State Infrastructure and Political Geography of Protest *

Abstract

How does state infrastructure influence protests? We show theoretically and empirically that transportation improvement can reshape the political geography of protests. Leveraging the staggered opening of high-speed railways (HSR) in China, we find that HSR mitigates protests in peripheral areas but intensifies them in central regions within provinces. This spatially heterogeneous effect is primarily driven by protests involving migrant workers, and we obtain similar evidence on labor strikes. To investigate the mechanisms underlying these findings, we propose a model outlining four potential channels. Empirical evidence predominantly supports the agglomeration effect, where HSR facilitates migration to central areas and amplifies conflict, along with the deterrence effect, where HSR strengthens state presence and suppresses protest participation in remote areas. These results shed light on citizens' protest participation in authoritarian states, providing novel insights for the reformulation of political geography in response to change in economic geography by state infrastructure.

Keywords: State infrastructure; Protest; Transportation; Political geography.

JEL Codes: O18, P25, R23, R40

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1 Introduction

Economic modernization is often accompanied by shifts in political geography (Huntington, 2006; Polanyi et al., 1944). State infrastructure, including highways, railways, post offices, and so on, acts as an important tool for the state to enhance economic ties and political control over its territory, particularly remote areas (Mann, 1984). The modernization of state infrastructure has the potential to reshape regional economic and political dynamics profoundly. While some scholars highlight the role of state infrastructure, such as railways, in promoting trade and facilitating economic development (Faber, 2014; Donaldson, 2018; Brancaccio et al., 2020; Allen and Arkolakis, 2022), others emphasize its function in extending state control through monitoring and repression, as evidenced by roads, probes, and police stations (Xu, 2021; Chang and Wang, 2024; Gonzalez et al., 2024). These functions are encapsulated in the "state presence" theory, emphasizing the state's incessant efforts to build infrastructure so as to penetrate society, extract rents, exerting social control, and foster citizens' compliance (Mann, 1984; Shue, 1990).

However, there remains no clear consensus on how state infrastructure impacts the interplay between state power and political resistance. While economic modernization has equipped states, particularly authoritarian regimes, with critical tools for local surveillance, the outcomes are far from uniform. Conventional wisdom posits that the construction of state infrastructure enhances state control, thereby reducing rebellions (Schuler and Truong, 2020; Chang and Wang, 2024). However, recent evidence provides counterexamples, suggesting that heightened state presence can, in some cases, provoke violent resistance (Ying, 2021; Chiovelli et al., 2024; Gonzalez et al., 2024).This article offers an alternative perspective by showing that state infrastructure can simultaneously suppress protests in certain regions while inciting them in others.

We focus on the implications for political protests, a critical challenge to authoritarian rule. Authoritarian states have historically deployed various strategies to repress dissent. State infrastructure, by extending political control from central to peripheral regions, may well function as a tool both to monitor local officials and to control citizens, thereby reducing protests. Yet, our findings reveal substantial empirical evidence of a more nuanced dynamic. While the expansion of state infrastructure suppresses protests in remote areas, it paradoxically fuels increased unrest in central regions. This dynamic is particularly consequential, which is even more perilous considering the greater threat of conflicts near the center (Campante, Do, and Guimaraes, 2019).

China's High-Speed Rail (HSR) program acts as an ideal case to examine the question. First, its massive scale is unparalleled. By 2023, Chinese HSR lines span 26,098 miles (the longest in the world), affecting over one billion citizens and serving 1.67 billion passengers annually. Second, its centralized organization distinguishes it from other infrastructure programs, which are often shaped by local governments or societal forces (Olken, 2007; Xu and Yao, 2015). The *Mid-to-Long Term Railway Network Plan* in China established a single, nationwide HSR network, with the Chi-

nese Ministry of Railway (hereafter MOR) funding most of its cost. Third, China's vast geography debilitates the state's ability to extend its power to remote regions (Weber, 2016; Mann, 1984). Transportation infrastructure, thus, becomes indispensable for monitoring local officials, exerting social control, and enhancing state capacity. The wide territory of each province also provides us with sufficient variation to document the heterogeneous impact of HSR construction. Last but not least, examining the issue in China, the world's largest developing country and authoritarian state, could offer valuable insights for other developing nations and non-democracies.

To analyze the political implications of Chinese HSR, we construct a panel dataset by matching prefecture-year-level data on HSR opening with data on protest events in China from 2010 to 2016. We manually collected data from the China Railway Yearbook to determine HSR access in each prefecture in any year between 2010 and 2016. Protest events are quantified using the Collective Action from Social Media (CASM) dataset, aggregated to the prefecture-year level Zhang and Pan (2019). We also employ the China Labor Bulletin (CLB) dataset as further verification. Our analysis focuses on within-province variation, reflecting the distinct economic geography and political structure of China. To account for heterogeneity in protests arising from varying distances between prefectures and provincial capitals, we calculate the distances using Arc-GIS.

Using difference-in-differences (DID) as our empirical strategy, we explore how HSR opening can reshape the incidence of protests across regions within each province. The baseline results reveal a spatially heterogeneous effect: HSR openings reduce protests in areas far from the provincial capital (peripheral areas, hereafter) while fostering protests in regions close to the capital (central regions, hereafter). For an average province, HSR opening leads to approximately 17.7 additional protests in the provincial capital each year. These findings are validated through heterogeneity-robust estimators following De Chaisemartin and d'Haultfoeuille (2024). Monthly protest data further corroborates these results. We also categorize protests by motive, finding they are predominantly driven by issues on wages, housing, education, and medicine, suggesting significant involvement of migrant workers. Verification using the CLB dataset supports the spatial heterogeneity of HSR's effects on strikes. Moreover, such strikes only emerge in pro-migrant industries following HSR opening, which again implies the significant role of migrants. Our results are robust to a battery of placebo tests and robustness checks.

We further investigate the sources of HSR's heterogeneous effects by developing a conceptual framework that integrates the monocentric model with a model of political riots, incorporating specific politico-economic elements to better capture the authoritarian context. The model proposes four possible explanations for our findings. First and foremost, the *agglomeration effect* posits that both physical and human capital tend to flow towards the center, resulting in a concentration of population and economic activities that may escalate conflicts. Conversely, the *spillover effect* suggests that peripheral areas benefit economically from HSR, leading to a decline in residents' willingness to protest. Third, the *monitoring effect* argues that stronger oversight of local officials

may reduce protests through improved governance. Finally, the *deterrence effect* considers the other side of the coin: heightened state presence discourages participation in protests.

