6}$$

where TFP losses come from Table B.7 and GDP shares from the IO table.[30]

As shown in Table B.8, the impact of a one SD increase in yardstick political competition across all sectors equals 0.54% of GDP, or approximately \$6.48 billion in 2000 USD. This represents a significant efficiency loss due to political competition-induced market fragmentation.

6 Additional Empirical Evidence

Having documented that yardstick competition reduces inter-city trade, I now examine the mechanisms through which political tournaments fragment markets. The analysis proceeds in three steps. First, I establish that competition drives politicians to outperform their provincial peers in GDP growth, validating that yardstick competition operates as theorized. Second, I demonstrate that politicians achieve these performance gains not

[27] Estimated coefficient 0.023×2.192 (standard deviation of Politician Age Differential for firm sample) $\approx$ 0.05 or 5%.

[28] Halpern et al. (2015) find that manufacturing firms in the United States experience a 0.22% increase in revenue productivity and 0.24% increase in quantity productivity for every 1% increase in intermediate inputs.

[29] The relationship between trade participation and productivity is well-established in the literature (Melitz, 2003; Bøler et al., 2015). The misallocation leading to inefficiency is also well documented (Hsieh and Klenow, 2009).

[30] For simplicity, under a production function with constant capital and labor inputs, a 1% decrease in TFP directly translates to a 1% decrease in GDP (Solow, 1957).

through explicit trade barriers or price manipulation, but through strategic resource allocation that systematically favors non-tradable sectors over tradables. This allocation pattern distorts production composition, reducing tradable capacity and thereby lowering trade flows through supply-side distortions. Third, I show that while this strategy generates short-term GDP gains, the cumulative costs of market fragmentation substantially undermine long-term economic development.

6.1 Mechanism: Competition and Relative Economic Performance

I examine how competition intensity affects short-term economic performance. Understanding this relationship is crucial for identifying the mechanism through which political tournaments shape policy choices: do politicians restrict trade because they are economically weak, or do trade restrictions serve as strategic instruments to enhance competitive position?

Table 4 presents results on the relationship between lagged Politician Age Differential and contemporaneous GDP performance relative to provincial peers. The analysis employs city-politician fixed effects and year fixed effects to isolate within-politician variation across postings and control for common temporal shocks. Column (1) measures the absolute GDP gap in hundreds of millions of RMB between a city and the provincial average, while Column (2) expresses this gap as a percentage deviation from the provincial mean.

The results reveal a significant negative relationship between lagged competition intensity and relative economic performance. A one standard deviation increase in Politician Age Differential is associated with a 32.3 hundred million RMB decrease in GDP relative to the provincial average (Column 1), and a 2.3 percentage point reduction in relative GDP performance (Column 2).[31] These effects are statistically significant at the 5 percent level and economically meaningful.

The negative coefficients indicate that politicians facing stronger competitive pressure–those with smaller age differentials from their provincial peers–achieve better short-term GDP performance relative to competitors. This finding is consistent with tournament theory predictions (Lazear and Rosen, 1981; Li and Zhou, 2005): officials in competitive positions near the promotion-optimal age face stronger incentives to exert effort and boost measurable performance metrics to secure promotion. The use of lagged age differential addresses potential reverse causality concerns, as prior-period competitive positions cannot be influenced by current GDP outcomes.

Integrating these findings with the trade restriction patterns documented in Table 1 reveals the strategic logic underlying local protectionism. Politicians facing intense

[31] Calculations: $7.243 \times 4.457 = 32.3$ hundred million RMB; $0.517 \times 4.457 = 2.3$ percentage points, where 4.457 years is the standard deviation of Politician Age Differential.

competition (small age differential) simultaneously (1) achieve better short-term GDP growth relative to provincial peers, yet (2) impose greater trade barriers against those same competitors. This apparent paradox dissolves when recognizing that trade restrictions serve as a complementary policy instrument rather than a substitute for growth-enhancing efforts. By fragmenting markets, officials can capture a larger share of economic activity within their jurisdiction, protect local industries from inter-regional competition, and boost short-term GDP metrics that are crucial for promotion evaluation–all while constraining competitors' access to their local markets and resources.

This strategic use of protectionism is further rationalized by China's official rotation system. With average party secretary tenures of 3-4 years, politicians face strong incentives to prioritize policies that generate immediate, observable performance improvements over those that maximize long-term welfare. Trade restrictions offer such short-term benefits: they can quickly boost local GDP by redirecting economic activity inward, increase fiscal revenues through heightened administrative discretion, and demonstrate responsiveness to local interest groups–all measurable within a single term. The longer-term costs of market fragmentation, including reduced specialization, diminished economies of scale, and foregone agglomeration benefits, typically materialize beyond the politician's tenure and are difficult to attribute to specific policy choices.

6.2 Three Endogenous Policy Tools that Distort Trade

6.2.1 Endogenous Trade Costs: Competition and Intercity Motorway Network Development

This subsection examines how yardstick competition shapes investment in inter-city road infrastructure, focusing on controlled-access motorways. Motorway construction represents the canonical high-spillover policy: it connects multiple jurisdictions, lowers bilateral trade costs, and re-routes economic activity beyond investing city boundaries. When competitive pressure is acute, incumbents tilt spending toward low-spillover, place-based amenities with geographically contained benefits. When competitive pressure weakens, the political return to high-spillover projects rises, making cross-jurisdictional roads more attractive (Bougheas et al., 1999; Limao and Venables, 2001).

Motor road networks are principal determinants of within-country trade frictions and local market integration. Modern spatial trade frameworks demonstrate that improving transport network edges lowers generalized trade costs along many origin-destination pairs, with resulting production, consumption, and routing re-optimization operating in general equilibrium. Allen and Arkolakis (2014) show that U.S. Interstate Highway System improvements generate meaningful welfare gains because benefits diffuse across

space through trade and mobility, estimating the Interstate network raised U.S. welfare by roughly 3.5 percent. Allen and Arkolakis (2022) similarly find that network improvements reshape flows and welfare well beyond treated links. Recent Chinese evidence shows expressways lower ad-valorem transport costs by about 20 percent relative to regular roads and increase aggregate exports, reinforcing motorways as trade-cost-reducing, high-spillover technology (Fan et al., 2023).

I leverage a city-level panel combining fiscal and political data with geospatial transport network information (Davis et al., 2025) to estimate whether yardstick competition depresses connective infrastructure investment.[32] Table 6 reports results across multiple motorway development outcomes. A larger Politician Age Differential—indicating weaker yardstick competition—is systematically associated with greater motorway provision. A one-standard-deviation increase (about 2.88 years) predicts a 6% increase in total and single-segment motorway length, a 4% increase in link counts, and a 2.6% increase in node and exit/entry counts.[33] The coefficient on betweenness centrality is negative and insignificant, suggesting adjustment occurs extensively (more links and access points) rather than through strategic network repositioning.

Spatial trade theory clarifies these magnitudes. In models with gravity-consistent trade and endogenous routing, social returns to motorway links depend on bilateral trade cost reductions across the network—not centrality alone. Investments increasing link density on secondary corridors can compress shipping times and improve reliability for many city pairs, raising market access in neighboring jurisdictions. Allen and Arkolakis (2014, 2022) demonstrate such network-wide spillovers are first-order for welfare and activity distribution, implying even "local" roadwork has non-local consequences. Chinese expressway evidence supports this: lower per-kilometer costs translate into higher aggregate trade, even for off-trunk expansions. Table B.6 shows the effect of motorway development on trade volume and exports.

These patterns align with the theoretical distinction between low- and high-spillover investments. Under intense yardstick competition, incumbents rationally underweight projects whose benefits leak to rivals, shifting toward within-jurisdiction amenities. Roads enhancing inter-city connectivity—investments that lower economy-wide trade costs (Chandra and Thompson, 2000; Faber, 2014)—are deprioritized. While politicians have limited control over road usage, they retain building discretion; under competitive pressure, they strategically curtail investments whose positive externalities would bolster neighboring leaders' performance (Besley and Case, 1995). Table 6 thus provides direct evidence that yardstick competition systematically biases policy away from connectivity-

[32]The Davis et al. (2025) dataset provides annual GIS records for highways, motorways, and rail, including detailed routes and access points permitting consistent connectivity measures over time.

[33]The standard deviation of Politician Age Differential is approximately 2.88 years.

enhancing infrastructure, fragmenting markets and slowing economic integration.

6.2.2 Spatial Heterogeneity: Strategic Targeting of High-Spillover Locations

The preceding results establish that yardstick competition systematically depresses motorway investment. This pattern raises a natural question: given that underinvestment harms local economic performance, as itself a key promotion metricm, how can such behavior constitute a rational political strategy? If infrastructure cuts impose comparable costs on both the local economy and rival jurisdictions, politicians would simply harm their own promotion prospects. The mechanism requires that costs imposed on competitors systematically exceed costs borne locally, or that politicians strategically concentrate cuts where the spillover-to-local-cost ratio is most favorable.

I employ the same dataset by Davis et al. (2025) and exploit county-level spatial variation to test whether politicians exhibit such strategic sophistication. Using geographic information systems, I classify each county as *border* or *interior* based on whether it shares boundaries with counties belonging to rival cities within the same province. Border counties face direct spatial adjacency to competing jurisdictions; motorway investments in these locations mechanically lower bilateral trade costs to rival cities and facilitate substantial cross-jurisdictional spillovers through general equilibrium trade adjustments (Allen and Arkolakis, 2014). Interior counties, geographically buffered from rival boundaries, exhibit attenuated spillover channels – infrastructure investments generate primarily local returns with limited leakage to competitors. If politicians blindly underinvest under competition, effects should be spatially uniform. If politicians strategically optimize the spillover-to-local-cost ratio, underinvestment should concentrate precisely in border counties where each foregone infrastructure dollar inflicts maximum relative damage on rivals while interior investments are maintained.

Table 7 reports interaction term regressions that test whether the effect of Politician Age Differential varies systematically between border and interior counties. The spatial heterogeneity is pronounced and strongly supports strategic targeting. The interaction terms between Politician Age Differential and the indicator for border counties are positive and statistically significant across all five motorway infrastructure measures, suggesting that the marginal effect of yardstick competition in border counties significantly exceeds that in interior counties. This systematic pattern reveals that competitive underinvestment intensifies precisely in locations where infrastructure generates the most cross-jurisdictional spillovers to rival cities.

This spatial targeting provides direct evidence that politicians strategically differentiate infrastructure investments based on spillover incidence. Rather than uniformly cutting all motorway spending, which would impose indiscriminate costs on local economic

performance, politicians concentrate underinvestment in border counties where cross-jurisdictional spillovers are most salient, while maintaining relatively stronger investment in geographically insulated interior counties. The significant interaction terms directly confirm that the competitive underinvestment mechanism operates differentially across space, with effects concentrated where they impose maximum relative costs on competitors. This pattern reveals sophisticated cost-benefit optimization: politicians accept local economic costs precisely where those costs generate maximum relative harm to competitors through reduced trade spillovers. The spatial heterogeneity thus demonstrates that strategic underinvestment operates through targeted location choices that maximize the net competitive advantage, consistent with politicians understanding and exploiting the geographic structure of infrastructure spillovers within promotion tournaments.

6.2.3 Production Costs and Productivity: Industrial Policy Spending

This subsection studies how yardstick competition shapes the allocation of government subsidies across sectors. Industrial policies—particularly subsidies—are a central policy tool in China (Aghion et al., 2015). Recent theory on geoeconomics argues that peacetime industrial policy is a substitute for credible conflict-time trade punishments: governments that cannot credibly threaten future trade taxes rely more on industrial policy today to build strategic capacity (Becko and O'Connor, 2024). Translating this logic to the municipal context, where local officials lack direct trade-policy instruments such as tariffs, implies that political incentives should manifest in the *composition* of subsidies between tradable and non-tradable sectors. Specifically, politicians facing intense yardstick competition may strategically shift subsidies away from tradable sectors—whose productivity gains could spill over to benefit rival jurisdictions—and toward non-tradable sectors with geographically confined benefits. If yardstick competition discourages policies that generate positive spillovers to rival jurisdictions, it should create systematic differences in subsidy allocations across these sectors.

To test this mechanism, I construct a city-sector panel and estimate:

$$\begin{aligned}\text{Log(Subsidy)}_{s,c,t} = \beta_0 + \beta_1 \text{ Politician Age Differential}_{c,t} \times \text{Sector}_s \\ + X'_{s,c,t} + \delta_{c,s} + \sigma_i + \tau_{s,t} + \gamma_{c,t} + \epsilon_{c,s,t},\end{aligned} \tag{7}$$

where $\text{Log(Subsidy)}_{s,c,t}$ is the logarithm of subsidies received by sector s in city c during year t. Sector_s equals 1 if the sector is tradable (manufacturing and wholesale following (Brandt et al., 2017)), 0 otherwise. Controls include city-sector characteristics and politician characteristics; fixed effects are at the city-sector, politician, sector-year, and city-year levels. Standard errors are clustered at the province-year level.

Panel A of Table 5 shows that the interaction between Politician Age Differential and the tradable-sector indicator is positive and significant across specifications. In the full model (Column 4), the coefficient of 0.087 implies that a one-standard-deviation increase in age differential (weaker yardstick competition) is associated with a 27.3 percent increase in subsidies to tradable sectors relative to non-tradables.[34] Consistent with the strategic-substitution logic in Becko and O'Connor (2024), when direct trade-policy instruments are unavailable at the local level, politicians facing less competitive pressure deploy industrial policy more aggressively toward tradables despite cross-jurisdiction spillovers. By contrast, the interaction with real-estate sectors is negative (-0.121) and statistically significant, suggesting that a one–standard-deviation increase in age differential (weaker yardstick competition) is associated with a 34.0 percent decrease in subsidies to real-estate sectors relative to other sectors.

Overall, these patterns indicate that yardstick competition systematically distorts public resource allocation. Under intense competition, politicians limit support for tradables to avoid strengthening rivals and redirect resources toward non-tradables with geographically confined benefits, in line with evidence on local political incentives in China (Chen and Kung, 2019; Wang et al., 2020; Lu et al., 2022). The magnitudes—on the order of 50 percent shifts in relative subsidy allocations—represent economically meaningful policy distortions and are consistent with the broader rationale that industrial policy composition adjusts when other policy instruments are constrained.

6.2.4 Agglomeration and Capacity: Land Allocation

Land allocation is a first-order policy lever for local politicians, shaping both urban form and the sectoral composition of economic activity. In decentralized settings, allocation choices respond to yardstick competition. Land-use planning and the timing, quantity, and composition of land released to the market thus become instruments for influencing observable outcomes (GDP growth, investment, fiscal take) (Brueckner, 2000). Given the post-1994 fiscal architecture, land-lease revenues ("land finance") provide a large, discretionary funding source for local governments, further heightening the political salience of land supply decisions (Cai et al., 2013; Fang et al., 2019).

To examine these mechanisms, I re-estimate Equation 2 at the city level, rotating the outcome variable across distinct measures of land provision and value. Specifically, I compile city-year aggregates for (i) manufacturing/tradable industrial land, (ii) real estate land (residential/commercial), and (iii) other non-tradable sector land. Industrial land transactions are drawn from the Ministry of Natural Resources' public registry,[35] which

[34] Using $(e^{0.087} - 1) \times 100 = 9.1\%$, then $2.98 \times 0.091 = 0.273$.

[35] China's Ministry of National Land and Resources website `https://www.landchina.com`.

reports universe-level transactions from 2000 to 2018; I classify parcels by designated end use following standard administrative categories used in urban land markets (see, e.g., Cai et al., 2013). For each category, I study both physical provision (area released) and contemporaneous market value (total transaction value), recognizing that quantities and prices capture different margins of political intervention.

Table 8 shows how the intensity of yardstick competition maps into land allocation across sectors. Consistent with the mechanism, weaker competition (larger age differential) induces a reallocation toward tradables and away from non-tradables.

From Columns (1) to (2), I find that a one-standard deviation increase in Politician Age Differential raises industrial land provision by 12.4% and the total value of industrial land sold by 20.1%. This pattern is consistent with politicians facing less immediate benchmarking pressure being more willing to invest in slower-maturing, high-spillover industrial capacity (Duranton and Puga, 2004).

In Columns (3) to (4), I find the same increase in age differential is associated with a 13.9% decline in real estate land provision and a 32.5% decline in the total value of real estate land sold. This contrasts sharply with the industrial margin and aligns with the notion that intense yardstick competition pushes politicians toward projects with rapid, locally appropriable gains in measured GDP and fiscal revenues. From Columns (5) to (6), for land provisions for other non-tradable land, one standard deviation increase in age differential falls by 14.2% and value by 23.8%.

The allocation responses fit a political economy logic. Industrial land and related infrastructure generate broader spatial spillovers – through supply chain linkages, labor pooling, and knowledge externalitiesthat – extend beyond jurisdictional borders (Duranton and Puga, 2004; Greenstone et al., 2010; Combes et al., 2011). When peer rivalry eases, the political cost of conferring benefits that partially accrue to neighbors falls, making such investments more attractive. By contrast, real estate and other non-tradables deliver highly visible, quickly realized, and geographically circumscribed benefits. These incentives are reinforced by governance shocks that reduce rent-seeking in land markets, which alter both the composition and pricing of land transactions (Chen and Kung, 2019).

6.3 Persistent Consequences of Yardstick Competition

Having established that yardstick political competition correlates with both protectionist policies and better short-term GDP performance, this section examines whether these effects persist over extended horizons. While competitive pressure generates immediate economic gains, the trade barriers it induces may create institutional distortions that accumulate over time. I employ a long-run perspective to assess whether sustained

yardstick competition yields persistent growth advantages or ultimately undermines development.