Empirically, our results primarily back up the *agglomeration effect* and refute the *spillover effect*, highlighting the role of agriculture-to-non-agriculture (A-to-NA) migrant workers. Specifically, HSR facilitates the flow of A-to-NA migrants to central cities, where they are faced with strong economic disparity and institutional barriers, and thus become potential protesters. On the other hand, we provide evidence against the *monitoring effect*, which implies the *deterrence effect*: HSR enhances the state's coercive power in remote areas, repressing potential protests at the cost of lower political trust. We also exclude alternative explanations including changes in local conditions (public expenditure, stability-maintenance institutions, and environment), protests directly related to HSR, or commuting for protests.

Literature. Our study fits directly into the literature on the implications of transportation infrastructure. Since Fogel (1964)'s seminal analysis of the social savings from railroads in the United States, subsequent research has extensively examined the economic impacts of transportation infrastructure (like Duranton, Morrow, and Turner (2014), see Redding and Turner (2015) for a literature review). Some studies focus on the overflow of resources and industrial activities (See e.g., Charnoz, Lelarge, and Trevien (2018); Lin (2017); Baum-Snow et al. (2017)), while others emphasize the agglomeration of human capital (See e.g., Faber (2014); Dong (2018); Dong, Zheng, and Kahn (2020)), yet discussions on its political ramifications remain limited. A few studies have investigated how infrastructure influences election outcomes (Voigtländer and Voth, 2014; Nall, 2015; Akbulut-Yuksel, Okoye, and Turan, 2024), crimes (Calamunci and Lonsky, 2024), and state repression (Gonzalez et al., 2024), but little is known about political uprisings, a critical dimension for state stability.[1] This study fills the gap by examining HSR openings and identifying the mechanisms through which they may mitigate or exacerbate protests.

Moreover, our study helps clarify a few controversies on the benefits of transportation infrastructure. While some scholars contend that such infrastructure can spur economic growth in peripheral regions (Lin, 2017; Bernard, Moxnes, and Saito, 2019; Donaldson, 2018), others are less convinced and find insignificant results (Faber, 2014; Banerjee, Duflo, and Qian, 2020; Borusyak and Hull, 2023). Similar to Brinkman and Lin (2024), we highlight geographical distance as a critical determinant of heterogeneity, yet we offer a more comprehensive framework for the underlying patterns, thereby broadening the scope of existing research.

Notably, we complement the research on the source of protests in authoritarian states. Sociopolitical literature highlights the role of participatory willingness (driven by internal grievances) and protest capability (shaped by external conditions) in triggering protests respectively (Gurr,

1. Cao and Chen (2022) find more social conflicts during canal abolishment in ancient China. We differentiate from their work by focusing on the economic centripetal force and political power, rather than market access.

1970; McCarthy and Zald, 1977; McAdam, 1999).[2] Recent studies have introduced technological progress as external shocks to examine their impact on protests, like communication technologies (Enikolopov, Makarin, and Petrova, 2020), mobile phones (Manacorda and Tesei, 2020), and general social media (Qin, Strömberg, and Wu, 2024). Our contribution differs from these works by exploring how state infrastructure influences protests, distinguishing the contribution of participatory willingness and protest capability, thereby linking the two strands of literature together.

Additionally, we contribute to the literature on migration by examining the political implications of intra-regional migration, a topic often overlooked in existing research.[3] Within-province migration in China induced by HSR opening provides a unique opportunity to examine these dynamics and their complex channels. Focusing on intra-regional migration in China, current research mainly explores its economic impacts, such as economic development (Tombe and Zhu, 2019), firm productivity (Imbert et al., 2022), and wage disparities (Combes et al., 2020; An et al., 2024). We extend the literature by examining how migration reshapes the political geography of protests. Further, by showing how migration patterns influence spatial politics, we add to the growing body of work on the political implications of spatial distribution (Campante et al., 2019).

More broadly, this study links with the literature on state presence that focuses mainly on how the state projects power across its territory (Rogowski et al., 2022). Existing research predominantly examines the positive impacts of state presence, like mitigating political violence (Kalyvas, 2006), reducing monitoring cost (Mastrorocco and Teso, 2023), promoting economic development (Acemoglu, García-Jimeno, and Robinson, 2015; Mattingly, 2016), and enhancing public goods delivery (La Porta et al., 1999). Recent studies, however, have begun to explore its potential negative effects on social stability (Ying, 2021; Chiovelli et al., 2024). This study contributes to this emerging discourse by examining the unintended consequences of state presence: while facilitating state control in peripheral regions, HSR inadvertently redirects protests to the center, resulting in heterogeneous outcomes. To the best of our knowledge, this is among the first research to analyze the spatially heterogeneous political impacts of extending state presence.[4]

The rest of this paper is laid out as follows. Section 2 introduces the Chinese HSR system and its politico-economic context. Section 3 details the data and outlines our empirical strategy. Section 4 examines how HSR opening exerts a heterogeneous impact on protests among different regions. Section 5 presents a conceptual framework, offering four potential channels whereby HSR could affect protests. Section 6 tests the channels empirically. Section 7 concludes.

2. Gurr (1970) focuses on protest participatory willingness, namely "relative deprivation", followed by empirical studies like Cantoni et al. (2019) and Bursztyn et al. (2021). The political process theory (McCarthy and Zald, 1977; McAdam, 1999), however, emphasizes protest capability, particularly the state's deterrence power.

3. Ample evidence has been provided on large-scale, long-term, trans-regional immigration, like its impact on regime change (Karadja and Prawitz, 2019), voting behavior (Barone et al., 2016), urban disorder (Castells-Quintana et al., 2022), violent crimes (Knight and Tribin, 2023), and even the civil rights movement (Calderon et al., 2023).

4. Baum-Snow et al. (2020) document the spatially heterogeneous influence of Chinese highway construction, yet they focus more on its economic implications. Another related study is Schuler and Truong (2020) that discussed the differential effect of the Internet on protests, due mainly to rural-urban heterogeneity.