To examine long-term consequences, I estimate the following cross-sectional specification:

$$\Delta Y_{c,1996-2018} = \alpha_0 + \alpha_1 \overline{\text{Politician Age Differential}}_{c,1996-2018} + X_c' + \delta_p + \epsilon_c \tag{8}$$

where $\Delta Y_{c,1996-2018}$ represents the change in economic outcomes for city c between 1996 and 2018. The key variable, $\overline{\text{Politician Age Differential}}_{c,1996-2018}$, captures a city's cumulative exposure to competitive pressure over more than two decades by averaging the age differential between each party secretary and their provincial peers. The vector X_c' includes baseline city characteristics, and δ_p denotes province fixed effects. Standard errors are bootstrapped at the province level.

Table 9 reveals a striking reversal of short-term patterns. Cities experiencing higher average age differentials—indicating lower competitive intensity and less protectionism—exhibit significantly better long-term outcomes. A one standard deviation increase in average age differential is associated with 36.6% higher cumulative GDP growth (Column 1), 26.7% higher nighttime lighting intensity (Column 2), 84.2% higher population growth (Column 3), and 53.5% higher trade volumes (Column 4).[36] These translate into sustained annual growth advantages over the 23-year period: 1.59% higher GDP growth, 1.16% higher lighting growth, 3.66% higher population growth, and 2.33% higher trade growth.

The magnitudes are economically substantial and statistically significant, with particularly strong effects on population and trade. Cities where party secretaries faced less intense competition—and consequently erected fewer trade barriers—experienced stronger market integration, attracting labor and capital, fostering agglomeration economies, and enabling sustained development (Donaldson, 2018; Faber, 2014).

6.3.1 Reconciling Short-Term Gains with Long-Term Costs

The contrast between Tables 4 and 9 reveals a fundamental tension: while competitive pressure enhances short-term GDP performance, sustained competition undermines long-term development. The resolution lies in understanding that competitive pressure induces greater effort consistent with tournament theory (Lazear and Rosen, 1981; Li and Zhou, 2005), but the protectionist instruments deployed create persistent institutional distortions. Trade barriers become entrenched through vested interests and bureaucratic inertia (Acemoglu et al., 2001), and the accumulated stock of protectionist policies erected by suc-

[36] Calculations: 0.082 × 4.457 = 0.366; 0.060 × 4.457 = 0.267; 0.189 × 4.457 = 0.842; 0.120 × 4.457 = 0.535, where 4.457 years is the standard deviation of Politician Age Differential.

cessive competitive administrations ultimately dominates transient benefits of enhanced effort. The multitask agency problem reinforces this mechanism (Holmstrom and Milgrom, 1991): competitive politicians rationally prioritize policies boosting short-term, measurable GDP even when these undermine long-term growth through market fragmentation.

Trade fragmentation generates dynamic efficiency losses compounding over time through obstructed technology diffusion, foregone scale economies, and resource misallocation (Frankel and Romer, 1999). The estimates suggest that reducing average competition intensity by one standard deviation could increase long-term GDP growth by approximately 36.6%, with larger gains in trade integration and population growth. These results demonstrate that local protectionism represents not merely distributional inefficiency, but dynamic inefficiency reducing aggregate growth—revealing that even well-designed tournament systems generate substantial costs when performance metrics emphasize short-term outcomes and agents possess policy instruments with persistent negative externalities.

These findings illuminate a tension in China's political tournament distinct from democratic contexts. While Besley et al. (2010) show that lack of yardstick competition in the U.S. may harm growth through reduced electoral discipline, China's bureaucratic promotion system—based on relative performance rather than electoral accountability—generates the opposite problem: intense peer competition incentivizes inefficient protectionism as politicians prioritize demonstrable short-term gains over long-term regional development. The desirable level of yardstick competition thus depends critically on institutional arrangements governing political selection.

7 Conclusion

This paper establishes that internal trade barriers are endogenous to the design of subnational political institutions. I demonstrate that yardstick competition – often praised for disciplining local politicians – can generate perverse incentives that systematically impede economic integration. My theoretical framework shows that when career advancement is tied to relative performance and economic activities generate spillovers, rational politicians face a dominant strategy to fragment markets.

To test this framework, I exploit exogenous variation in yardstick competition intensity in China, proxied by relative age differentials among city-level party secretaries within provinces. I find that a one standard deviation increase in this age differential (indicating lower competition) is associated with a 4.9% increase in inter-regional trade volume.

My analysis uncovers specific policy levers used by politicians under competitive pressure: misallocation of industrial policy spending, biased land provision, and underin-

vestment in trade-enhancing infrastructure. These distortionary effects are not transitory; regions subject to more intense yardstick competition exhibit lower long-term economic development, evidenced by reduced nighttime lights and population growth.

The policy implications extend beyond China's context. Any system combining subnational autonomy with relative performance evaluation risks creating incentives for local protectionism. Policy reforms should address underlying political economy mechanisms by redesigning personnel evaluation systems to incorporate inter-jurisdictional cooperation measures, establishing institutions that reward collaborative competition, and creating oversight structures to counter politically motivated trade restrictions.

This research demonstrates that the political architecture of decentralization, not just its degree, fundamentally shapes economic outcomes. As countries devolve authority to subnational governments, addressing these institutional design challenges becomes critical for realizing the benefits of both political decentralization and economic integration.

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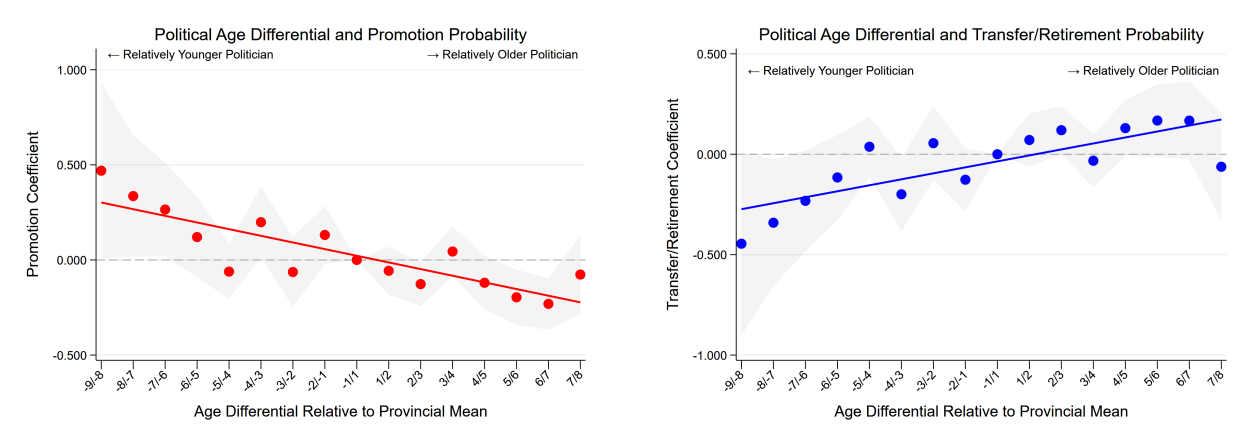
8 Figures

Figure 1: Signed Politician Age Differential and Career Prospects (Controlling Politician's Age)

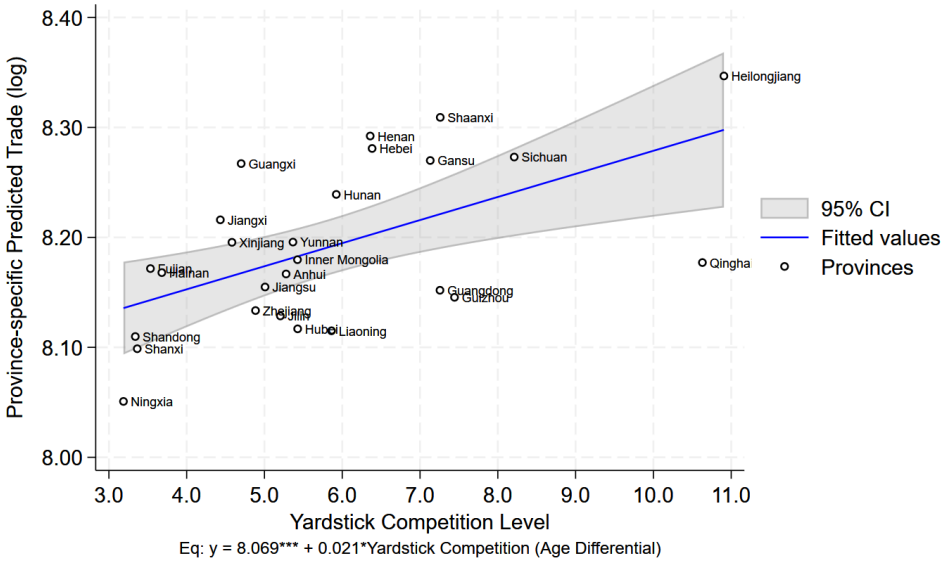


(a) Promotion after the Tenure

(b) Transfer/Retirement after the Tenure

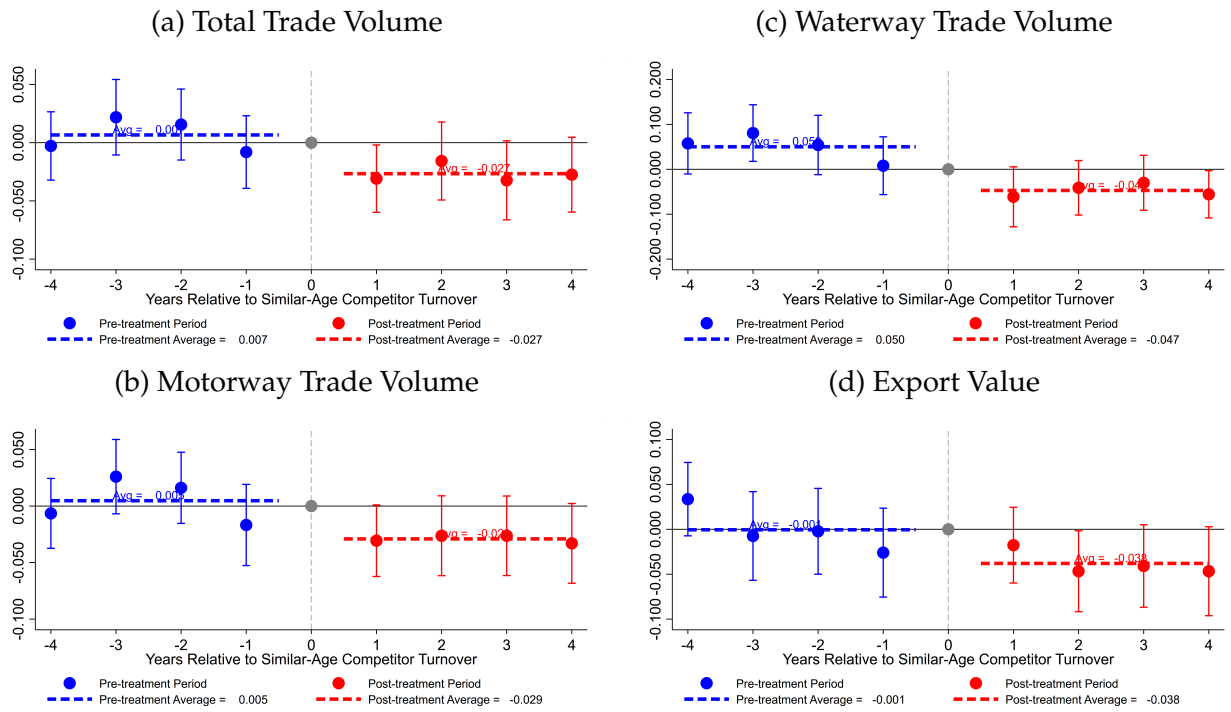
Notes: This figure shows how the signed age differential affects career prospects. The signed age differential is calculated as a politician's age minus the mean age of other party secretaries in the same province during the term; negative values indicate younger than peers, positive values indicate older. This signed measure is used here to separately examine career incentives for younger versus older politicians; the main trade regressions instead use the absolute value of this gap, which captures competition intensity regardless of direction. The x-axis shows binned age differentials, with [-1,1] as the reference category. The analysis uses politician term-level data from 2004 to 2014. Controls include city characteristics, politician characteristics, politician's provincial connections, city fixed effects, and tenure start year fixed effects. Standard errors clustered at the city level. 95% confidence intervals shown.

Figure 2: Province-specific Estimates of Trade Volume



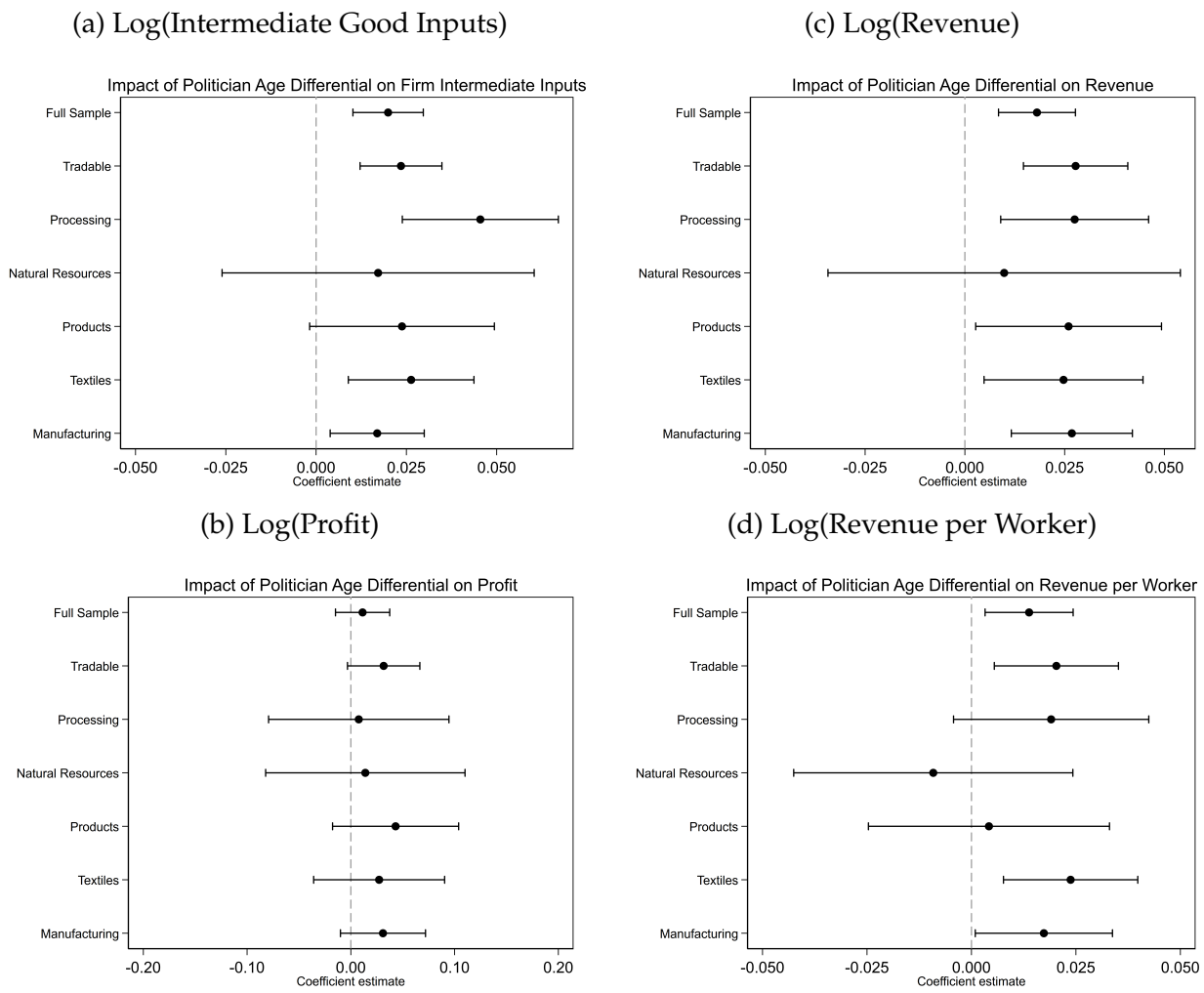
Notes: This figure illustrates the effect of yardstick competition measured by politician age differential on trade volumes in each province in China.

Figure 3: Event-study: Years Relative to the Political Turnover of a Similar Age Politician



Notes: These figures illustrate the event-study of the effect of political turnover of age similar competitor (within the same province) on city trade volumes. The x-axis shows the years relative to the political turnover of similar-age competitors, and the y-axis shows the estimated coefficients. The vertical lines represent 95% confidence intervals. Across all specifications, I control for city fixed effects, politician fixed effects, and year fixed effects. Standard errors are clustered at the province-year level. 95% confidence intervals are shown.

Figure 4: Effects of Politician Age Differential on Different Firms: Upstream vs. Downstream Sectors



Notes: These figures illustrate the effect of Politician Age Differential on various outcomes of firms operating in different sectors. Panel (a) shows the effect on firm intermediate good inputs; panel (b) shows the effect on firm profit; panel (c) shows the effect on firm revenue; and panel (d) shows the effect on firm revenue per worker. Across all specifications, I control for politician controls, firm controls, firm fixed effect, politician fixed effect, and sector-year fixed effect. Standard errors are clustered at the province-year level. 95% confidence intervals are shown.