2 Background

2.1 Chinese High-speed Railway (HSR) System

HSR, also known as bullet trains, operates at a speed of 250 km per hour (kmph) or higher in China, in contrast to conventional trains that typically operate at speeds not exceeding 150 kmph (Zheng and Kahn, 2013), despite several rounds of speed acceleration. The *Mid-to-Long Term Railway Network Plan*, ratified by the Chinese State Council in 2004 and subsequently updated in 2008, was largely completed by 2016 (Dong, 2018).[5] The plan emphasizes enhancing connectivity between provincial capitals and local prefectures. By 2023, China has constructed 159 HSR lines spanning a total mileage of 26,098 miles (42,000 km), with 1.67 billion passengers annually.[6]

China's investment in HSR has grown exponentially, soaring from $14 billion in 2004 to a substantial $719 billion by 2022, taking up a significant portion of the government's budget.[7] Concerns were raised about its safety, occupancy rates, and environmental impacts. Nevertheless, HSR remains a favored mode of transport due to its speed, reliability, and comfort. The expansion of HSR has notably enhanced intercity transportation, particularly linking remote prefectural cities with central megacities (usually provincial capitals) (Dong et al., 2020). The expansive HSR lines also serve as tentacles for the provincial capital to connect with remote regions, which strengthens state presence in such areas (Chang and Wang, 2024).

2.2 The Political Economy of HSR

The Chinese administrative hierarchy is structured into four levels, as shown in Figure A1. The state comprises 22 provinces, 5 ethnic autonomous regions, and 4 municipalities. We focus on provinces and ethnic autonomous regions, both of which are subdivided into prefectures, while municipalities are cities with higher administrative level, not consisting of prefectures. Figure A2 presents the spatial distribution of Chinese provinces and their capitals. We focus on the political economy within one province, where there is a center (the provincial capital) and some prefecture-level cities and autonomous prefectures (both called "prefectures" hereafter). Figure A3 exemplifies the pattern using Sichuan Province. Central cities are Chengdu and its adjacent prefectures, while peripheral regions refer to those far from Chengdu (usually near the boarder).

5. The plan outlines the direction of HSR development. For details, see https://www.gov.cn/xinwen/2016-07/20/5093165/files/1ebe946db2aa47248b799a1deed88144.pdf. Check the updated content at https://www.nra.gov.cn/jglz/ghyj/202104/t20210428_199680.shtml.

6. See https://www.nra.gov.cn/xwzx/xwxx/xwlb/202305/t20230529_341754.shtmlandhttps://www.gov.cn/xinwen/2023-01/13/content_5736816.htm.

7. Sourced from https://www.gov.cn/xinwen/2023-01/04/content_5734924.htm.

Political Geography within Provinces Three main factors impel us to focus on political geography within provinces. The first reason stems from the unique economic geography of China, where political power and economic activities are heavily centralized in provincial capitals. Provincial capitals are, by definition, political centers. They also possess significantly more resources that attract migrants from other prefectures within the province. As is shown in Figure A1, the average population of provincial capitals exceeds that of prefecture-level cities and autonomous prefectures by 2.5 and 4.5 times, respectively. Economic agglomeration is more pronounced, with 23 provinces' primacy of provincial capital (ratio of capital's GDP to provincial GDP) exceeding 20%, including 10 above 30%, and 2 over 50%. Hence, the political center overlaps with the economic center in most provinces.[8] This phenomenon does not apply to the country as a whole, with Beijing and Shanghai serving as the political and economic centers, respectively. In addition, China's large territory and household registration system (*hukou*) impede inter-provincial migration.[9] As a result, political power and economic forces often operate separately at the national level.

The second reason is rooted in China's political structure. The central government retains control over military, diplomatic, and ideological matters to ensure national unity, while delegating other powers to the province level. Provinces enjoy autonomy over key areas, including legislation (via provincial congresses), judicial decisions (by provincial courts and procuratorates), personnel appointments (by provincial party committees), development plans (by provincial government, specifically the development and reform commission), a system summarized by Xu (2011) as "regionally decentralized authoritarianism" (RDA, hereafter). In addition, Chinese provinces are large in both territory (351,481km^2 on average) and population (54.9 million on average), comparable to mid-sized European countries. Thus, each province functions almost as a "state", with the provincial capital exerting substantial political influence on other prefectures. While local governments (prefecture/county/town-level) hold some authority, their power is more restricted, and their territory is too small to have significant internal variation. In sum, the RDA structure makes it appropriate to focus on provinces as the primary political entities.

A third relevant factor is the process of HSR construction, which involves collaboration between central and provincial governments. While the railway center[10] designs the HSR lines, their actual construction relies on economic resources from the provincial government. To address local needs, provinces also conduct local HSR plans seeking central approval. Take "the 14th Five-year Plan" as an example. The railway center announces a grand HSR project at the state level, subdivided by many small projects for each province.[11] Many of the newly constructed lines, in partic-

8. This is the key assumption in our analysis. We provide empirical evidence that this assumption does not restrict our main finding in Table A13 in Online Appendix C.

9. Intra-provincial migration dominates the general migration pattern in China (approximately 55%). See Table 1 of Tombe and Zhu (2019) or https://www.thepaper.cn/newsDetail_forward_12902468 for details.

10. This refers to the MOR before 2013. To separate government functions from corporate functions, the MOR is split into two parts: the China Railway Limited and the National Railway Administration (affiliated to the Ministry of Transport). For details, see https://www.gov.cn/2013lh/content_2354443.htmfordetails.

11. See https://www.qianzhan.com/analyst/detail/220/211125-230ef9b5.html.

ular, serve provinces' needs to strengthen economic ties and extend political control to peripheral areas. As shown in Figure A4, HSR openings in other prefectures always occur after those in the provincial capitals, signaling connectivity to the provincial capital. Local governments, however, possess minimal decision-making authority during the route-planning and location-setting process. Local officials merely facilitate construction conditions, having a negligible impact on the already decided HSR lines. Thus, HSR construction affects but is seldom affected by, local governments, providing an ideal setting to explore the implications of state infrastructure.[12]

Geographical Distance The nature of HSR makes geographical distance a pivotal factor. HSR possesses competitive advantage over airlines for journeys shorter than 500 miles, whereas traditional means like trains or buses are considered more suitable than HSR within 100 miles (Pan, Shroff, and Zhang, 2023). Thus, HSR matters particularly for journeys between 100 and 500 miles, which also justifies our primary focus on within-province outcomes (rather than within-country or within-prefecture ones). As shown in Figure A5, over 80% of prefectures lie within 100-300 miles from provincial capitals, making them heavily influenced by HSR.

2.3 Two Primary Effects of HSR Opening

While acknowledging the wide-ranging socioeconomic changes brought about by HSR, this paper aims to examine its impact on protest incidence, stemming from its two primary functions.

States with vast territories, particularly authoritarian regimes, often grapple with the monitory dilemma. Remote areas, distanced from central authority, often experience minimal state presence and breed conditions conducive to insurrections. HSR, as a testament to state capacity, has the potential to extend governance reach and mitigate protests in these peripheral regions.

Nonetheless, as our analysis in Section 6 corroborates, HSR opening has unexpectedly amplified the incidence of protests in provincial capitals and their surrounding regions. The convenience afforded by HSR to the rural-urban migration flow, while enabling economic opportunities, also underscores systemic disparities between urban and rural areas. The entrenched urban-rural divide, coupled with limited labor protections, inequitable wages, and pervasive discrimination, has hindered the integration of migrant workers into urban society (Rho, 2023). Although HSR provides these workers with greater access to cities, their experiences of mistreatment, alienation, and discrimination amplify grievances. The migration, initially underpinned by hope, culminates in greater disillusionment and exacerbates urban protests. subsection B.2 provides further institutional context and anecdotal evidence, offering a deeper understanding of the mechanisms through which urban migrant worker protests are galvanized.

12. Considering that particular local officials may influence HSR opening (possibly through non-procedural way, summarized by Ma (2022) as "localized bargaining"), we conduct robustness checks on officials' personal characteristics in the Appendix. Even if they might hold some power, it hardly affects our results.

3 Data and Empirical Strategies

3.1 Dataset

By matching data on HSR construction with protest event data in China from 2010 to 2016, we examine the heterogeneous impact of HSR opening on protests at varied geographical distances from provincial capitals. Our baseline primarily utilizes the dataset at the prefecture-year level. We exclude samples from municipalities and cities without available information, eventually obtaining a prefecture-year level dataset covering 279 prefectures. To ensure the robustness of our findings, we extend our analysis to prefecture-month-level datasets.

3.1.1 Data on protest events

Collective Action from Social Media Dataset. Traditional data sources for protest events, such as newspapers and press releases, tend to overrepresent larger-scale and more sensational protests (Chang and Wang, 2024). This issue becomes particularly challenging in authoritarian states with strict media censorship, where traditional news media cannot report protest events.

To address the issue, we use the Collective Action from Social Media (CASM) dataset, recently made available by Zhang and Pan (2019). This dataset employs convolutional neural networks on image data and recurrent neural networks on text data in a two-stage classifier to identify social media posts about offline protest events. The CASM dataset identifies more than 100,000 protest events in China from January 1, 2010 to June 30, 2017, sourced from Sina Weibo, China's biggest micro-blogging platform. By 2016, Weibo had 297 million monthly active users, accounting for 41.83% of Chinese Internet users. We aggregate this event-level dataset to prefecture-year level (and further to prefecture-month level).

The CASM dataset has several advantages. First, it has high credibility. Zhang and Pan (2019) evaluate its performance through cross-validation, out-of-sample validation, and comparisons with other protest datasets, such as the Global Database of Events, Language, and Tone (GDELT), the Integrated Conflict Early Warning System (ICEWS), and WiseNews. They show the main features of the CASM dataset align with all above, and more importantly, CASM offers broader coverage, documenting a greater number of daily protests that are ubiquitous in the daily lives of Chinese citizens.[13] Second, it is minimally influenced by censorship. Unlike state media that is heavily censored in China, Weibo's censorship was not stringent until 2017. From 2010 to 2016, many sensitive, provocative, and anti-government posts appeared on Weibo without being censored. Moreover, post hoc content removal does not substantially influence the data (Zhang and

13. GDELT puts more coverage on ethnic conflicts (40%), which is more plausible in analyzing anti-regime protests and repression, like Beraja, Kao, Yang, and Yuchtman (2023). In comparison, CASM concentrates more on daily protests like unpaid-wage (29%), property (26%), and land-related (17%) protests, which fits our focus.

Pan, 2019). Third, the dataset provides extensive details. The CASM categorizes protest events into 11 types based on motives and 3 primary forms based on action types. Figure A7 shows the structure of different kinds of protests and their temporal variation.

China Labor Bulletin. We use the strike dataset for supplementary validation. China Labor Bulletin (CLB) is a non-profit organization based outside mainland China, collecting data on workplace strikes from various media sources. The dataset covers strikes in different industries, enabling us to explore which groups of workers are most likely to engage in protests.[14]

3.1.2 Data on HSR

We obtain the data on whether the prefecture has access to HSR in a certain year from the China Railway Yearbook, encompassing details such as construction commencement dates, opening dates, route lengths, designated speeds, and ridership. We cross-verify the stoppage points along each operational line using official data from the railway service website (https://www.12306.cn/). Figure 1 shows the difference in opening times of different prefecture-level cities.

3.1.3 Control variables and other datasets

China City-specific Characteristics. To control for regional influences, we incorporate predetermined prefectural characteristics from the *China City Statistical Yearbook*. We control for the interaction terms between the year dummy and the proportions of the primary sector, secondary sector, per capita GDP, population, and urban area in 2010. Also, we manually collected detailed data on Chinese officials to rule out alternative explanations, and employ various datasets to explore the mechanisms, as described below.