9 Tables

Table 1: Effects of Politician Age Differential on City Trade

	City Party Secretary (Within-province Competition)					Placebo: City Mayor
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Total Trade Volume						
Politician Age Differential	0.012***	0.012***	0.011***	0.009***	0.011***	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)
Observations	4,819	4,819	4,819	4,768	4,819	5,009
R-squared	0.807	0.807	0.936	0.952	0.937	0.860
Panel B: Motorway Trade Volume						
Politician Age Differential	0.007***	0.009***	0.008**	0.006*	0.008**	0.004
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Observations	4,718	4,718	4,678	4,634	4,671	4,840
R-squared	0.801	0.801	0.934	0.950	0.934	0.941
Panel C: Waterway Trade Volume						
Politician Age Differential	0.022***	0.017**	0.022***	0.022***	0.022***	-0.003
	(0.006)	(0.007)	(0.008)	(0.008)	(0.008)	(0.007)
Observations	2,670	2,670	2,616	2,540	2,610	2,732
R-squared	0.877	0.877	0.967	0.974	0.967	0.969
Panel D: Export Value (USD)						
Politician Age Differential	0.014***	0.017***	0.011**	0.009	0.011**	-0.004
	(0.005)	(0.004)	(0.005)	(0.006)	(0.005)	(0.004)
Observations	3,638	3,638	3,551	3,486	3,534	3,747
R-squared	0.930	0.930	0.977	0.983	0.976	0.982
City Characteristics	–	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	–	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	–	–
Politician FE	–	–	Yes	Yes	–	–
Year FE	Yes	Yes	Yes	–	Yes	Yes
Province-Year FE	–	–	–	Yes	–	–
City-Politician FE	–	–	–	–	Yes	Yes

Notes: This table examines how politician age differentials between party secretaries (within the same province) affect city-level trade volumes. The analysis uses city-level panel data from 1996 to 2018. The key independent variable Politician Age Differential' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. In column (6), I analyze the city mayor's Age Differential on trade flows as the placebo test, as they do not fact within-province competition. Panel A shows effects on total trade volume, Panel B on road trade, Panel C on waterway trade, and Panel D on the value of international exports (USD). All trade volumes are logged and measured at 10,000 tons. I control for politician characteristics, city fixed effects, politician fixed effects, year fixed effects, and city-politician fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: Effect of Politician Age Differential on Firm Network and Firm Outcomes

	Firm$_i$ Located in City$_i$ Direct Effect on Focal Firms				Firm$_j$ Connected to Firm$_i$ in Business Network Indirect/Spillover Effect on Firms Show a 95% Similarity Score (LLM)			
VARIABLES	Log(Intermediate Good Inputs) (1)	Log(Profits) (2)	Log(Revenue) (3)	Log(Revenue per Worker) (4)	Log(Intermediate Good Inputs) (5)	Log(Profits) (6)	Log(Revenue) (7)	Log(Revenue per Worker) (8)
Panel A: Baseline Specification								
Politician Age	0.027***	0.030*	0.023***	0.023***	0.020**	0.057**	0.022**	0.026***
Differential in City$_i$	(0.007)	(0.016)	(0.007)	(0.007)	(0.009)	(0.028)	(0.009)	(0.009)
Observations	27,336	27,344	27,342	27,337	120,305	120,324	120,322	120,308
R-squared	0.824	0.731	0.879	0.846	0.790	0.691	0.845	0.819
Panel B: With Firm Controls								
Politician Age	0.028***	0.031*	0.024***	0.024***	0.026***	0.065**	0.029***	0.028***
Differential in City$_i$	(0.008)	(0.016)	(0.007)	(0.007)	(0.009)	(0.028)	(0.010)	(0.009)
Observations	27,336	27,344	27,342	27,337	120,305	120,324	120,322	120,308
R-squared	0.844	0.744	0.902	0.850	0.818	0.708	0.878	0.825
Panel C: With Firm Controls, Sector-Year Fixed Effects, and City$_j$-Year Fixed Effects								
Politician Age	0.023***	0.011	0.016***	0.016***	0.008***	0.015*	0.005**	0.008***
Differential in City$_i$	(0.005)	(0.013)	(0.005)	(0.006)	(0.003)	(0.009)	(0.002)	(0.003)
Observations	27,336	27,344	27,342	27,337	120,305	120,324	120,322	120,308
R-squared	0.870	0.760	0.911	0.864	0.870	0.777	0.906	0.862
Firm Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Politician FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table examines how age differentials between party secretaries affect firm-level outcomes and business network connections. The analysis uses firm-level panel data from 2000 to 2007, where Columns (1)-(4) show effects on the focal firms (Firm$_i$), and Columns (5)-(8) show effects on firms connected to the focal firms through business networks (Firm$_j$). The key independent variable 'Politician Age Differential in City$_i$' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. Panel A shows baseline results, Panel B adds firm-level controls, and Panel C further includes sector-year and connected city-year fixed effects. All specifications include firm pair fixed effects, politician fixed effects, and year fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Politician Age Differential and Firm Suppliers/Competitors

	Firm$_j$ Connected to Firm$_i$ in Business Network Indirect/Spillover Effect on Firms Show a 95% Similarity Score (LLM)			
VARIABLES	Log(Intermediate Good Inputs) (1)	Log(Profits) (2)	Log(Revenue) (3)	Log(Revenue per Worker) (4)
Panel A: Potential Supplier and Partner				
Politician Age Differential	0.008***	0.013	0.006**	0.008**
	(0.003)	(0.010)	(0.002)	(0.003)
Observations	100,126	100,136	100,134	100,121
R-squared	0.870	0.791	0.903	0.862
Panel B: Potential Competitor: Similar Products/Business Activities				
Politician Age Differential	-0.001	0.017	0.001	0.006
	(0.006)	(0.021)	(0.005)	(0.005)
Observations	15,580	15,587	15,587	15,586
R-squared	0.945	0.858	0.976	0.944
City Characteristics	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes
Firm Pair FE	Yes	Yes	Yes	Yes
Politician FE	Yes	Yes	Yes	Yes
City *j*-Year FE	Yes	Yes	Yes	Yes

Notes: This table examines the heterogeneous effects of yardstick political competition on connected firms (firm *j*), differentiating by the type of inter-firm relationship. The analysis uses firm-pair panel data from 2000-2007. Panel A focuses on firm pairs classified as potential suppliers or partners, while Panel B focuses on firm pairs classified as potential competitors. The key independent variable is Politician Age Differential in the city governing firm *i*. Dependent variables, shown in Columns (1) through (4), are log-transformed intermediate good inputs, profits, revenue, and revenue per worker for firm *j*. All specifications include city and politician controls, firm pair fixed effects, politician fixed effects, and City *j*-Year fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table 4: Mechanism: Effect of Politician Age Differential on Short-Term GDP Performance Among Competitors

VARIABLES	(1) GDP Gap Relative to Provincial Average (100 Million RMB)	(2) GDP as % Deviation From Provincial Average
Politician Age Differential$_{t-1}$	-7.243**	-0.517**
	(3.331)	(0.215)
Observations	3,896	3,896
R-squared	0.974	0.984
City-Politician FE	Yes	Yes
Year FE	Yes	Yes

Notes: This table examines the relationship between politician age differential and short-term GDP performance relative to provincial peers. The analysis uses city-level panel data from 1996 to 2018. The key independent variable 'Politician Age Differential$_{t-1}$' measures the lagged absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. Column (1) measures the GDP gap in hundreds of millions of RMB between a city and the provincial average. Column (2) expresses this gap as a percentage deviation from the provincial mean. Both specifications include city-politician fixed effects to control for time-invariant characteristics of specific politician-city matches, and year fixed effects to control for common temporal shocks. Standard errors (in parentheses) are clustered at the province-year level. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Effects of Politician Age Differential on Industrial Policy Spending: Tradable vs. Real Estate

	City-Sector Log(Mean Subsidies)					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Politician Age Differential × Tradable Sector	0.043**	0.073***	0.087***			
	(0.019)	(0.020)	(0.023)			
Politician Age Differential × Real Estate Sector				-0.066	-0.094*	-0.121**
				(0.052)	(0.054)	(0.053)
Observations	9,739	9,739	9,739	9,739	9,739	9,739
R-squared	0.644	0.710	0.743	0.644	0.710	0.743
City-Sector Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
City-Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	–	Yes	Yes	–
Politician FE	–	Yes	Yes	–	Yes	Yes
City-Year FE	–	Yes	Yes	–	Yes	Yes
Sector-Year FE	–	–	Yes	–	–	Yes

Notes: This table examines how age differentials between party secretaries (within the same province) differently affect tradable and real estate sectors. The analysis uses city-sector panel data from 2005 to 2017. The key independent variable 'Politician Age Differential' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. The dependent variable is the log of city-sector subsidies. 'Tradable' is a dummy variable for sectors producing tradable goods, while 'Real Estate' is a dummy for the real estate sector. Controls include city-sector fixed effects, city-sector characteristics, politician fixed effects, sector-year fixed effects, and city-year fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Effects of Politician Age Differential on Trade Network Infrastructure

VARIABLES	Log(Total Motorway Length) (1)	Log(Single Motorway Length) (2)	Log(Motorway Link Count) (3)	Log(Motorway Node Count) (4)	Log(Motor Exit/ Entry Count) (5)	Log(Motorway Betweenness) (6)
Politician Age Differential	0.021**	0.021**	0.014**	0.009**	0.009**	-0.002
	(0.009)	(0.009)	(0.006)	(0.004)	(0.004)	(0.013)
Observations	4,469	4,469	4,469	4,429	4,429	4,232
R-squared	0.952	0.951	0.967	0.968	0.968	0.970
City Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table examines the effects of politician age differential on trade infrastructure development. The analysis uses panel data with various measures of motorway network characteristics from 1995 to 2018. The key independent variable 'Politician Age Differential' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. Dependent variables include log-transformed measures of total motorway length, single motorway length, motorway link count, motorway node count, motor exit/entry count, and motorway betweenness centrality. All specifications include politician characteristics, year fixed effects, and city-politician fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Spatial Heterogeneity: Trade Infrastructure Under-investment under Yardstick Competition

VARIABLES	Log(Motorway Sum Length) (1)	Log(Motor Exit/ Entry Count) (2)	Log(Motorway Link Count) (3)	Log(Motorway Node Count) (4)	Log(Motorway Betweenness) (5)
Politician Age Differential	0.014	0.003	0.002	0.003	0.019
	(0.027)	(0.003)	(0.004)	(0.003)	(0.020)
Politician Age Differential × Border Region	0.038**	0.004**	0.006**	0.004**	0.021*
	(0.018)	(0.002)	(0.003)	(0.002)	(0.013)
Observations	38,504	38,504	38,504	38,504	38,504
R-squared	0.932	0.954	0.953	0.954	0.930
County Characteristics	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes	Yes
County-Politician FE	Yes	Yes	Yes	Yes	Yes
Province-Year FE	Yes	Yes	Yes	Yes	Yes
Border-Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table examines the differential effects of politician age differential on motorway infrastructure investment between border and interior counties through interaction terms. Border counties are defined as counties that share geographic boundaries with counties belonging to rival cities within the same province, where cross-jurisdictional spillovers from infrastructure investment are most salient. The key independent variable 'Politician Age Differential' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. The interaction term 'Politician Age Differential × Border Region' captures the additional effect of yardstick competition in border counties of the politician's jurisdiction. Dependent variables include log-transformed measures of motorway sum length, motor exit/entry count, motorway link count, motorway node count, and motorway betweenness centrality. All specifications include county characteristics, politician characteristics, county-politician fixed effects, province-year fixed effects, and border-year fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Effects of Politician Age Differential on Land Provision and Value: Tradable vs. Real Estate

	Manufacturing/Tradable Land		Real Estate Land		Other Non-tradable Land (Commercial)	
VARIABLES	Log(Industrial Land Provision) (1)	Log(Total Value of Industrial Land Sold) (2)	Log(Real Estate Land Provision) (3)	Log(Total Value of Real Estate Land Sold) (4)	Log(Other Sector Land Provision) (5)	Log(Total Value of Other Sector Land Sold) (6)
Politician Age Differential	0.040**	0.065**	-0.045**	-0.105**	-0.046*	-0.077*
	(0.019)	(0.033)	(0.022)	(0.046)	(0.025)	(0.043)
Observations	4,155	4,155	4,155	4,155	4,155	4,155
R-squared	0.955	0.956	0.896	0.904	0.864	0.881
Poltician Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table examines how age differentials between party secretaries affect land provision and usage across different categories. The analysis uses city-level panel data from 2000 to 2018. The key independent variable 'Politician Age Differential' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. Columns (1)-(2) show effects on different aspects of industrial land allocation: total provision and total value of land sold. Columns (2)-(4) show effects on real estate land provision and value, while Columns (5)-(6) show effects on land provision of other non-tradable sectors. All dependent variables are in logarithmic form. All specifications include controls, city-politician fixed effects, and province-year fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Effects of Politician Age Differential on Long-Term Economic Outcomes from 1996 to 2018

VARIABLES	ΔLog(City GDP) (1)	ΔLog(Night-time Lighting) (2)	ΔLog(City Population) (3)	Log(Average Trade Volumes) (4)
Average Politician Age Differential$_{1996-2018}$	0.082*	0.060*	0.189***	0.120**
	(0.043)	(0.031)	(0.057)	(0.054)
Observations	207	292	179	287
R-squared	0.493	0.660	0.358	0.605
Province FE	Yes	Yes	Yes	Yes
Baseline Characteristics	Yes	Yes	Yes	Yes

Notes: This table examines the long-term impacts of politician age differentials on city development. The analysis uses cross-sectional city-level data comparing outcomes between 1996 and 2018. The key independent variable is the average absolute age differential between a city's party secretary and those in other cities within the same province over the entire period. The dependent variables are log-differences (ΔLog) between 1996 and 2018: city GDP (Column 1), nighttime lighting intensity (Column 2), city population (Column 3), and average trade volumes over the period (Column 4). All specifications include province fixed effects and baseline city controls. Standard errors are bootstrapped at the province level by 500 times. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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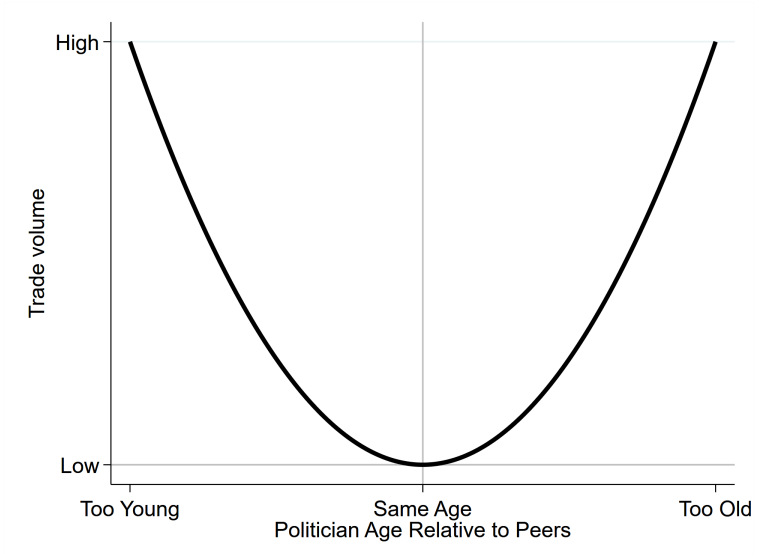
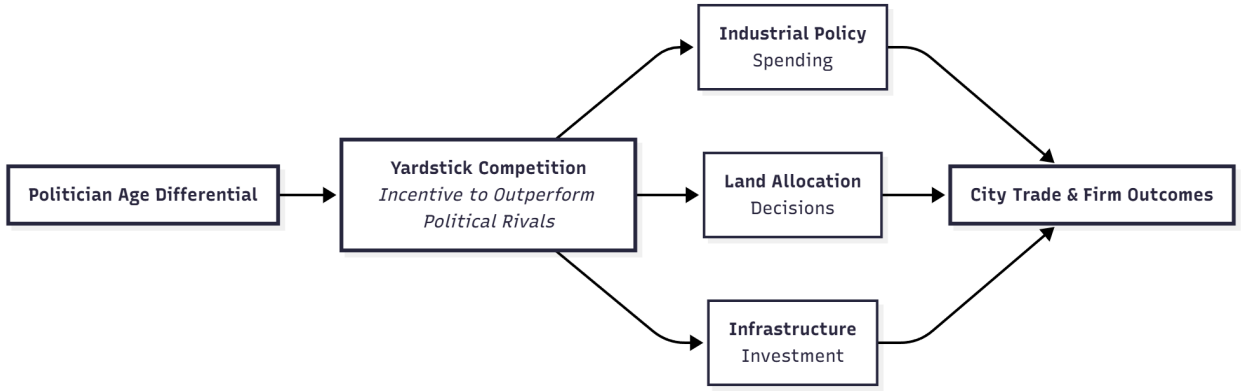
A Figures

Figure A.1: Hypothesized U-shaped Relationship between Politician Age Differential and Trade Volumes



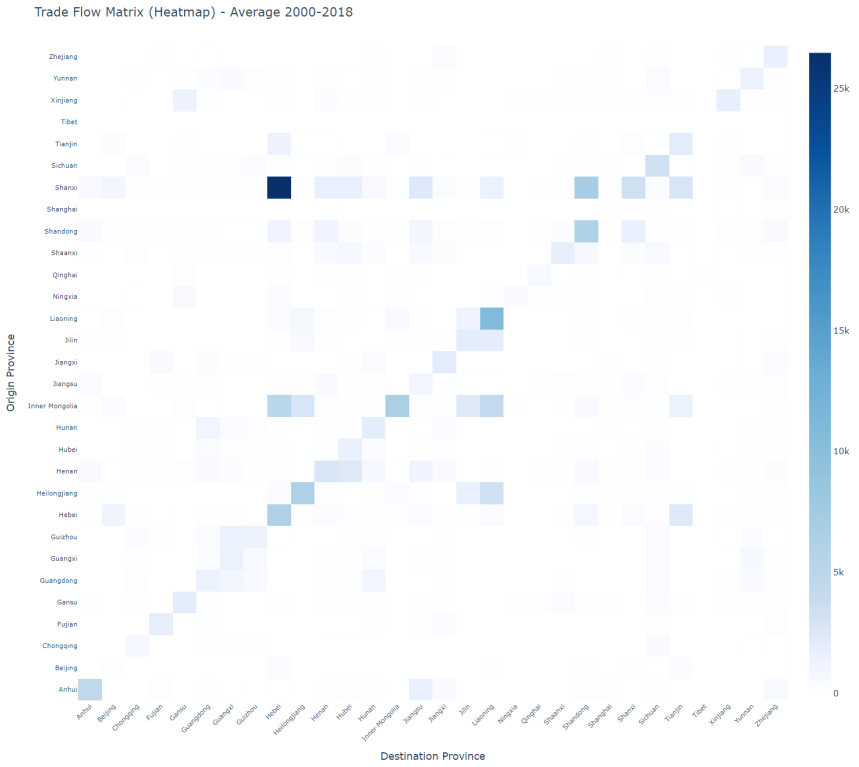
Notes: This figure illustrates the hypothesized u-shaped relationship between politicians' age differential and city trade volumes.