Individual Surveys. We employ a series of individual-level micro surveys to investigate the mechanisms in greater detail. First, we utilize the China Family Panel Studies (CFPS), a nationally representative social survey, capturing a wide range of aspects of Chinese citizens' lives. We use it to examine how HSR openings affect individuals' emotions and political attitudes. Second, we use the Ideology Survey of Chinese Internet Users (ISCIU) dataset obtained from Ma and Wang (2015), which is frequently used to analyze the ideological inclinations of Chinese citizens. This dataset provides data on individuals' channels for expressing their views to the government. Third, we employ the China Migrants Dynamic Survey (CMDS), an annual cross-sectional survey covering a large sample of migrants from 267 prefectures (642,700 individual-years). The CMDS offers unique information on the status of migrant workers in central cities.

14. Qin et al. (2024) employ the dataset to show the spatial contagion of strikes in China. Campante et al. (2023) also use this dataset to study the effects of export slow-down on labor unrest in China.

3.1.4 Descriptive statistics

Table 1 presents the summary statistics for our sample, which comprises 279 prefectures annually. On average, 29 protest events take place each year in a prefecture. We plot its spatial distribution in Figure A6, showing that most protests occurred in economically developed regions and populous provinces, such as Sichuan, Shaanxi, Henan, and Jiangsu. Based on the raw data, we compare the geography of protests before and after HSR opening in Figure 2. Protests are rather sporadic before HSR opening, after which they show a declining trend with geographical distance. This suggests that the HSR opening may reshape the political geography by redirecting protests to the center. Figure A6 also shows the outcome in the end of the sample period: within each province, the provincial capital has substantially more protests than other prefectures. To test for possible causal relationships, we employ the Difference-in-Differences (DID) method in subsequent analyses.

3.2 Empirical Strategy

We begin by applying the DID approach, comparing the relative changes in protest events in prefectures with HSR opening to those without. The model specification takes the following form:

$$Protestsd_{cpt} = \alpha_0 + \alpha_1 HSR_{cpt} + \alpha_2 \phi' \boldsymbol{X_c} \times T_t + \lambda_c + \theta_{pt} + \epsilon_{cpt}, \tag{1}$$

where, $Protestsd_{cpt}$ represents the number of protests in province p, prefecture c, year t, standardized for ease of interpretation. HSR_{cpt} is a dummy variable that takes the value 1 if a prefecture has HSR access and 0 otherwise. λ_c is the prefecture fixed effect that allows us to identify the impact from within-prefecture variations, absorbing time-invariant local factors. θ_{pt} is the province-year fixed effect that excludes potential time-varying confounders at the province level. We also control predetermined features $\boldsymbol{X_c}$ interacted with time dummy T_t to partial out their potential influence on protests. For each regression, we report two sets of standard errors. First, the standard errors clustered at the prefecture level, as our dependent variable HSR varies between prefectures. Second, we report the Conley standard errors following the approaches suggested in Conley (1999). We employ alternative clustering choices in Section 4.6 as robustness.

This identification relies on two sources of variation: differences in HSR openings across cities and the pre- and post-HSR changes in protests within the same city. Thus, the key parameter of interest, α_1, captures the average treatment effect on the treated (ATT) of HSR opening on protests. However, we argue that HSR openings influence the geographic distribution of protests, with varying effects based on the distance to provincial capitals. Consequently, the total effect of α_1 may be offset by both positive and negative effects across cities, potentially resulting in an overall null effect on protests. To explore this further, we introduce a prefecture-to-capital

distance variable to examine how geographical proximity moderates the effect of HSR openings on protests:

$$Protestsd_{cpt} = \beta_0 + \beta_1 HSR_{cpt} + \beta_2 HSR_{cpt} \times lndistance_c + \beta_3 \phi' \boldsymbol{X_c} \times T_t + \lambda_c + \theta_{pt} + \epsilon_{cpt}, \quad (2)$$

The only difference between Equation Equation 1 and Equation 2 is the inclusion of the interaction term between distance to the provincial capital ($lndistance_c$) and HSR. We employ the log form following extant studies (See e.g., Glaeser et al. (2012); Campante and Do (2014)), and plus 1 to account for zeros. The results are robust with different measures like logged distance (without plus 1) or actual distance. The parameters of primary interest in Equation 2 are β_1 and β_2. β_2 indicates the change in protests as the distance from the provincial capital increases after HSR opening, while β_1 represents the change of protests in the provincial capital.

Identification Assumptions Our identification does not require the exogeneity of HSR opening, though this assumption likely holds at the prefecture level. Instead, what is required is the parallel-trend assumption: in prefectures without HSR, the trend of protests over time and with respect to distances from the provincial capital is similar to those with HSR openings. We enhance the plausibility of the assumption in two ways. First, we use a specification that includes province-year fixed effects. Second, we estimate a fully dynamic version to test potential pre-trends, which also allows us to examine the temporal variation of its effect on protests.

Diff-in-diff estimation with staggered treatment can suffer from a bias when there are heterogeneous treatment effects over time or across subgroups. Since the two-way fixed effects (TWFE) estimator is a weighted sum of the average treatment effects (ATEs) in each group and time period, some ATEs may be given negative weights, causing the estimator to have a different sign than all the ATEs (De Chaisemartin and d'Haultfoeuille, 2020). This issue is particularly relevant in our context, as we focus on spatially heterogeneous effects. To shed light on heterogeneity by distance, we divide our sample into four subgroups based on their geographical distance to the center (closet, near, mid, and far) and then estimate their ATEs respectively.[15]

Additionally, in Equation 2, we assume that regional heterogeneity in the HSR effect is driven by linear distance variations. To relax this assumption, we take two steps: First, we include dummy variables for different distance bins in our robustness checks, providing a more flexible specification. Second, we conduct subgroup regressions based on prefecture-to-capital distance for Equation 1, using the heterogeneity-robust estimator for each distance category.

15. Recent studies have proposed a number of new estimators to overcome this issue (De Chaisemartin and d'Haultfoeuille, 2020; De Chaisemartin and d'Haultfoeuille, 2024; Sun and Abraham, 2021; Callaway and Sant'Anna, 2021; Borusyak et al., 2024), yet little is known about the way to estimate the staggered DID with an interaction term. We thank Clément de Chaisemartin for recommending us to estimate the effect separately on different groups and employ their hetero-robust estimator.

4 Empirical Results

4.1 Baseline Estimation

We begin by estimating the direct effect of HSR on protests (Equation 1). Columns (1)-(3) in Table 2 show that HSR opening has a small and statistically insignificant effect in the full sample.This motivates our analysis in Equation 2, focusing on the heterogeneous effects of HSR opening by distance to the provincial capital. In columns (4)-(6), we find a significant increase in protests in provincial capitals following HSR opening, with the effect gradually diminishing as the distance from the capital increases. We control prefecture and year fixed effect in column (4), add province-year fixed effect in column (5), and further employ predetermined-year control in column (6), verifying the robustness of our findings. We conclude that, on average, in our sample of prefectures and years, HSR opening did not lead to more protests, but it played a pivotal role in intensifying protests in central regions while reducing protests in peripheral areas.

Specifically, after HSR opening, protests in central regions increased by 0.467 standard deviations, which diminishes gradually (0.109 s.d.) as the distance from the provincial capital grows. This translates to 17.705 (0.467×37.912) additional protests in the center and 4.132 (0.109×37.912) fewer protests as distance doubles. Figure A8 shows the heterogeneous effect by distance explicitly: HSR gives rise to protest events in central regions (positive intercept), but the effect turns negative gradually as the city becomes farther from the center (negative slope). Furthermore, we use dummy variables for different distance sections to analyze the respective effect on distinct regions. Table A1 shows a strong positive effect for central regions and a more negative effect for distant prefectures, with consistent evidence using different distance classification.

We then compare our results with related works. Chang and Wang (2024) also use the CASM dataset, finding 1.384 fewer protests after the establishment of the Committee for Comprehensive Management of Public Security (CMPS) at the county level. Their result is equivalent to 0.269 s.d., smaller than our effect. Considering a prefecture has 8.5 counties on average, their result can also be regarded as 11.78 fewer protests for each CMPS. Therefore, the effect of HSR is at least as large as the CMPS program. Similarly, Manacorda and Tesei (2020) find a 4 percent fall in GDP growth leads to 2.3 more protests (per million people) between areas with mobile phone coverage and those without. Column (7) of Table 2 shows 4.364 more protests after HSR opening in central regions and 0.914 fewer with distance doubled. Thus, the effect of HSR opening is roughly equivalent to a 7.59 percent decrease in GDP ($4.364/2.3 \times 4 = 7.59$), and doubled distance functions similarly as a 1.59 percent rise in GDP ($0.091/0.23 \times 4 = 1.59$) in alleviating protests. The result also demonstrates that our findings are not solely driven by mechanical population growth.

One potential concern is different pre-trends in protests for different groups. We estimate a fully dynamic version of Equation 2 and test for potential pre-trends in Figure 3. Before HSR

opening, there is little difference in protests for the treatment (with HSR) and control (without HSR) groups.[16] Afterwards, protests soar in central regions (plotted in Panel A and B), but diminish with the geographical distance (plotted in Panel C and D). The results suggest that the trend of protests is similar for the treatment and control group. Moreover, the effect persists for long, so the observed effects can hardly be driven by an immediate political spotlight effect (i.e., citizens using the HSR opening as an opportunity to express grievances).

We further address problems with the TWFE estimator using the DID_M estimator proposed by De Chaisemartin and d'Haultfoeuille (2020). Table A2 shows similar results with our baseline estimates: HSR can increase protests in regions closest to the center but reduce them in more distant regions. Additionally, we test for the dynamic effects using the DID_l estimator (De Chaisemartin and d'Haultfoeuille, 2024), which compares switchers and not-yet-switchers.[17] Figure A9 shows no significant pre-trends, and more importantly, the effect is significantly positive for the closest group, negative for the farthest group, while insignificant for intermediate groups.

4.2 Using Monthly Data

To delve into the temporal evolution of HSR's effect, we obtain monthly data on protests and estimate Equation 2. Table 3 shows a similar effect with our baseline. As we include stricter fixed effects, HSR's effect becomes more significant, both statistically and economically. In column (5), we control for the province-year-month and prefecture-month fixed effect along with the interaction terms between predetermined variables and year.[18] We find that, protests in central regions increased by 0.325 s.d. after HSR opening, but decreased gradually as distance doubled (by 0.074 s.d.). The result is equal to 1.209 (0.325×3.719) additional protests in the center each month (decreasing by 0.274). We plot the pre-trend tests using monthly data in Figure A10. Similarly, the two groups show minor differences in protest pre-trends, with protests rising sharply in central regions and declining with the geographical distance.

4.3 Further Classification

Protests vary both in their causes (content) and intensity (form). People engage in protests for different reasons, ranging from political issues, like the Gwangju Uprising, the Prague Spring, the Arab Spring..., to social and economic problems like the "Occupy Wall Street" movement. Different kinds of protests carry distinct meanings, prompting the government to make distinct responses

16. Before treatment, protest grows a bit with distance, which may reflect lower state presence and control in more remote regions. However, the coefficients are not statistically significant, with little threat to our results.

17. DID_l allows for heterogeneous ATEs and inter-temporal effects. For binary and staggered setting, it is the same as the group-time ATE by Callaway and Sant'Anna (2021).

18. The "month" fixed effect keeps within-month variations (not within the same year). Hence, we adopt the "year-month" fixed effect to keep variations within the same month of the same year. Likewise, the Province-year-month fixed effect compares samples within the same prefecture and the same year-month.

(Cantoni et al., 2024). We use the 11 classifications of protests from the CASM dataset to explore how HSR opening influences specific types of protests. The results are shown in Table 4: HSR opening influences four kinds of protests (those related to unpaid wages, housing issues, education issues, and medical issues), intensifying them in central regions while reducing them in peripheral regions. We further plot the pre-trend test for these four kinds of protests in Figure A11 and Figure A12. The effect persists for long after HSR opening, suggesting that these four categories contribute significantly to the overall baseline findings. The results imply that migration plays a crucial role in shaping the political geography of protests. As mentioned in section 2, A-to-NA migrants suffer particularly from wage, housing, healthcare, and education issues.