Figure A.2: Causal Chains from Politician Age Differential to Trade Outcomes



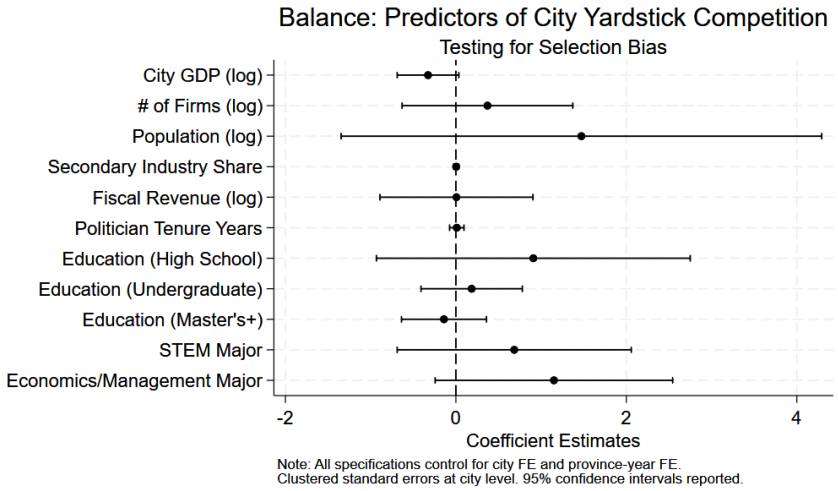
Notes: This figure illustrates the flow chart of causal chains from politician age differential to city and firm trade outcomes.

Figure A.3: Inter-province Trade Flows



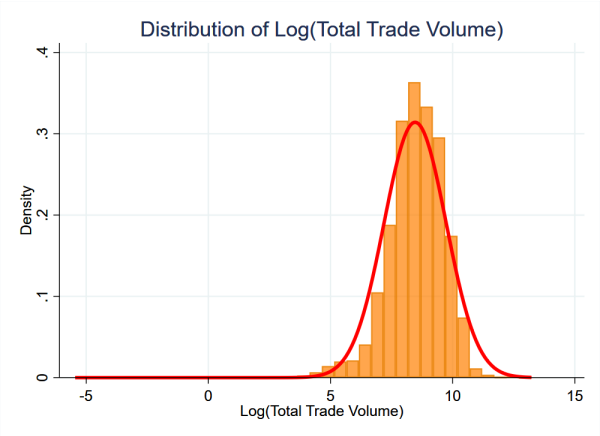
Notes: This figure illustrate the average inter-province trade flows from 2000 to 2018.

Figure A.4: Balance Test: Relationship between Politician Age Differential and Politician and City Characteristics

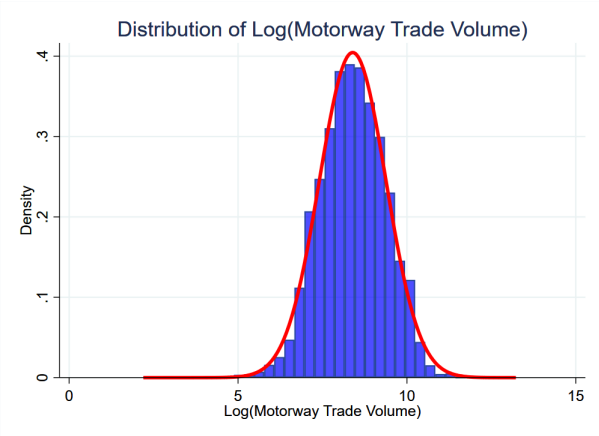


Notes: This figure presents a balance test examining the relationship between Politician Age Differential and various politician and city characteristics. The lack of statistically significant relationships suggests that age differential is plausibly exogenous to these characteristics.

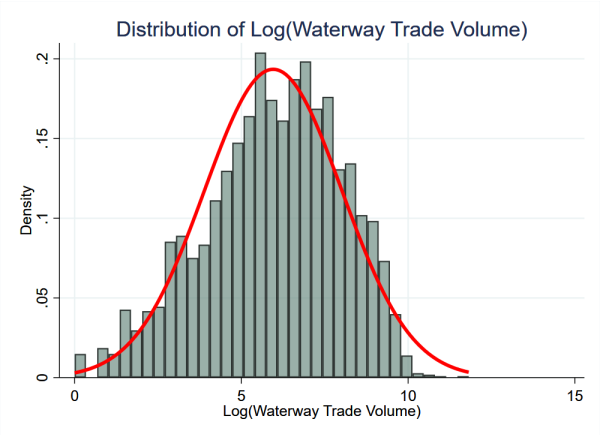
Figure A.5: Distribution of Trade Indicators



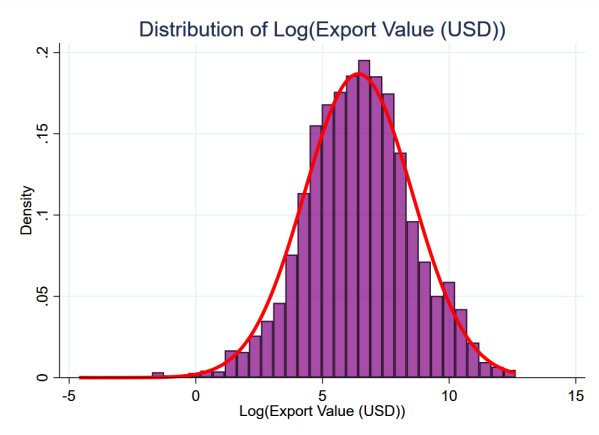
(a) Log (Total Trade Volume)



(b) Log (Motorway Trade Volume)



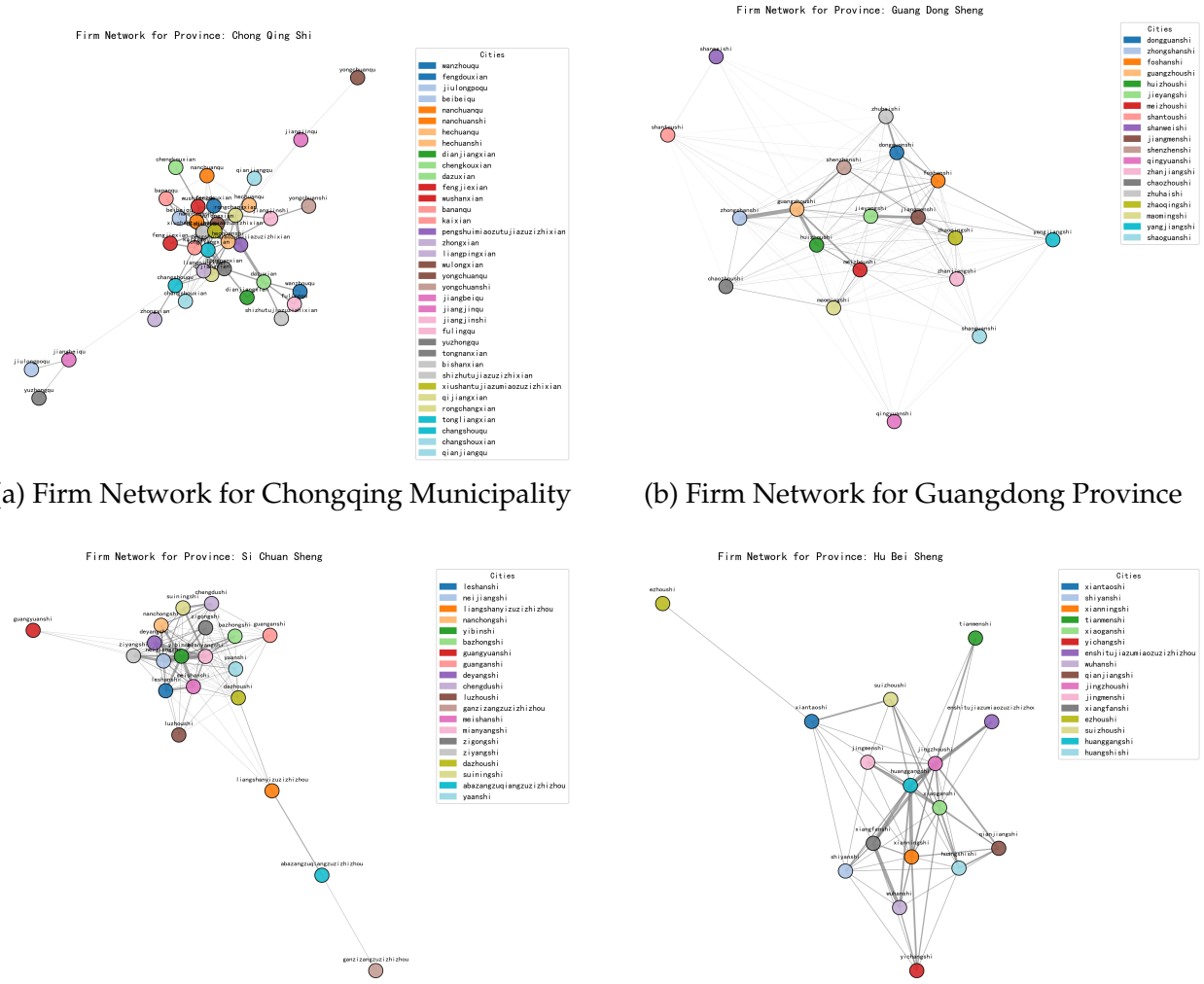
(c) Log (Waterway Trade Volume)



(d) Log (Export Value USD)

Notes: This figure presents frequency distributions of key variables in the analysis. Panel (a) displays the log-transformed total trade volume. Panels (b), (c), and (d) present infrastructure-related trade measures: log-transformed motorway trade volume, waterway trade volume, and export value in USD, respectively. All distributions include normal curve overlays in red for reference.

Figure A.6: Firm Networks (Breitung and Müller, 2025) in Four Selected Provinces and Municipality



(a) Firm Network for Chongqing Municipality

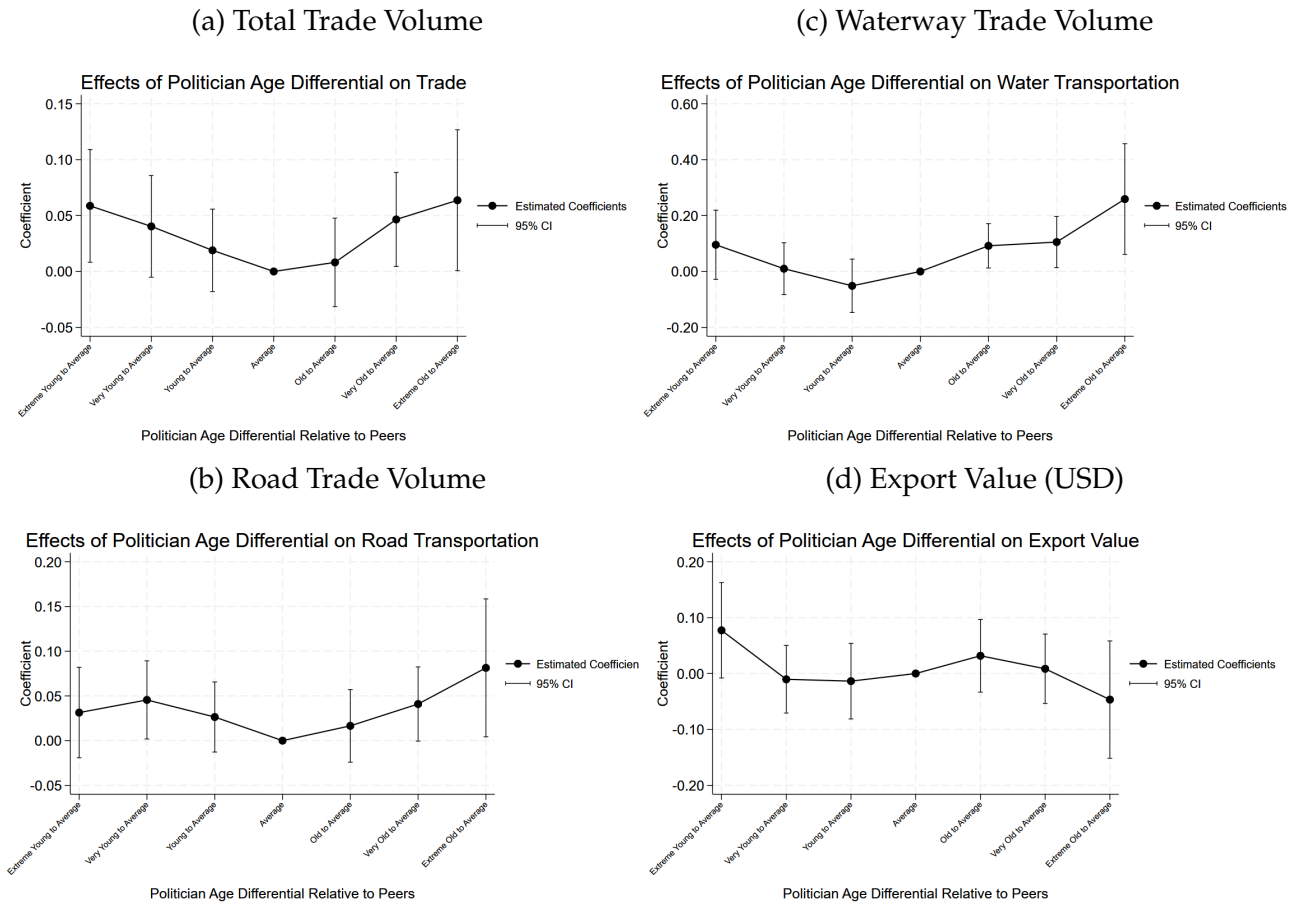
(b) Firm Network for Guangdong Province

(c) Firm Network for Sichuan Province

(d) Firm Network for Hubei Province

Notes: This figure illustrates business network structures in four selected Chinese provinces/municipalities. Each node represents a different industry, with colors indicating industry categories according to the legend. The connecting lines (edges) represent business relationships between industries, with thicker lines indicating stronger connections.

Figure A.7: The U-shaped Relationship between Politician Age Differential and Trade Volumes



Notes: These figures show the estimated effects of Politician Age Differential on different trade volumes across different age categories. The analysis uses city-level panel data from 1996 to 2018. The x-axis shows seven categories of age differential relative to the provincial peer average: 'Extreme Young', 'Very Young', 'Young', 'Average' (reference category), 'Old', 'Very Old', and 'Extreme Old'. The y-axis shows the estimated coefficients from a regression of log trade volume on age differential category indicators. I control for city and politician characteristics, city fixed effects, politician fixed effects, year fixed effects, and city-politician fixed effects. Standard errors are clustered at the province-year level. 95% confidence intervals are shown.

B Tables

Table B.1: Correlation Between Signed Age Differential and Promotion Outcomes

	1(Promotion)			
VARIABLES	(1)	(2)	(3)	(4)
Politician's Start Age	-0.022***	-0.008	0.007	0.014
	(0.004)	(0.008)	(0.013)	(0.014)
Signed Age Differential		-0.016**	-0.031**	-0.033**
		(0.007)	(0.014)	(0.014)
Signed Age Differential × Deputy City Level				0.038*
				(0.020)
Log(Education Years)				0.018**
				(0.009)
Average Light Density				0.051
				(0.126)
Log(Jurisdictional Population)				0.038
				(0.303)
Colleague Ties (Provincial Secretary)				-0.029
				(0.060)
Colleague Ties (Governor)				0.005
				(0.051)
Hometown Ties (Provincial Secretary)				-0.248
				(0.240)
Hometown Ties (Governor)				0.044
				(0.113)
Observations	673	673	672	659
R-squared	0.050	0.056	0.408	0.424
City Characteristics	–	–	–	Yes
Politician Characteristics	–	–	–	Yes
Connections to Provincial Politicians	–	–	–	Yes
City FE	–	–	Yes	Yes
Tenure Start Year FE	–	–	Yes	Yes

Notes: This table examines the relationship between signed age differential and promotion outcomes for city party secretaries. The analysis uses politician-level data from 2004 to 2014. The dependent variable is a binary indicator for whether a politician was promoted to a higher position. The key independent variable, Signed Age Differential, is calculated as the politician's age minus the average age of party secretaries in other cities within the same province; negative values indicate younger than peers, positive values indicate older. This signed measure is used here to separately examine career incentives for younger versus older politicians; the main trade regressions use the absolute value of this gap. Control variables include politician characteristics (age, education years), jurisdictional characteristics (GDP and population), and provincial connection measures. Standard errors (in parentheses) are clustered at the city level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.2: Correlation Between Signed Age Differential and Transfer/Retirement Outcomes

	1(Transfer/Retirement)			
VARIABLES	(1)	(2)	(3)	(4)
Politician's Start Age	0.020***	0.007	-0.014	-0.023
	(0.004)	(0.008)	(0.014)	(0.015)
Signed Age Differential		0.015**	0.035**	0.039***
		(0.007)	(0.014)	(0.015)
Signed Age Differential × Deputy City Level				-0.047**
				(0.019)
Log(Education Years)				-0.013
				(0.009)
Average Light Density				-0.058
				(0.122)
Log(Jurisdictional Population)				0.618
				(0.419)
Colleague Ties (Provincial Secretary)				0.033
				(0.059)
Colleague Ties (Governor)				0.009
				(0.053)
Hometown Ties (Provincial Secretary)				0.255
				(0.241)
Hometown Ties (Governor)				-0.103
				(0.121)
Observations	673	673	672	659
R-squared	0.038	0.043	0.399	0.420
City Characteristics	–	–	–	Yes
Politician Characteristics	–	–	–	Yes
Connections to Provincial Politicians	–	–	–	Yes
City FE	–	–	Yes	Yes
Tenure Start Year FE	–	–	Yes	Yes