In addition, the intensity of protests also differs. Some protests are moderate, with protesters posting flyers, shouting slogans, and petitioning. Others are more extreme, including physical confrontations, direct conflicts with police, and even armed struggle, bloodshed, or mass injuries. We examine whether residents engage in drastic or moderate protests after HSR opening. We classify them into three forms: conventional (street marches, strikes, public gatherings, demonstrations, and group petitions), disruptive (occupation of buildings, construction of barricades, and cutting off power supplies), and violent (physical conflicts with police or government officials), following Zhang and Pan (2019). The first category is rather moderate, while the latter two are drastic. Within the latter two forms, disruptive protests are highly organized and usually well-planned, whereas violent ones tend to be more spontaneous, simply for protesters to vent their grievances. The results are shown in Table A3. All three forms of protest show similar trends, but disruptive ones are affected less by HSR opening. The pre-trend tests in Figure A13 and Figure A14 show that conventional and violent events increase in central regions and decline in remote areas. These findings echo previous results on protest causes. Since economic issues such as wages, housing, education, and healthcare are the primary drivers of protests, it is unlikely that protesters will organize large-scale, coordinated resistance.[19]

4.4 Alternative Data Source

To ensure the robustness of our results and mitigate potential biases from social media, we validate our findings using the CLB dataset, which is based on actual occurrences of worker-led protests. Given that A-to-NA migrant workers are the primary contributors to our observed effects, our results should consistently apply to worker protests in the CLB, as opposed to large-scale anti-state protests, such as those captured in the GDELT dataset. Table 5 illustrates HSR's impact on strike frequency, showing results consistent with our baseline: HSR does not increase nor reduce strikes per se, but it reveals pronounced spatial heterogeneity. As shown in column (2),

19. Previous studies have shown that politically related protests, especially coups, are more likely to be well-organized and long-planned (Cantoni et al., 2024). Economic and social issues, on the contrary, usually motivate people to launch protests in a sudden and end them soon.

HSR opening leads to a 0.4 s.d. increase in strikes in central regions, with a reduction in peripheral areas. Pre-trend tests are shown in Figure A15. With insignificant change prior to HSR opening, strikes soar in central regions (in Panel A and B) but dwindle with the geographical distance (in Panel C and D). Thus, there is no clear pre-trends, and the effect persists for long. Similar results can be obtained using monthly-level data, as shown in Figure A16.

To further explore the role of A-to-NA migrants, we examine the industries in which strikes take place. We classify the industries into two groups: labor-intensive (construction, manufacturing, services, and mining) and skill-intensive (government agencies and the education sector). A-to-NA migrants, typically low skilled but with strong laborforce, predominantly work in the labor-intensive ones. If they are driving our findings, we would expect HSR to have a significant effect on strikes in labor-intensive ones, but little effect on skill-intensive ones. Columns (3) and (4) of Table 5 confirm this hypothesis: HSR openings increase strikes in labor-intensive industries in central regions while reducing them in remote areas, with no significant effect on strikes in skill-intensive industries. Overall, labor strikes in labor-intensive industries respond to HSR openings in a manner similar to protests, underscoring the pivotal role of A-to-NA migrant workers.

4.5 Placebo Tests

In this section, we strengthen our conclusion through several placebo tests.

First, to assess the plausibility of using distance to the provincial capital as a key variable, we test the impact of other distances in Table A4. In column (1), we replace the distance to the provincial capital by the distance to Beijing, capital of China. If Beijing could exert direct control over prefectures, or if there were a predominant flow of people toward Beijing, then the coefficient of the interaction term between the distance to Beijing and HSR opening should be significant. The result indicates that this effect is probably non-existent. In columns (2)-(4), we test the influence of other national economic centers (Shanghai and Guangzhou), with similar insignificant results. In column (5), we replace the original distance with the distance to the nearest provincial capital, and in column (6), with the distance to the largest non-capital city within a province. Both specifications capture possible economic attraction without political power, and we find little effect. Combined together, the spatial pattern of protest emerges only when using the distance to provincial capital, which supports our focus on within-province outcomes. Specifically, the capital's economic centripetal power and political repression force jointly shape the protest geography.

Second, we use historical variables for placebo tests in Table A5. In column (1), we employ the administrative divisions of Qing Dynasty to measure the distance from a prefecture to the Qing provincial capital. The coefficient of column (1) reflects a similar pattern to our baseline but is not as significant. This demonstrates that changes in the spatial distribution of protests caused by HSR are attributed mainly to the modern economic and political geography rather than historical ones.

Additionally, in columns (2)-(4), we use distances to major cities in the Ming and Qing dynasties, silk trade cities, and tea trade centers as placebos, with data derived from Chen, Kung, and Ma (2020). The coefficients are all insignificant, corroborating our findings in the baseline.

Finally, we randomly permute the opening year of HSR across different prefectures to check whether our results are affected by omitted variables. We calculate the "pseudo effect" based on Equation 2 and repeat this process 200 times to improve the accuracy of the placebo test. The results in Figure A17 indicate that our baseline results are not significantly affected by this issue.

4.6 Robustness Checks

We first exclude the influence of potential confounding factors. We consider the potential influence of officials' personal characteristics in Table A6 and Table A7 and fiscal conditions in Table A8 to control for differences in local incentives or bargaining power. In Table A9, We exclude the confounding effects of alternative transportation modes, and in Table A10, we control for the Internet penetration rate to alleviate potential measurement errors. We then exclude the influence of cultural norms and social organizations in Table A11, and natural geographical factors in Table A12. All results consistently indicate the robustness of our baseline results.

A critical assumption underlying our analysis is the overlap between the economic and political centers of Chinese provinces, with provincial capitals possessing strong economic centripetal power. While this pattern holds for most provincial capitals, we test the sensitivity of our results to some exceptions in Table A13. These tests account for various scenarios where centripetal power may be weaker, and the results remain consistent with our baseline. Combined with Table A4, the results endorse this assumption and support our focus on within-province outcomes.

Additionally, we examine the robustness of our findings to different model specifications. The results in Figure A18, Figure A19, Table A14, and Table A15 show that our conclusion is robust to alternative time windows, clustering methods, dependent variables, and distance measurements.

Lastly, we address the possibility that citizens may "expect" an HSR opening from policy announcements and adjust their protest behavior. Following Borusyak and Hull (2023), we re-center the estimates by controlling for the "expected probability of HSR opening" ($EHSR$) and adopt its difference with actual HSR opening (HSR) as the instrument variable for estimation, as shown in Table A16.[20] The results remain robust and exhibit even greater economic significance. Notably, the coefficients of $EHSR$ are opposite in sign to those of HSR, which can probably be ascribed to the *deterrence effect*: anticipating stronger state presence and potential repression, citizens are less inclined to protest. This mechanism will be further elaborated in section 6.