Notes: This table examines the relationship between signed age differential and transfer-/retirement outcomes for city party secretaries. The analysis uses politician-level data from 2004 to 2014. The dependent variable is a binary indicator for whether the politician was transferred to another position or retired. The key independent variable, Signed Age Differential, is calculated as the politician's age minus the average age of party secretaries in other cities within the same province; negative values indicate younger than peers, positive values indicate older. This signed measure is used here to separately examine career incentives for younger versus older politicians; the main trade regressions use the absolute value of this gap. Control variables include politician characteristics (age, education years), jurisdictional characteristics (GDP and population), and provincial connection measures. Standard errors (in parentheses) are clustered at the city level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.3: Correlation between Trade Volumes in City i and Economic Performance Indicators in Other Cities j (Same Province)

VARIABLES	Log(Nighttime Light Intensity in City$_{j,t}$) (1)	Log(Population Size in City$_{j,t}$) (2)	Log(GDP in City$_{j,t}$) (3)
Trade Volume in City$_{i,t-1}$	0.053***	0.015***	0.050**
	(0.008)	(0.005)	(0.022)
Observations	41,554	41,554	41,554
R-squared	0.980	0.989	0.520
City Pair FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Notes: This table examines the spillover effects of trade activity in one city on the economic performance of other cities within the same province. The analysis uses city-pair panel data from 1996 to 2018. The key independent variable 'Trade Volume in City$_i$' measures the total trade volume in the focal city, while the dependent variables measure different economic outcomes in connected cities (City$_j$ in the same province): nighttime light intensity, population size, and total GDP. All specifications include city-pair fixed effects and year fixed effects. Standard errors (in parentheses) are clustered at the city$_j$ level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.4: Summary Statistics

VARIABLES	N (1)	mean (2)	sd (3)	min (4)	max (5)
Panel A: Trade and Transportation Variables					
Log(Total Trade Volume)	4,819	8.628	1.032	0.693	13.23
Log(Motorway Trade Volume)	4,718	8.441	0.961	4.078	13.23
Log(Waterway Trade Volume)	2,678	5.977	2.040	0	11.82
Log(Railway Trade Volume)	3,487	6.157	1.408	0.693	10.30
Log(Airway Trade Volume)	1,545	-1.095	2.743	-9.210	4.921
Log(Export Value (USD))	3,638	6.445	2.108	-4.605	12.63
Panel B: Politician Variables					
Politician Age Differential	4,819	4.213	4.457	0	25
Starting Age	4,819	50.46	3.737	36	60
Tenure Years	4,819	2.892	1.674	1	11
Panel C: Economic Variables					
Log(Regional GDP in 10,000 Yuan)	4,819	15.56	1.818	0	19.25
Panel D: Firm Characteristics					
Log(Firm I Intermediate Goods)	27,337	9.856	1.172	2.303	16.68
Log(Firm I Revenue)	27,343	10.20	1.122	5.050	17.06
Log(Firm I Revenue per Worker)	27,338	5.006	0.977	0.261	9.249
Log(Firm I Profit)	27,344	6.490	1.923	0	14.83
Log(Firm J Intermediate Goods)	120,306	9.995	1.091	0	16.32
Log(Firm J Revenue)	120,322	10.34	1.039	5.011	16.52
Log(Firm J Revenue per Worker)	120,308	5.047	0.924	-0.0275	9.232
Log(Firm J Profit)	120,324	6.682	1.885	0	14.03
Panel E: City-sector Characteristics					
Log(City-sector Subsidies)	9,739	14.24	1.660	5.704	24.11
Log(City-sector Firm #)	9,739	0.401	0.609	0	4.078
Log(City-sector Revenue)	9,739	21.54	1.364	16.17	28.57
Log(City-sector Average Wage)	9,739	15.09	0.706	11.41	18.39
Panel F: County-sector Firm Registration					
Log(# Firm Entry)	5,967,624	1.705	1.186	0.693	9.414
1(Tradable Firms)	5,967,624	0.483	0.499	0	1
1(Real Estate Firms)	5,967,624	0.042	0.199	0	1

Notes: This table presents summary statistics for key variables used in the analysis. Panel A shows statistics for different measures of trade and transportation volume. Panel B presents statistics related to politician characteristics, where 'Politician Age Differential' measures the absolute difference between a politician's age and the average age within the region. Panel C displays regional economic characteristics. Panel D shows statistics for firm characteristics. Panel E presents statistics related to city-sector characteristics. Panel F displays the characteristics of county-sector firm registration.

Table B.5: Promotion Statistics of City Party Secretaries (2004-2014)

Politician Category	Promotion Metric	Value
Promoted City Party Secretaries	To central gov. or other provinces	2%
	Within-province promotion	98%
	Overall promotion rate	18%

Notes: This table shows a statistics of promoted city party secretaries from 2004 to 2014. The 98% within-province promotion suggests a strong within-province competition.

Table B.6: Effect of Motorway Development on Motorway Trade Volume

	Log(Motorway Trade Volume)				
VARIABLES	(1)	(2)	(3)	(4)	(5)
Log(Motorway Length)	0.041**				
	(0.019)				
Log(Motorway Entry/Exit)		0.093***			
		(0.021)			
Log(Motorway Link)			0.077***		
			(0.021)		
Log(Motorway Node)				0.093***	
				(0.021)	
Log(Motorway Betweenness)					0.004
					(0.006)
Observations	4,694	4,646	4,694	4,646	4,469
R-squared	0.803	0.806	0.803	0.806	0.804
City FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table examines how different measures of motorway development affect city-level trade volumes. The analysis uses city-level panel data from 1996 to 2018. The key independent variables are different measures of motorway development, including motorway length (Column 1), the number of motorway entry and exit points (Column 2), the number of motorway links connecting cities (Column 3), the number of motorway nodes or junctions (Column 4), and motorway betweenness centrality measuring a city's position in the motorway network (Column 5). The dependent variable is the logarithm of trade volume via motorway transport. All specifications include city and year fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.7: Politician Age Differential (1 SD Decrease) and Firm TFP

Sector	Coefficient	Input Loss (%)	TFP Loss (%)
Full Sample	0.023	5.04	1.21
Tradable	0.026	5.70	1.37
Manufacturing	0.019	4.17	1.00
Processing	0.042	9.21	2.21
Natural Resources	0.019	4.17	1.00
Products	0.028	6.14	1.47
Textiles	0.026	5.70	1.37

Notes: This table presents the estimated percentage loss in intermediate inputs and Total Factor Productivity (TFP) for firms across various sectors following a one standard deviation decrease in Politician Age Differential. Input Loss is calculated as Coefficient $\times$ 2.192. TFP loss is calculated based on the reduction in intermediate input availability using the elasticity from Halpern et al. (2015), where a 1% increase in intermediate inputs yields a 0.24% increase in productivity. Data is derived from firm-level analysis using the Annual Survey of Industrial Firms (ASIF) from 2000–2007.

Table B.8: Calculation of GDP Impact by Sector (1 SD Decrease in Politician Age Differential)

Sector	TFP Loss (%)	GDP Share (%)	GDP Impact (%)
Processing	2.21	10.23	0.226
Products	1.47	14.18	0.208
Textiles	1.37	4.08	0.056
Natural Resources	1.00	5.03	0.050
Total			0.540

Notes: This table calculates the estimated aggregate impact on national GDP resulting from TFP losses induced by a one standard deviation decrease in Politician Age Differential across specific sectors. The GDP Impact (%) for each sector is calculated by multiplying the sector's TFP Loss (%) by its corresponding GDP Share (%) obtained from China's 2000 Input-Output table. The total GDP impact is the sum of the impacts across the listed sectors.

Table B.9: Effects of Provincial Politician Age Differential on Bilateral Trade Volume (Inter-province Trade)

VARIABLES	Log(Bilateral Provincial Trade Volume) (1)	(2)	(3)	(4)
Provincial Politician Age Differential (Origin Province)	0.021**	0.022***	0.022***	
	(0.009)	(0.009)	(0.009)	
Provincial Politician Age Differential (Destination Province)	0.011	0.011		0.012
	(0.009)	(0.009)		(0.009)
|Provincial Politician Age (Origin) - Provincial Politician Age (Destination)|	0.002			
	(0.003)			
Observations	16,215	16,215	16,215	16,215
R-squared	0.943	0.943	0.943	0.943
Origin-Destination FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Origin Province $\times$ Origin Politician FE	Yes	Yes	Yes	Yes
Destination Province $\times$ Destination Politician FE	Yes	Yes	Yes	Yes

Notes: This table examines how politician age differentials affect bilateral trade volumes between Chinese provinces. The analysis uses province-pair panel data from the Railway Statistical Yearbook covering 2000-2018. The origin politician age differential measures the absolute difference between the origin province's party secretary age and the national average age of all provincial party secretaries. The destination politician age differential applies the same measure to the destination province. All specifications include origin-destination fixed effects, year fixed effects, and origin-destination-politician fixed effects. Standard errors (in parentheses) are clustered at the origin-destination pair level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.10: Robustness: Effect of Politician Age Differential on Firms with High-Connectivity Input-Output Relationships (1997)

	Firm$_j$ Connected to Firm$_i$ in Provincial Input-Output Table (Above Median Connectivity) in 1997			
VARIABLES	Log(Intermediate Good Inputs) (1)	Log(Revenue) (2)	Log(Revenue per Worker) (3)	Log(Profits) (4)
Politician Age Differential in Firm$_i$ City	0.011***	0.013***	0.009**	0.001
	(0.004)	(0.003)	(0.004)	(0.003)
Observations	1,146,985	1,146,940	1,146,940	1,147,128
R-squared	0.894	0.922	0.817	0.798
City Characteristics	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes
Firm Pair FE	Yes	Yes	Yes	Yes
Politician FE	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes

Notes: This table presents robustness checks examining how political age differentials affect firm intermediate good inputs and other firm outcomes through province-specific input-output linkages. The analysis focuses on firm pairs connected via provincial input-output relationships with above-median connectivity levels based on the 1997 input-output table. The key independent variable 'Politician Age Differential in Firm$_i$ City measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. All dependent variables are in logarithmic form. The sample includes manufacturing firms from the Annual Survey of Industrial Firms (ASIF) database. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.11: Placebo Test: Cross-Provincial Age Differential and Trade Outcomes in Border Cities

VARIABLES	Log(Total Trade Volume) (1)	Log(Road Trade Volume) (2)	Log(Waterway Trade Volume) (3)	Log(Export Value) (4)
Cross-Provincial Age Differential	-0.000	-0.003	-0.028	-0.018
(Relative to Neighboring Provinces)	(0.010)	(0.009)	(0.022)	(0.020)
Observations	2,995	2,903	1,563	2,165
R-squared	0.926	0.925	0.960	0.965
City Characteristics	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Politician FE	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: This table presents a placebo test examining whether cross-provincial age differentials affect trade outcomes in border cities. The analysis is restricted to cities that border other provinces to test whether political competition with neighboring provinces (rather than within-province competition) drives trade patterns. The key independent variable, Cross-Provincial Age Differential, measures the absolute difference between a border city party secretary's age and the average age of party secretaries across all neighboring provinces. For cities bordering multiple provinces, this is calculated as the average across all neighboring province averages. The dependent variables are: total freight trade volume (Column 1), road freight volume (Column 2), waterway freight volume (Column 3), and export value (Column 4), all in logarithmic form. This serves as a placebo test because the theoretical mechanism predicts that within-province yardstick competition''not cross-provincial age differences''should affect local officials' infrastructure investment decisions and resulting trade patterns. Finding null effects supports the interpretation that age-based competition operates primarily within provincial boundaries where officials compete for promotion. The sample includes border city-year observations from 1996 to 2018. City characteristics include logged population, number of firms, GDP, and urban road length. Politician characteristics include lagged secretary and average peer ages. All specifications include city fixed effects, politician fixed effects, city-politician interaction fixed effects, and year fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.12: PLACEBO TEST: POLITICIAN AGE DIFFERENTIAL AND LONG-DISTANCE TRADE (RAILWAY & AIRWAY)

	City Party Secretary					City Mayor
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Railway Trade Volume (Long-Distance)						
Politician Age Differential	0.008***	0.006	0.003	0.006	0.002	-0.004
	(0.003)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
Observations	3,484	3,484	3,434	3,372	3,424	3,564
R-squared	0.839	0.839	0.939	0.950	0.939	0.939
Panel B: Airway Trade Volume (Long-Distance)						
Politician Age Differential	0.004	0.000	−0.013	0.006	−0.014	-0.001
	(0.008)	(0.015)	(0.021)	(0.022)	(0.021)	(0.005)
Observations	1,532	1,532	1,468	1,331	1,464	1,543
R-squared	0.867	0.867	0.929	0.949	0.930	0.936
City Characteristics	–	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	–	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	–	–
Politician FE	–	–	Yes	Yes	–	–
Year FE	Yes	Yes	Yes	–	Yes	Yes
Province-year FE	–	–	Yes	–	–	–
City-Politician FE	–	–	–	–	Yes	Yes

Notes: This table examines how politician age differentials between party secretaries and city mayors (within the same province) relate to *long-distance* city-level trade, focusing on railway and airway volumes as placebo outcomes that are less likely to be driven by within-province political frictions. The analysis uses city-level panel data from 1996 to 2018. The key independent variable 'Politician Age Differential' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. Columns (1)-5) reproduce the baseline secretary specifications, while Column (6) appends a *placebo* using the age differential of city mayors, estimated under the same most-stringent specification as Column (5) (City-Politician fixed effects with full controls). Trade volumes are logged and measured at 10,000 tons. I control for politician characteristics, city fixed effects, politician fixed effects, year fixed effects, and city-politician fixed effects as indicated. Standard errors (in parentheses) are clustered at the province-year level. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.13: Placebo Test: Effects of Politician Age Differential on Railway Infrastructure

VARIABLES	Log(Total Railway Length) (7)	Log(Single Railway Length) (8)	Log(Railway Link Count) (9)	Log(Railway Node Count) (10)	Log(Railway Station Count) (11)	Log(Railway Betweenness) (12)
Politician Age Differential	0.001	0.001	0.001	0.002	0.002	0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Observations	5,154	5,125	5,154	5,153	5,153	5,068
R-squared	0.990	0.987	0.991	0.997	0.997	0.982
City Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents placebo tests examining the effects of politician age differential on railway infrastructure development. Railway infrastructure is used as a placebo because, unlike motorways which are largely under local government control, railway construction is centrally planned by the national government and should not be affected by local politician competition dynamics. The analysis uses panel data with various measures of railway network characteristics from 1995 to 2018. The key independent variable 'Politician Age Differential' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. Dependent variables include log-transformed measures of total railway length, single railway length, railway link count, railway node count, railway station count, and railway betweenness centrality. All specifications include politician characteristics, year fixed effects, and city-politician fixed effects. Standard errors (in parentheses) are clustered at the province-year level. The insignificant coefficients support the validity of our identification strategy. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.14: Placebo Test: Effect of Politician Age Differential on Firm Networks in Bordering Cities

	Firm$_j$ Connected to Firm$_i$ in Business Network (Different Provinces) (Firms Show a 95% Similarity Score)			
VARIABLES	Log(Intermediate Good Inputs) (1)	Log(Revenue) (2)	Log(Revenue per Worker) (3)	Log(Profits) (4)
Politician Age Differential in Firm$_i$ City	-0.007	-0.012	-0.004	0.087
	(0.045)	(0.036)	(0.034)	(0.083)
Observations	1,655	1,655	1,655	1,655
R-squared	0.939	0.960	0.926	0.843
Firm Pair FE	Yes	Yes	Yes	Yes
Politician FE	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes

Notes: This table presents a falsification test examining whether age differentials between party secretaries affect firms in bordering cities across different provinces. The analysis uses firm-pair panel data where firms are connected through business networks but located in different provinces. The key independent variable 'Politician Age Differential in Firm$_i$ City measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. Dependent variables measure outcomes for connected firms (Firm$_j$ in different provinces): intermediate good inputs, revenue, revenue per worker, and profits (all log-transformed). All specifications include firm pair fixed effects, politician fixed effects, and sector-year fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.15: Robustness: Alternative Time Trend, Clustering, and Restricted Sample

	Log(Trade Volume)				
VARIABLES	(1)	(2)	(3)	(4)	(5)
Panel A: Total Trade Volume					
Politician Age Differential	0.010***	0.011***	0.011***	0.011***	0.011***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	4,819	4,819	4,819	4,819	4,533
R-squared	0.939	0.946	0.937	0.937	0.931
Panel B: Road Trade Volume					
Politician Age Differential	0.008**	0.010***	0.008**	0.008**	0.008**
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
Observations	4,671	4,671	4,671	4,671	4,401
R-squared	0.935	0.943	0.934	0.934	0.928
Panel C: Waterway Trade Volume					
Politician Age Differential	0.022***	0.019***	0.022**	0.022***	0.021**
	(0.008)	(0.007)	(0.009)	(0.008)	(0.008)
Observations	2,610	2,610	2,610	2,610	2,439
R-squared	0.968	0.974	0.967	0.967	0.964
Panel D: Export Value (USD)					
Politician Age Differential	0.008	0.008	0.011*	0.011*	0.012**
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)
Observations	3,534	3,534	3,534	3,534	3,303
R-squared	0.978	0.982	0.976	0.976	0.972
City Characteristics	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	–	Yes
Province Linear Trend	Yes	–	Yes	–	Yes
City Linear Trend	–	Yes	–	–	–
Cluster at City Level	–	–	Yes	–	–
Cluster at Politician Level	–	–	–	Yes	–
Exclude Deputy Province Cities	–	–	–	–	Yes

Notes: This table examines the robustness of how Politician Age Differential between party secretaries (within the same province) affects city-level trade volumes. The analysis uses city-level panel data from 1996 to 2018. The key independent variable 'Politician Age Differential' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. Panel A shows effects on total trade volume, Panel B on road trade, Panel C on waterway trade, and Panel D on export trade. All trade volumes are logged and measured at 10,000 tons. Column (1) includes province linear trends, Column (2) adds city linear trends, Column (3) clusters standard errors at the city level, Column (4) clusters at the politician level, and Column (5) excludes cities at deputy provincial level. All specifications control for city characteristics, politician characteristics, city fixed effects, politician fixed effects, and city-politician fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C Data Description

C.1 Provincial Bilateral Trade Flows

To validate the baseline city-level findings and examine the underlying mechanism – namely, how local politicians strategically influence inter-regional trade – I employ provincial bilateral trade flow data spanning 2000 to 2018. These data, obtained from the Railway Statistical Yearbook, capture trade volumes between province pairs transported via railway networks.

C.2 City-sector Subsidies and Firm-level Data

City-sector government subsidies data are drawn from the China Stock Market & Accounting Research (CSMAR) Database. Firm-level data, including employment, revenue, and intermediate inputs, come from the Annual Survey of Industrial Firms (ASIF). The ASIF provides comprehensive coverage of industrial enterprises exceeding a revenue threshold (typically 5 million RMB), accounting for over 95% of China's total industrial output.

C.3 Land Provision Data

Land provision data is obtained from China's Ministry of National Land and Resources website.[37] The dataset contains comprehensive land transaction information including city, purpose, area, and price. I track keywords to identify industrial/residential land provision from purpose descriptions. During 2000-2018, there are over 2.5 million land transactions, collapsed into city-year panel data.

C.4 Motorway Network Data

Motorway network data are sourced from the comprehensive GIS database of China's transport network compiled by Davis et al. (2025). This database provides granular, annual GIS records of national highways, motorways, and railways with detailed spatial coordinates and network characteristics. The original data are aggregated to the city level for analysis. Key variables include motorway length, network nodes, network links, and betweenness centrality metrics that capture each city's position within the broader transportation network.

[37] The data can be obtained from www.landchina.com

C.5 Firm Entry Data

This study utilizes comprehensive firm registration data from China's State Administration for Industry and Commerce (SAIC), including all registered companies. The dataset provides registered addresses, registration dates, operational status, and industry classifications. I developed a city-industry-year panel tracking new firm entries from 1996-2018, containing approximately 6 million observations.

D Business Network Construction

To analyze the propagation of politically induced trade barriers through inter-firm relationships, this study constructs a comprehensive business network using China's Annual Survey of Industrial Firms (ASIF) dataset covering 2000-2007. The methodology follows Breitung and Müller (2025) for network identification.

The network construction proceeds in three stages. First, firm-level data is extracted for enterprises meeting the revenue threshold (typically 5 million RMB), representing over 95% of China's industrial output. Key attributes include industry subcategory, primary business activities, geographical location, and financial metrics (output value, sales, exports, assets, liabilities, revenue, profit, and intermediate goods usage). Firms with missing values in critical fields are excluded.

Second, composite feature vectors are engineered for each firm by combining textual and quantitative characteristics. Textual descriptions are transformed into embeddings using the paraphrase-multilingual-MiniLM-L12-v2 SentenceTransformer model, while financial variables are standardized to zero mean and unit variance. These components are concatenated to form unified feature vectors.

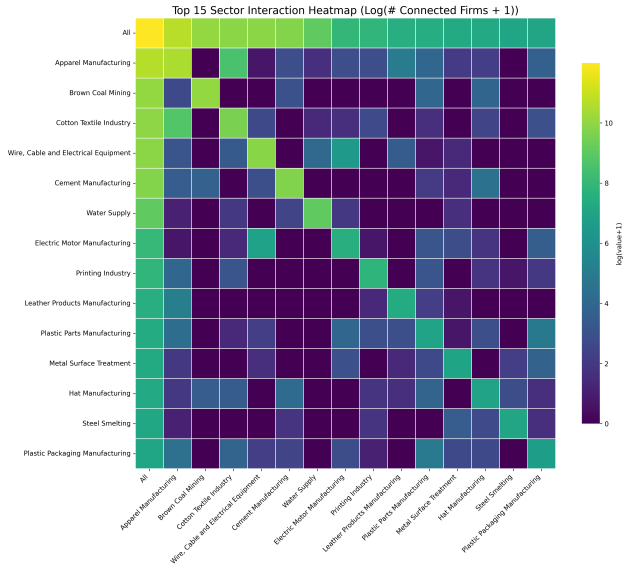
Third, business connections are established using cosine similarity between feature vectors. Network linkages require: (1) cosine similarity ≥ 0.95 to capture only the strongest relationships, (2) firms located in the same province but different cities to identify inter-city connections relevant to internal trade barriers, and (3) unique pair recording to avoid redundancy.

The matched firm pairs from 2000 are extended across the 2000-2007 period, incorporating time-varying financial data when both firms remain active and satisfy geographical constraints. All industry subcategories are grouped into 45 sectors using K-Means clustering on text embeddings, with dummy variables indicating sector membership and same-sector linkages.

This methodology yields a dynamic panel dataset of inter-city firm relationships within provinces, providing the empirical foundation for analyzing how political competition

and trade frictions propagate through interconnected firms across jurisdictions. Figure D.1 visualizes the intensity of connections among the top 15 sectors, while Figure A.6 displays network structures for selected provinces.

Figure D.1: Connected Sectors in Business Networks (Heatmap)



Notes: This heatmap illustrates inter-sectoral firm connections within the business network, showing connection intensity between sectors using 2000-2007 data. Lighter colors indicate higher connection strength between corresponding sectors.

Table D.1: Example Matched Firm Pair

Attribute	Firm I Details	Firm J Details
Similarity Score from LLM (96.81%)		
Firm ID	13346	1267002
Name	Shanghai Gaodong Paint Factory	Shanghai Rongsheng Coating Co., Ltd.
Industry Subcategory	Organic Chemical Products Manufacturing	Organic Chemical Products Manufacturing
Activity 1	Paint and Coating	Paint Spraying Processing
City	Pudong New District	Qingpu District

Notes: This table shows an example of firms connected via business networks based on main business activity and sectors. The similarity score also considers the financial status of firms.

E Construction of Sectoral Connectedness (IO Table)

To capture structural interdependencies at the sectoral level, I construct a measure of connectedness using province-specific Input-Output (IO) tables. I specifically use the 1997 IO tables, which predate the main sample period, to mitigate potential endogeneity

concerns arising from contemporaneous shocks that might jointly affect firm performance and sectoral linkages.

While the text-based measure identifies latent similarities in business scope, the IO approach explicitly maps vertical supply chain linkages between industries. Let Z_{sk}^p denote the intermediate input flows from upstream sector s to downstream sector k within province p, and let X_k^p represent the total inputs of sector k. The direct input coefficient (technical coefficient) a_{sk}^p is calculated as:

$$a_{sk}^p = \frac{Z_{sk}^p}{X_k^p}. \tag{9}$$

This coefficient represents the value of inputs from sector s required per unit of total inputs in sector k, thereby proxying the intensity of the direct supply chain linkage.

To distinguish significant economic linkages from negligible transactions, I define sectoral connectedness based on the distribution of these coefficients within the IO table. Let M^p denote the median value of all nonzero technical coefficients in province p. The binary connectedness indicator C_{sk}^p is defined as:

$$C_{sk}^p = \mathbf{1}\left(a_{sk}^p > M^p\right), \tag{10}$$

where $\mathbf{1}(\cdot)$ is the indicator function. Sectors s and k are thus considered *connected* only if their direct input-output dependency exceeds the median linkage intensity observed in the 1997 provincial economy. This threshold approach ensures that the measure captures salient structural relationships while filtering out minor or incidental cross-sector transactions.

F Firm Pair Classification Procedure: Potential Competitors/Suppliers

This appendix details the classification of high-similarity firm pairs into "potential competitors" and "potential suppliers/partners" for the heterogeneity analysis in Section 5.3.1.

F.0.1 Conceptual Framework

Following Chen (1996), I identify competitors based on two dimensions: market commonality and resource similarity. Direct competitors are firms that operate in the same market

segment *and* possess comparable strategic endowments. Bergen and Peteraf (2002) emphasize that true horizontal competitors should exhibit similarity in both product offerings and operational characteristics. In contrast, vertically related firms may have overlapping product descriptions but differ in their financial profiles due to different positions in the value chain (Fresard et al., 2020).

F.0.2 Classification Criteria

Among the firm pairs already identified as having high product similarity using text-based methods following Hoberg and Phillips (2016) (Section 5.3.1), I classify pairs as **potential competitors** if they satisfy two additional conditions:

1. **Same sector**: Both firms operate in the same 2-digit industry, indicating direct market overlap.
2. **Similar financial status**: Firms have comparable operating profit margins (within 5 percentage points) and asset turnover ratios (within 0.5), indicating similar business models and scale of operations.

Firm pairs that do not meet both conditions are classified as **potential suppliers/-partners**. This residual category captures vertical relationships where firms have related products but occupy different positions in the supply chain, typically reflected in different profitability and asset utilization patterns.

G Additional Results

G.1 Bilateral Trade Flows and Provincial Yardstick Competition

To validate that the yardstick competition mechanism operates beyond the city level and through bilateral trade relationships, I examine inter-provincial trade flows using province-pair panel data. This analysis addresses two objectives: first, demonstrating that the competition effects persist when using bilateral trade flows rather than aggregate city volumes; second, showing that the mechanism operates across different levels of government where yardstick competition exists.

A note on the choice of transport mode is warranted. In the city-level analysis, railway freight served as a placebo outcome because rail primarily handles long-distance inter-provincial routes beyond the control of city-level officials, whose jurisdiction is confined to local road and waterway infrastructure. At the provincial level, however, railway freight becomes the appropriate outcome variable precisely because it captures inter-provincial trade. Provincial leaders possess greater authority over railway logistics within their jurisdictions—including freight scheduling, terminal access, and coordination with national rail networks. Thus, the shift from road/waterway freight at the city level to railway freight at the provincial level reflects the change in spatial scale: the politically salient transport mode depends on which infrastructure falls within the relevant leader's sphere of influence.

At the provincial level, party secretaries compete nationally for central government positions, creating a different but analogous tournament structure to the within-province competition among city leaders. I construct the provincial-level age differential by comparing each provincial party secretary's age to the average age of all other provincial party secretaries nationally. This measure captures the intensity of yardstick competition among provincial leaders, where those closer to the national average age face more intense competition for limited central government positions.

The empirical specification examines bilateral trade flows between province pairs:

$$\text{Log(Bilateral Trade)}_{ij,t} = \alpha_0 + \alpha_1 \text{Age Diff}_{i,t} + \alpha_2 \text{Age Diff}_{j,t} + \delta_{ij} + \tau_t + \gamma_{i,pol} + \gamma_{j,pol} + \epsilon_{ij,t} \tag{11}$$

where i and j index origin and destination provinces, δ_{ij} represents province-pair fixed effects controlling for time-invariant bilateral trade relationships, τ_t denotes year fixed effects, and $\gamma_{i,pol}$, $\gamma_{j,pol}$ are province-politician fixed effects capturing individual leader characteristics.

Table B.9 presents the results using bilateral provincial trade data spanning approximately 900 province-pairs per year. The findings demonstrate that yardstick competition af-

fects trade flows at the provincial level, with origin province competition showing stronger effects than destination competition. A larger age differential in the origin province (indicating weaker competitive pressure) is associated with significantly higher bilateral trade volumes, with coefficients of 0.021-0.022 that are statistically significant at the 1% level.

The asymmetric effects between origin and destination provinces align with the theoretical framework. Politicians have greater control over policies affecting outbound trade flows from their jurisdiction—through industrial policies, regulatory approaches, and inter-provincial coordination—than over inbound flows, which depend primarily on destination province policies.

Notably, the destination province age differential shows weaker and statistically insignificant effects (0.012-0.014), consistent with the notion that trade-restricting policies primarily operate through origin-side mechanisms. When examining only origin effects (Column 3) or destination effects (Column 4) separately, the origin competition measure remains robust while destination effects remain insignificant.

These results provide two important validations of the main findings. First, they confirm that the competition mechanism operates through bilateral trade relationships rather than being an artifact of aggregate city-level trade measurement. Second, they demonstrate that yardstick competition effects extend beyond the specific institutional structure of city-provincial promotion tournaments to operate across different levels of government where similar competitive dynamics exist.

The consistency between city-level and provincial-level findings strengthens the interpretation that career-driven yardstick competition systematically influences politicians' willingness to implement policies that facilitate or restrict inter-jurisdictional economic integration, regardless of the specific administrative level at which this competition occurs.

G.2 New Firm Entry: Tradable vs Real Estate

Building upon established evidence that political incentives shape policy outcomes under yardstick competition, I further examine how such competition influences local economic structure through its effects on new firm entry.[38] I hypothesize that yardstick competition generates heterogeneous effects on firm creation contingent upon sectoral characteristics, particularly tradability and potential for generating inter-jurisdictional spillovers that may affect competing politicians' performance metrics.

Using the SAIC firm registration data previously described, this dataset covers the universe of all firms that were ever registered in China. The data contains detailed

[38]While firm entry represents a critical driver of economic dynamism, politicians can strategically manipulate entry patterns to enhance their relative performance within promotion tournaments, effectively constituting a form of industrial policy.

information on firms' registered address, date of registration, current state of existence, and industry (3-digit). I thus construct a county-industry-year panel data, measuring the number of firm entries. Overall, I have obtained about 5.8 million county-industry-year observations from the data period 1996 to 2018. I estimate the following equation:

$$Y_{s,c,t} = \alpha_0 + \alpha_1 \text{Politician Age Differential}_{c,t} \times \text{Sector}_s + \delta_{s,c} + \sigma_i + \gamma_{c,t} + \epsilon_{s,c,t} \tag{12}$$

where $Y_{s,c,t}$ denotes the logarithm of the number of firm registrations plus one in 3-digit sector s, county c, and year t. Politician Age Differential$_{c,t}$ $\times$ Sector$_s$ denotes the interaction terms between Politician Age Differential and tradable/real estate sector indicators. The specification includes county-sector fixed effects ($\delta_{s,c}$), politician fixed effects (σ_i), and county-year fixed effects ($\gamma_{c,t}$). Note that the main effect of Politician Age Differential is absorbed by the county-year fixed effects, while the main effect of Sector is absorbed by the county-sector fixed effects. Standard errors are clustered at the province-year level.

Table G.1 reports the results. I find that weaker yardstick competition increases the number of new firm entries within tradable sectors. Specifically, the interaction term between Politician Age Differential and an indicator for tradable sectors is positive and significant across all specifications in Columns (1)-(3). A one standard deviation increase in Politician Age Differential would lead to a 1.7 percent increase in tradable firm entries.[39] This finding is congruent with the study's central argument that diminished competitive pressures incentivize politicians to adopt policies more conducive to activities with potential inter-jurisdictional spillovers, such as fostering tradable industries through favorable subsidy allocations or infrastructure investments, thereby creating a more attractive environment for entrepreneurial endeavors in these domains.

In contrast, the analysis reveals an inverse relationship concerning the real estate sector. The interaction term between Politician Age Differential and real estate sectors yields a negative and statistically significant coefficient across specifications in Columns (4)-(6). The results suggest that a one standard deviation decrease in Politician Age Differential (stronger yardstick competition) would lead to a 2.0 percent increase in real estate firm entries.[40] This observation aligns with the theoretical framework wherein politicians facing intense rivalry strategically reallocate resources towards non-tradable sectors that offer primarily localized benefits, such as real estate, which generate economic outcomes confined to their own jurisdiction without benefiting competing politicians.

These patterns of firm entry, conditional on the interplay between yardstick competition

[39] Using the coefficient 0.0076 from the most complete specification in Column(3) and assuming a standard deviation of 2.2 for Politician Age Differential: 0.0076 $\times$ 2.2 = 0.017 or 1.7 percent.

[40] Using the coefficient -0.0093 from Column(6): 0.0093 $\times$ 2.2 = 0.020 or 2.0 percent.

intensity and sectoral characteristics, reveal a further channel through which the career concerns of local politicians can shape the contours of local industrial structure. An environment characterized by attenuated political competition appears to foster greater dynamism in tradable sectors, whereas heightened competition may, ceteris paribus, make entry into non-tradable sectors like real estate relatively more prevalent as politicians prioritize geographically circumscribed economic outcomes.

Table G.1: Politician Age Differential and Number of Firm Entry

	Log(# Firm New Entry + 1)					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Politician Age Differential × Tradable Sector	0.0075***	0.0077***	0.0076***			
	(0.0014)	(0.0014)	(0.0014)			
Politician Age Differential × Real Estate Sector				-0.0114***	-0.0105***	-0.0093***
				(0.0023)	(0.0022)	(0.0022)
Observations	5,765,294	5,765,291	5,765,056	5,765,294	5,765,291	5,765,056
R-squared	0.548	0.558	0.574	0.548	0.558	0.574
County-Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	–	Yes	Yes	–
Politician FE	–	Yes	Yes	–	Yes	Yes
County-Year FE	–	–	Yes	–	–	Yes

Notes: This table examines the impact of Politician Age Differential on the number of new firm entries, distinguished by sector type (tradable versus real estate). The analysis utilizes county-industry-year panel data from 1996 to 2018, with the dependent variable being the logarithm of the number of new firm entries plus one. The key independent variables are the interaction terms between Politician Age Differential and indicators for tradable sectors and real estate sectors, respectively. All specifications control for county-sector fixed effects, politician fixed effects, and county-year fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

G.3 Instrumental Variable Estimates

To address potential concerns about endogeneity and reverse causality between politician age differentials and regional trade outcomes, I employ instrumental variable estimation using the one-year lagged value of Politician Age Differential. While the variation in Politician Age Differential is plausibly exogenous to unobservable characteristics affecting regional trade volume, the IV approach provides additional robustness by exploiting predetermined variation in political competition.

I instrument Politician Age Differential using its one-year lagged value. This approach exploits the predetermined nature of lagged political competition while maintaining relevance to current competitive dynamics. The lagged instrument is valid under the assumption that past realizations of politician age differentials affect current economic outcomes only through their influence on current political competition, rather than through direct channels.

The relevance condition is satisfied because political competition exhibits persistence over time–age differentials that existed in the previous period continue to influence current competitive dynamics through ongoing career trajectories, established networks, and accumulated political capital. However, the one-year lag ensures that the instrument is predetermined with respect to current-period shocks that might simultaneously affect both political competition and economic outcomes.

The exclusion restriction requires that lagged politician age differentials do not directly affect current trade outcomes except through their impact on current political competition:

$$E[\epsilon_{i,c,t}|Z_{i,p,t-1}, X_{i,c,t}, \alpha_c, \gamma_i, \delta_{p,t}] = 0 \tag{13}$$

where $Z_{i,p,t-1}$ represents the one-year lagged Politician Age Differential, $\epsilon_{i,c,t}$ is the error term in the structural equation, $X_{i,c,t}$ denotes control variables, and α_c, γ_i, and $\delta_{p,t}$ represent city, politician, and province-year fixed effects, respectively.

Table G.2 presents the second-stage results from the instrumental variable estimation, which strongly confirm the baseline findings of a positive relationship between Politician Age Differential and trade volumes across different transportation modes and trade types. The IV estimates are consistently positive and statistically significant across all specifications.

The first-stage F-statistics range from 19 to 35 across specifications, all well above conventional thresholds for weak instrument concerns, indicating strong relevance of the lagged instrument. Figure G.1 illustrates the first-stage relationship, showing a clear positive correlation between the one-year lagged Politician Age Differential and its current value.

These IV results provide strong evidence that the positive relationship between politician age differentials and regional trade performance reflects a causal effect of political competition rather than spurious correlation. The consistency of results across different outcome measures reinforces confidence in the robustness of the main findings.

G.4 Regression Discontinuity Design: Start Age Above 57

The baseline OLS analysis establishes a relationship between the Politician Age Differential and inter-regional trade volumes, suggesting that a larger age differential – implying less intense yardstick competition – is associated with increased trade volumes. This indicates that career incentives tied to a politician's age relative to their peers influence policy choices regarding trade liberalization.

To validate this conclusion and examine how altered career incentives affect trade policy, I employ a Regression Discontinuity Design (RDD) exploiting the threshold of

Figure G.1: First Stage Relationship: One-Year Lagged Politician Age Differential

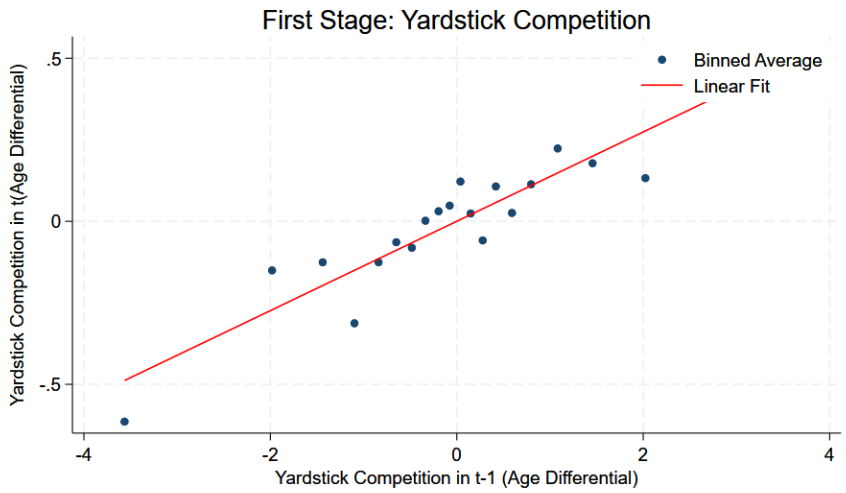


Table G.2: Instrumental Variable Estimates: Effect of Politician Age Differential on City Trade Volume

VARIABLES	Log(Total Trade Volume) (1)	Log(Motorway Trade Volume) (2)	Log(Waterway Trade Volume) (3)	Export Value (4)
Politician Age Differential	0.071***	0.057**	0.183**	0.110*
	(0.026)	(0.026)	(0.078)	(0.056)
Observations	4,819	4,671	2,610	3,534
First-Stage F-stat	35	32	19	19
City Characteristics	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes

Notes: This table presents instrumental variable (IV) regression results estimating the causal effect of politician age differential on city trade volumes. The sample covers city-level panel data from 1996 to 2018. Politician Age Differential is instrumented using its one-year lagged value. The dependent variables are log-transformed trade volumes by transportation mode and trade type. All specifications include comprehensive controls for city and politician characteristics, along with city, politician, year, and city-politician fixed effects. The Kleibergen-Paap Wald F-statistic tests for weak identification. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

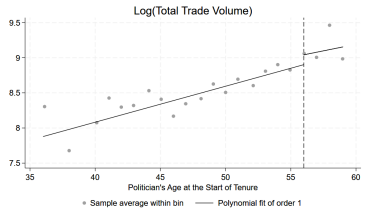
politicians beginning their tenure at age 57 (Campante et al., 2023; Zeng and Zhou, 2024). This age threshold represents a plausible point at which institutional factors, including proximity to mandatory retirement ages and promotion ceilings, induce a discontinuous shift in politicians' career incentives and policy orientation. The RDD provides a robustness check for the baseline results by testing whether a discrete change in incentive structure at this career juncture generates corresponding changes in policy behavior. The identifying assumption is that politicians just above and below the 57-year threshold are comparable in all respects except for the discontinuous change in career incentives. If politicians perceive significantly altered promotion prospects upon reaching this age, their motivation for engaging in inter-jurisdictional competition may shift discontinuously, independent of their relative age position among peers.

A significant positive discontinuity in trade volumes for politicians whose starting age exceeds 57, compared to those just below this threshold, would indicate that altered career incentives lead to less restrictive trade policies. Such findings would validate the OLS results through three channels. First, they would corroborate the mechanism by which career stage influences policy: if promotion incentives diminish sharply past age 57, reducing engagement in local protectionism, this aligns with OLS findings that reduced competitive pressure correlates with increased trade. Second, the RDD's local randomization around the threshold isolates the effect of incentive shifts, strengthening causal inference regarding career incentives' role in trade policy determination. Third, methodological triangulation between OLS and RDD approaches, employing different identifying variation and assumptions, would provide converging evidence that politicians' career stage and associated incentives affect their propensity to restrict trade.

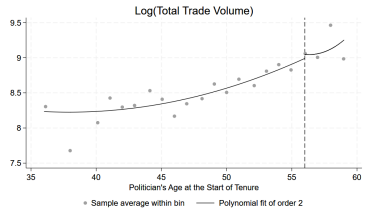
Figure G.2 presents visual evidence for discontinuities across total, road, waterway, and train trade volumes, plotting logarithmic values against politicians' starting age with polynomial fits. The plots reveal notable jumps at the 57-year threshold across all trade volume measures. Log(Total Trade Volume) in panels (a) and (b) exhibits a clear upward discontinuity for politicians starting tenure above age 57. This pattern is consistent across Log(Motorway Trade Volume) in panels (c) and (d), Log(Waterway Trade Volume) in panels (e) and (f), and Log(Export Value) in panels (g) and (h), with all transportation modes showing increased trade volumes above the threshold.

The RDD estimation confirms these visual patterns, yielding statistically significant positive discontinuities in trade volumes at the 57-year threshold across all measures. The results demonstrate that politicians beginning tenure just above this age threshold facilitate substantially higher trade volumes compared to those just below, providing robust evidence that altered career incentives lead to less restrictive trade policies. These findings strongly validate the OLS conclusions by establishing that exogenous shifts in

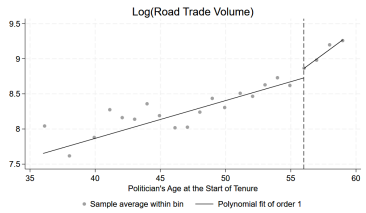
Figure G.2: Regression Discontinuity: Politician Start Age Above 57



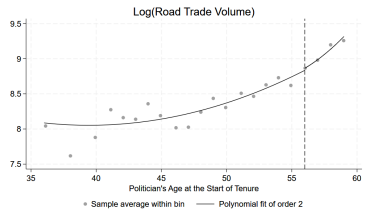
(a) Total Trade Volume (Polynomial Fit of Order 1)



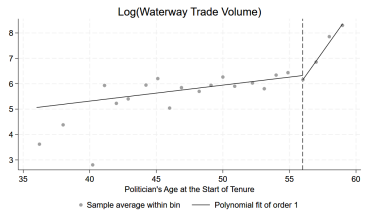
(b) Total Trade Volume (Polynomial Fit of Order 2)



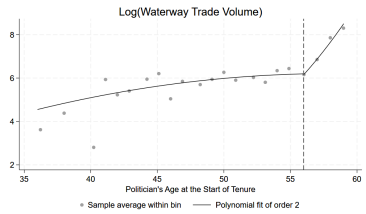
(c) Road Trade Volume (Polynomial Fit of Order 1)



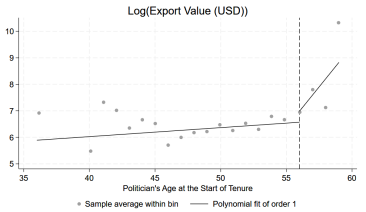
(d) Road Trade Volume (Polynomial Fit of Order 2)



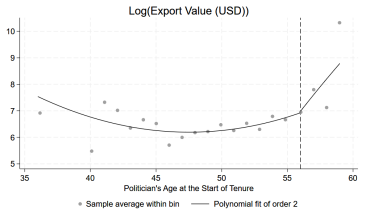
(e) Waterway Trade Volume (Polynomial Fit of Order 1)



(f) Waterway Trade Volume (Polynomial Fit of Order 2)



(g) Export Value (USD) (Polynomial Fit of Order 1)



(h) Export Value (USD) (Polynomial Fit of Order 2)

Notes: These figures present regression discontinuity results examining the effect of politicians' career incentives on city trade volume across different transportation modes. The running variable is the politician's age at the beginning of their tenure. The threshold is set at age 57, as politicians who begin their tenure above this age face mandatory retirement and have no opportunity for future promotion, creating a sharp change in career incentives. Each panel compares polynomial fits of order 1 and 2 to demonstrate the robustness of the discontinuity. Trade volumes are expressed in logarithmic form.

career incentives at critical ages generate policy outcomes consistent with the theory of politically induced trade barriers.

G.5 Heterogeneous Effects by Initial Economic Conditions

A key question in political economy is how a region's economic conditions shape the impact of political distortions. This study's framework suggests that politicians' incentives to manipulate trade under yardstick competition may vary with local economic characteristics. To test this, the baseline model is extended by interacting the Politician Age Differential with four measures of city-level economic structure: non-agricultural employment share, firm tax revenue, an indicator for high manufacturing share of GDP, and the manufacturing employment share. The results in Table G.3 show that these interaction terms are consistently negative and statistically significant, indicating that the positive effect of a larger age differential (weaker competition) on trade is systematically attenuated in more economically developed cities.

However, the magnitude of this mitigating effect is generally modest. For instance, the interaction with non-agricultural employment share (Column (1)) is -0.0002. This implies that a substantial 10 percentage point increase in a city's non-agricultural employment only reduces the main effect of the Politician Age Differential (0.033) by about 6%. The interaction with manufacturing employment share (Column (4)) is also -0.0002, suggesting a similarly small dampening effect. The most notable mitigation occurs in cities where manufacturing constitutes over 50% of GDP (Column (3)), where the main effect is nearly halved. Overall, while the moderating influence of economic structure is statistically present, it is not strong enough to eliminate the primary impact of yardstick competition, which remains economically meaningful across most city types.

From an institutional standpoint, these findings suggest that politicians' strategic responses are conditioned by their local economic environment. In more developed and interconnected economies, the costs of implementing protectionist policies are higher. Disrupting complex supply chains could harm a politician's absolute economic performance metrics, creating a powerful disincentive that counteracts the pressure from relative evaluation. This tension means that politicians in advanced cities face greater constraints on their ability to manipulate trade flows for political gain, thus weakening, but not eliminating, the observable link between competition intensity and trade outcomes.

Table G.3: Effect of Politician Age Differential by City Industry Structure

	Log(Total Trade Volume)			
VARIABLES	Non-Agri Employment (1)	City Government Firm Tax Revenue (2)	VA in Manuf $\geq$ 50% (3)	2nd Industry Employment % (4)
Politician Age Differential	0.033***	0.053**	0.015***	0.020***
	(0.012)	(0.026)	(0.004)	(0.007)
Non-agricultural Employment Share	0.005**			
	(0.002)			
Age Diff $\times$ Non-agri Share	-0.0002**			
	(0.000)			
City Firm Tax Revenue		0.054*		
		(0.029)		
Age Diff $\times$ Firm Tax Revenue		-0.003*		
		(0.002)		
1(50% City Manufacturing GDP)			0.094***	
			(0.031)	
Age Diff $\times$ Manufacturing GDP			-0.007**	
			(0.004)	
City Manufacturing Employment				0.004**
				(0.002)
Age Diff $\times$ Manufacturing Emp				-0.0002*
				(0.000)
Observations	4,198	3,716	4,420	4,214
R-squared	0.933	0.937	0.937	0.940
City Characteristics	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes

Notes: This table examines how the effect of politician age differential on trade volume varies across cities with different industry structures. Column (1) examines non-agricultural employment measured by the city-level total employment share of non-agricultural sectors, Column (2) examines city government firm tax revenue, Column (3) examines the manufacturing value-added share of GDP (indicator for $\geq$ 50%), and Column (4) examines manufacturing employment share of the total labor of the city. The dependent variable is log total trade volume across all specifications. The main variable of interest is politician age differential and its interactions with city industry structure measures. All specifications include city characteristics, politician characteristics, year fixed effects, and city-politician fixed effects. Standard errors are in parentheses and are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

G.6 Politician Age Differential and Tenure Years

One alternative explanation for the effect of the Politician Age Differential on trade volumes is that it merely captures a politician's time in office or experience, rather than the intensity of yardstick competition. For instance, politicians with longer tenures might be associated with certain age differentials and could independently influence trade. To address this, I examine whether the impact of the Politician Age Differential varies systematically across a politician's tenure. Figure G.3 plots the average evolution of this differential across tenure years, providing context for the competitive dynamics over a politician's term.

To formally test this, the baseline specification is augmented by interacting the Politician Age Differential with dummy variables for each year in office (from year 1 to 5) and with indicators for whether a politician is serving a consecutive term or their first term in a city. The results are presented in Table G.4.

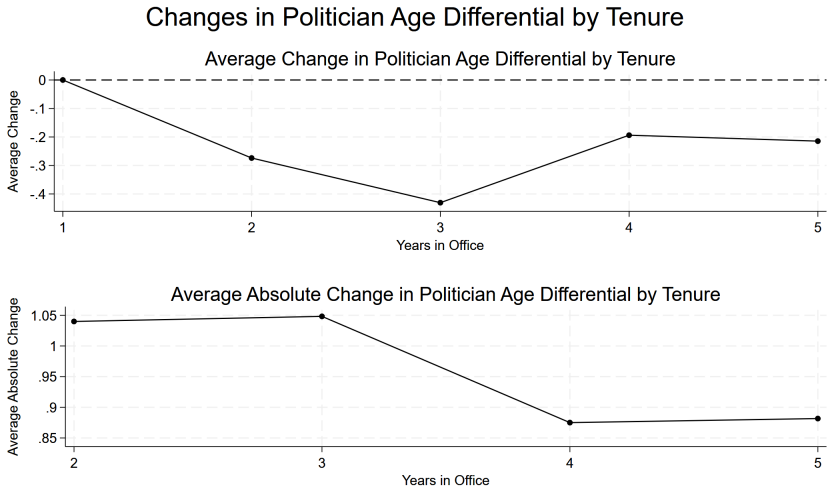
Across the different trade measures, the interaction terms between the Politician Age Differential and the tenure dummies (Columns 1-5) are generally statistically insignificant. Similarly, the interaction with the indicator for serving a consecutive term (Column 6) shows no consistent, significant pattern. The main effect of the Politician Age Differential remains positive and statistically significant in most specifications, with a magnitude similar to the baseline results. For example, the coefficient on total trade volume remains stable and significant across Columns (1) through (7) in Panel A. These results suggest that the relationship between the Politician Age Differential and trade is not primarily driven by the number of years a politician has been in office. The effect associated with yardstick competition appears distinct from the potential influence of tenure duration, accumulated experience, or incumbency status.

Table G.4: Politician Age Differential and Tenure Effects

	Log(Trade Volume)						
VARIABLES	Year 1 (1)	Year 2 (2)	Year 3 (3)	Year 4 (4)	Year 5 (5)	Consecutive Term (6)	First City Term (7)
Panel A: Total Trade Volume							
Politician Age Differential	0.009**	0.011***	0.011***	0.011***	0.011***	0.010***	0.012***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Politician Age Differential × Tenure	0.005	-0.002	0.000	-0.005	0.005	0.010	-0.003
	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.012)	(0.003)
Observations	4,819	4,819	4,819	4,819	4,819	4,819	4,819
R-squared	0.937	0.937	0.937	0.937	0.937	0.937	0.937
Panel B: Road Trade Volume							
Politician Age Differential	0.008**	0.009**	0.008**	0.009**	0.008**	0.007**	0.010***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Politician Age Differential × Tenure	0.001	-0.002	0.003	-0.003	0.000	0.021	-0.005*
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.021)	(0.003)
Observations	4,671	4,671	4,671	4,671	4,671	4,671	4,671
R-squared	0.934	0.934	0.934	0.934	0.934	0.934	0.934
Panel C: Waterway Trade Volume							
Politician Age Differential	0.023**	0.022***	0.023***	0.022***	0.023***	0.021**	0.025***
	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Politician Age Differential × Tenure	-0.001	0.002	-0.002	0.000	-0.011	0.019	-0.010
	(0.008)	(0.006)	(0.008)	(0.009)	(0.012)	(0.017)	(0.008)
Observations	2,610	2,610	2,610	2,610	2,610	2,610	2,610
R-squared	0.967	0.967	0.967	0.967	0.967	0.967	0.967
Panel D: Export Value (USD)							
Politician Age Differential	0.008	0.012**	0.011**	0.011**	0.012**	0.011*	0.011**
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Politician Age Differential × Tenure	0.007	-0.004	0.000	0.006	-0.013	0.010	0.002
	(0.005)	(0.005)	(0.004)	(0.009)	(0.009)	(0.013)	(0.006)
Observations	3,534	3,534	3,534	3,534	3,534	3,534	3,534
R-squared	0.976	0.976	0.976	0.976	0.976	0.976	0.976
City Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table examines how the effect of age differentials between party secretaries on trade volumes varies across politicians' tenure years. The analysis uses city-level panel data from 1996 to 2018. Panel A shows effects on total trade volume, Panel B on road trade, Panel C on waterway trade, and Panel D on export trade. The key independent variable 'Politician Age Differential' measures the absolute difference between a city party secretary's age and the average age of party secretaries in other cities within the same province. Interaction terms between age differential and tenure year dummies (Columns 1-5), consecutive term indicator (Column 6), or first city term indicator (Column 7) test whether the competition effect varies by politicians' time in office. All specifications include city characteristics, politician characteristics, year fixed effects, and city-politician fixed effects. Standard errors (in parentheses) are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure G.3: Changes in Politician Age Differential



Notes: This figure illustrates how Politician Age Differential changes over time. It shows how age differentials evolve across politicians' tenure years. The horizontal axis represents years in office (1-5+).

G.7 Pre-trend in Trade Volume

To further support the causal interpretation of the relationship between Politician Age Differential and trade volumes, I conduct a placebo test to examine the possibility of pre-existing trends. Specifically, I test whether future levels of political competition (measured by the average age differential in a later period) are correlated with past changes in city trade volumes. If cities that were set to experience lower or higher competition intensity in the future already exhibited different trade growth trajectories before those competition levels were realized, it would cast doubt on the identification strategy, suggesting potential reverse causality or omitted variables driving both competition and trade patterns.

For this test, I regress the change in city trade volumes (total, motorway, waterway, and export) between 2000 and 2005 on the average Politician Age Differential observed during the subsequent 2006 to 2010 period. The regression includes province fixed effects and baseline city controls from 2000.

The results are presented in Figure G.4. I find no statistically significant relationship between the average Politician Age Differential during 2006-2010 and the change in trade volumes during the earlier 2000-2005 period. The estimated coefficients are close to zero and statistically insignificant across all trade categories examined.

This lack of correlation between future competition intensity and past trade dynamics suggests that the main findings are unlikely to be driven by pre-existing trends. It provides additional evidence supporting the interpretation that changes in yardstick political competition, proxied by the Politician Age Differential, have a causal impact on inter-regional trade volumes, rather than merely reflecting pre-determined city-specific trade trajectories.

G.8 Alternative Measures of Yardstick Competition

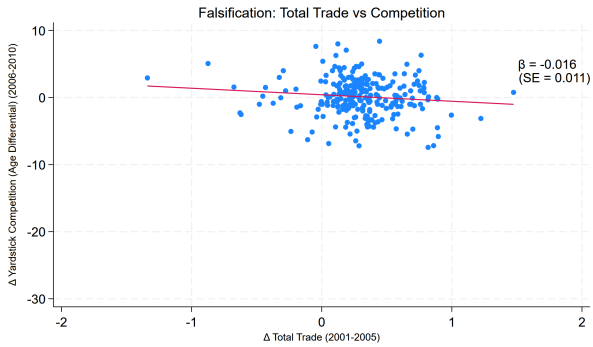
To assess the robustness of the main findings, this section re-estimates the baseline specification using alternative measures of yardstick competition. While the primary hypothesis centers on age, competition could plausibly occur along other dimensions such as tenure, education, or experience. The results of these estimations are presented in Table G.5.

First, I test whether competition based on characteristics other than age produces similar effects. Panels B, C, and F replace the age differential with differentials in tenure, education level, and total working years, respectively. Across all trade categories, these alternative measures of competition are consistently statistically insignificant. This suggests that the observed effect is specific to the institutional importance of **age** in the promotion tournament, rather than being a general proxy for differences in experience or human capital.

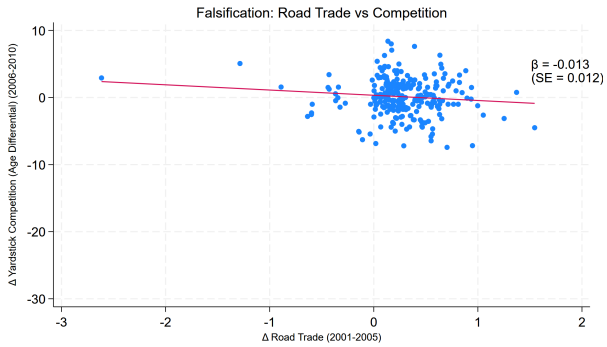
Next, I examine alternative specifications of the age-based competition measure. Panel

Figure G.4: Falsification: Past Trade Volumes and Future Yardstick Competition

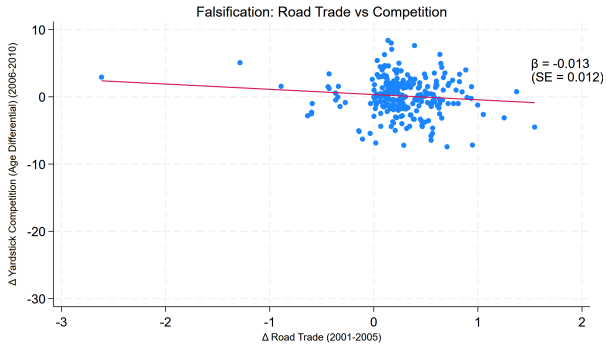
(a) Total Trade Volume



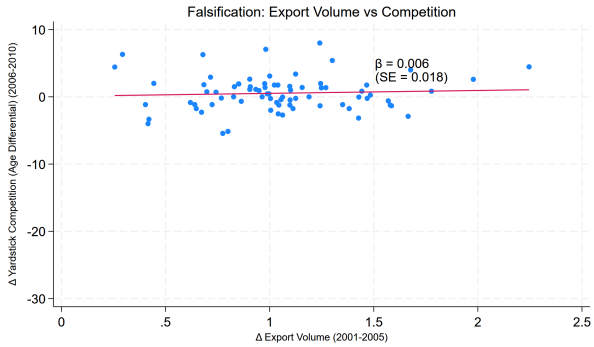
(c) Waterway Trade Volume



(b) Motorway Trade Volume



(d) Export Value (USD)



Notes: These figures test whether past trade growth predicts future political competition. The dependent variables are log changes in trade volumes during 2000–2005: total trade (panel a), motorway trade (panel b), waterway trade (panel c), and export value (panel d). The independent variable is the average Politician Age Differential during the subsequent 2006–2010 period. A significant coefficient would suggest pre-existing trends, casting doubt on the causal interpretation. The insignificant coefficients indicate no evidence of such pre-trends. All specifications include province fixed effects and baseline city controls from 2000. Standard errors are bootstrapped at the province level by 500 times.

E restricts the sample to politicians aged 57 or younger, isolating the group with the strongest promotion incentives. The results are nearly identical to the baseline in Panel A, confirming that the findings are not driven by politicians near retirement who might have different motivations.

Finally, Panels D and G measure competition intensity by counting the number of peers within a close range (±3 years) of a politician's age or working experience. A higher count signifies a more crowded competitive field. As shown in Panel D, a greater number of similarly-aged competitors is associated with significantly lower trade volumes, particularly for waterway trade and exports. This finding is consistent with the main hypothesis: more intense competition leads to greater market fragmentation. A similar, though weaker, pattern holds for the count of similarly experienced peers in Panel G. Taken together, these robustness checks reinforce the conclusion that yardstick competition in this context is uniquely and robustly tied to politicians' relative age.

G.9 Controlling for Past Trade Volume and Economic Growth

To ensure the main findings are not driven by pre-existing economic trends that might correlate with both political competition and current trade volumes, I conduct a robustness check by controlling for lagged economic indicators. The main specification is re-estimated, including lagged values of nighttime lighting (as a proxy for historical economic conditions) and the specific trade volume being analyzed. The specifications in Table G.6 use both a one-year lag and a three-year average for these controls, while maintaining the full set of fixed effects.

The results confirm the robustness of the primary finding. The coefficient for the Politician Age Differential remains positive and statistically significant across all trade modes and specifications. For instance, even after controlling for past trade levels and economic activity, a larger age differential is still associated with higher total trade volumes. As expected, the lagged trade volumes themselves are strong predictors of current trade, indicating a high degree of persistence. The stability of the main coefficient after including these dynamic controls provides further confidence that the estimates are not biased by unobserved, slowly evolving city-specific trends.

Table G.5: Effect of Different Competition Measures

VARIABLES	Log(Total Trade Volume) (1)	Log(Motorway Trade Volume) (2)	Log(Waterway Trade Volume) (3)	Log(Export Value (USD)) (4)
Panel A: Baseline Relative Age Competition				
Politician Age Differential	0.011***	0.008**	0.022***	0.011**
	(0.003)	(0.003)	(0.008)	(0.005)
Observations	4,819	4,671	2,610	3,534
R-squared	0.937	0.934	0.967	0.976
Panel B: Relative Tenure Year Competition				
Politician Tenure Year Differential	-0.009	-0.004	-0.001	0.011
	(0.006)	(0.006)	(0.011)	(0.008)
Observations	4,819	4,671	2,610	3,534
R-squared	0.936	0.934	0.967	0.976
Panel C: Relative Educational Level Competition				
Politician Education Level Differential	0.004	0.004	-0.005	-0.001
	(0.003)	(0.003)	(0.008)	(0.005)
Observations	4,819	4,671	2,610	3,534
R-squared	0.936	0.934	0.967	0.976
Panel D: Similar Age Count				
Similar Age (+3/-3) Counts within Province	-0.003	-0.002	-0.021***	-0.009**
	(0.003)	(0.003)	(0.007)	(0.004)
Observations	4,819	4,671	2,610	3,534
R-squared	0.936	0.934	0.967	0.976
Panel E: Relative Age Competition ($\leq$ Age 57)				
Politician Age Differential $\leq$ Age 57	0.011***	0.009***	0.024***	0.012**
	(0.003)	(0.003)	(0.008)	(0.006)
Observations	4,405	4,275	2,425	3,226
R-squared	0.934	0.935	0.967	0.977
Panel F: Relative Experience Year Competition				
Politician Working Years Differential	0.003	0.001	0.014**	0.003
	(0.002)	(0.002)	(0.005)	(0.003)
Observations	4,347	4,236	2,416	3,273
R-squared	0.935	0.934	0.968	0.976
Panel G: Similar Experience Count				
Similar Working Year (+3/-3) Counts within Province	-0.000	-0.002	-0.020***	-0.004
	(0.003)	(0.003)	(0.006)	(0.005)
Observations	4,352	4,238	2,416	3,273
R-squared	0.934	0.934	0.968	0.976
City Characteristics	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes

Notes: This table investigates the effect of different yardstick competition measures on trade volumes (log-transformed) and export values. Each panel presents results from separate regressions using different measures of political competition. Panel A shows the baseline relative age competition effect using politician age differential. Panel B examines relative tenure competition using politician tenure differential. Panel C examines educational level competition using politician education level differential. Panel D tests the effect of similar age politician counts within provinces. Panel E restricts the analysis to politicians aged 57 or below to capture promotion incentives before mandatory retirement. Panel F analyzes relative experience year competition using working years differential. Panel G examines similar experience politician counts within provinces. The dependent variables are Total Trade Volume (Column 1), Motorway Trade Volume (Column 2), Waterway Trade Volume (Column 3), and Export Value in USD (Column 4). All specifications include city characteristics, politician characteristics, year fixed effects, and city-politician fixed effects. Standard errors are in parentheses and are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table G.6: Robustness: Controlling for Historical Economic Conditions and Trade Volume

VARIABLES	Log(Total Trade Volume) (1)	Log(Total Trade Volume) (2)	Log(Motorway Trade Volume) (3)	Log(Motorway Trade Volume) (4)	Log(Waterway Trade Volume) (5)	Log(Waterway Trade Volume) (6)	Log(Export Value (USD)) (7)	Log(Export Value (USD)) (8)
Politician Age Differential	0.009***	0.008***	0.007**	0.005*	0.016**	0.021**	0.012**	0.011*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.007)	(0.010)	(0.005)	(0.006)
Log(Lagged Total Trade Volume)	0.260***							
	(0.074)							
Log(Lagged Nighttime Lighting)	0.066		0.064		0.038		0.155	
	(0.068)		(0.059)		(0.099)		(0.137)	
Log(3-Year Avg Total Trade Volume)		0.178**						
		(0.091)						
Log(3-Year Avg Nighttime Lighting)		0.100		0.225**		-0.098		0.338*
		(0.103)		(0.092)		(0.215)		(0.204)
Log(Lagged Road Trade Volume)			0.262***					
			(0.071)					
Log(3-Year Avg Road Trade Volume)				0.238***				
				(0.081)				
Log(Lagged Waterway Trade Volume)					0.284***			
					(0.055)			
Log(3-Year Avg Waterway Trade Volume)						0.235***		
						(0.079)		
Log(Lagged Export Trade Volume)							0.131	
							(0.085)	
Log(3-Year Avg Export Trade Volume)								0.106
								(0.092)
Observations	4,743	4,290	4,522	4,028	2,435	2,105	3,293	2,738
R-squared	0.938	0.931	0.938	0.935	0.971	0.971	0.979	0.981
City Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table examines the robustness of the main findings by controlling for historical economic conditions and past trade volumes. The dependent variables in Columns (1) through (8) are the log of Total Trade Volume (Columns 1-2), Motorway Trade Volume (Columns 3-4), Waterway Trade Volume (Columns 5-6), and Export Value (USD) (Columns 7-8), respectively. Odd-numbered Columns use lagged variables, while even-numbered Columns use 3-year averages (L3). The key independent variable is 'Politician Age Differential'. Specifications include controls for Log(Lagged Nighttime Lighting) or Log(3-Year Avg Nighttime Lighting), and the respective lagged or 3-year average Log(Trade Volume) for the dependent variable in each column. All specifications include city characteristics, politician characteristics, year fixed effects, and city-politician fixed effects. Standard errors are in parentheses and are clustered at the province-year level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

G.10 Institutional Shifts: The Anti-Corruption Campaign

The period under study includes the anti-corruption campaign initiated under Xi Jinping's leadership, which represents a significant institutional shift. To examine whether this campaign altered the effects of yardstick competition, I test for changes in the relationship after 2013 and, more precisely, after the staggered roll-out of central government anti-corruption inspections in each province.[41]

Table G.7 presents the results. The main effect of the Politician Age Differential remains positive and significant in most specifications, suggesting the underlying competitive mechanism persists. However, the interaction terms reveal a moderating effect of the campaign. The coefficient for 'Politician Age Differential × Anti-corruption Inspection' is negative and statistically significant for both total and road trade volumes (Columns 5 and 6). This indicates that the positive effect of a larger age differential (weaker competition) on trade was systematically attenuated after the anti-corruption inspections began. While the campaign did not eliminate the incentive structure, it appears to have dampened its effects, possibly by shifting politicians' focus away from purely growth-oriented metrics. The results are consistent with (Fang et al., 2025).

[41]The central government inspection teams visited different provinces in different years, creating variation in the timing of the institutional shock.

Table G.7: Effect of Politician Age Differential after Xi's Anti-corruption Campaign

VARIABLES	Log(Total Trade Volume) (1)	Log(Motorway Trade Volume) (2)	Log(Waterway Trade Volume) (3)	Log(Export Value (USD)) (4)	Log(Total Trade Volume) (5)	Log(Motorway Trade Volume) (6)	Log(Waterway Trade Volume) (7)	Log(Export Value (USD)) (8)
Politician Age Differential	0.012***	0.025***	0.010**	0.011*	0.012***	0.010***	0.025***	0.009
	(0.004)	(0.010)	(0.004)	(0.006)	(0.004)	(0.004)	(0.009)	(0.006)
Politician Age Differential × Post2013	-0.009*	-0.014	-0.008	0.002				
	(0.005)	(0.014)	(0.005)	(0.008)				
Politician Age Differential × Anti-corruption Inspection					-0.014**	-0.014**	-0.014	0.011
					(0.006)	(0.006)	(0.014)	(0.009)
Observations	4,819	2,610	4,671	3,534	4,819	4,671	2,610	3,534
R-squared	0.937	0.967	0.934	0.976	0.937	0.934	0.967	0.976
City Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Politician Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City-Politician FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction	Post-2013	Post-2013	Post-2013	Post-2013	Inspection	Inspection	Inspection	Inspection

Notes: This table examines how Xi's anti-corruption campaign moderates the effect of yardstick competition on trade. Columns (1)–(4) interact Politician Age Differential with a Post-2013 indicator; Columns (5)–(8) interact it with province-specific anti-corruption inspection timing. The dependent variables are: Log(Total Trade Volume) in Columns (1) and (5), Log(Motorway Trade Volume) in Columns (2) and (6), Log(Waterway Trade Volume) in Columns (3) and (7), and Log(Export Value in USD) in Columns (4) and (8). All specifications include city characteristics, politician characteristics, year fixed effects, and city-politician fixed effects. Standard errors clustered at the province-year level are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.