20. $EHSR$ is constructed by dividing the number of HSR stations opened at year t to the total number of HSR stations opened within the three years $(t-1, t, t+1)$, during which the HSR stations are assumed to be built randomly (Borusyak and Hull, 2023). If no HSR station is built in the city within the three years, the probability is set as zero.

5 Theoretical Framework for Possible Channels

In this section, we build a spatial model to explore how HSR affects protest incidence, following the framework of political riots (Passarelli and Tabellini, 2017).

5.1 Settings

Consider an economy consisting of one central city and a large number of small cities around (with linear form, as in Duranton and Puga (2015); Wang, Zhang, and Zhou (2020)). In our setting, the center is the provincial capital, while the small cities are prefectures surrounding the capital. Denote each city (or prefecture) by i, with d_i and N_i representing its distance to the capital, its population, respectively. Let $N = \sum_{i=1}^{n} N_i$ be the total population and D denoting the distance of the farthest area. In other words, $0 \leq d_i \leq D, \forall i \in \mathcal{N} = \{1, ..., n\}$, where $d_i = 0$ for the capital and $d_i = D$ for the most remote city. Suppose the labor participation rate is $\alpha \in (0, 1)$, then αN_i is the average population of labor in city i.[21]

Since the circular model is isomorphic to a linear one,[22] we simplify the model to a line, with the center located at the origin "0" and other cities located at $d_i \leq D$. For a certain individual j living in city i while working in city k, his[23] utility is a continuous, increasing function of consumption (or surplus) $u_{ik}^j = u(c_{ik}^j)$. On average, $\mathbb{E}(c_{ik}^j) = c_{ik} = w_k - R_k - 2T_{ik}$, where w_k, R_k, T_{ik} represents the average wage in city k, land rent in k, and commuting cost between k and i.

Concerning the strong economic centripetal force of the provincial capital and our focus on HSR, we simplify the model by assuming people can only make a binary work choice between his hometown and the capital. After migrating to the capital, he gets $c_{i0} = w_0 - R_0 - 2T_{i0} = w_0 - R_0 - 2d_i\tau_i$, where τ_i is the cost per mileage that can vary with distance. Alternatively, he can work locally and gain $c_{i1} = w_i - R_i$. By $2T_{i0}$, we capture the reality that most Chinese migrate to work and return home once every year (twice in total), yet it is flexible to use kT_{i0} for any $k > 0$.

We then provide a basic setting for protests. Each individual j unilaterally decides whether or not to participate in protests faced with aggrievement a_{ij}. The aggrievement has many sources, while we consider two major ones, his utility u_{ij} and local corruption rate q_i^c. Individuals are more aggrieved when faced with lower utility and higher corruption, so $a_{ij} = a(u_{ij}, q_i^c)$ is decreasing in u_{ij} while increasing in q_i^c. Alternatively, q_i^c can be regarded as the rent-seeking proportion, like excessive tax or fees, and $a_{ij} = a(u(c_{ij}(1 - q_i^c)))$, which also satisfies the above conditions. Denote with p_i the average participation rate in protests for city i. In the next subsection we derive the

21. There are $(1 - \alpha)N_i$ people out of laborforce, like children and the elderly. We may also consider $\alpha = \mathbb{E}(\alpha_i)$, where α_i is the labor participation rate of each city i.

22. The isomorphism is constructed by taking an equivalence class based on distance. Let $\mathcal{C}$ be the original disk, then $\mathcal{L} = \mathcal{C}/\mathcal{D}$, where $\mathcal{D} = \{i \in \mathcal{N} : d_i = d\}$. Hence, $\mathcal{C}$ and $\mathcal{L}$ are isomorphic based on the quotient mapping $\pi : \mathcal{C} \to \mathcal{L}$.

23. We use "he" for residents and "she" for officials for concision, without special reference.

equilibrium participation rate that can be expressed as a function of common aggrievement, then we connect it with HSR opening and discuss the potential channels for our empirical findings.

5.2 A Simple Model of Collective Resistance

Individuals unilaterally decide whether to participate in resistance, trading off the cost and benefit of participation. Based on extant literature (Gurr, 1970; Granovetter, 1978), we model the benefit as emotional: it is the psychological reward of joining other residents in a public display of the aggrievement. Let a_i denote the common aggrievement among residents in city i. Let λ_i denote the number of potential protesters, which is the residents (total population plus/minus the migrants) living in city i and adjacent cities. We assume the mobilization range to be $r \in (0, D)$ so that a protest occurring in city i can at most mobilize residents living in $j \in \{j : |d_i - d_j| \leq r\}$. We assume there is a complementarity: the benefit of participation grows proportionately with the mass of other participants $p_i\lambda_i$. This assumption is plausible on several grounds. The psychological benefit of a public display of anger is likely to be stronger if more people join; alternatively, participation could proxy for the probability that a critical threshold of participators is reached such that the crowd overwhelms the police (Morris and Shin, 2000). Equivalently, on the cost side, the probability of being arrested is smaller in a large crowd (Le Bon, 1897).

On the other hand, joining a resistance entails costs, in terms of time, or risk of being arrested or injured. We model these costs as the sum of three components, $\mu + \mu_i + \epsilon_{ij}$. The parameter $\mu > 0$ is known ex-ante, common to all individuals and cities, reflecting external conditions like the time cost. $\mu_i > 0$ is common to all individuals in city i, reflecting the probability of repression (perceived deterrence). The term ϵ_{ij} is a random variable that captures idiosyncratic components of the cost, following a distribution F_i. This distribution is common knowledge, continuous, and has density f_i, with support lying on both sides of 0.

Combining these assumptions, individual j in city i chooses to join the crowd in protests if benefits are larger than costs: $p_i\lambda_i a_i - \mu - \mu_i - \epsilon_{ij} \geq 0$. The fraction of individuals in city i who participate in the protest is thus given by:

$$p_i = Pr(\epsilon_{ij} \leq p_i\lambda_i a_i - \mu - \mu_i) = F_i(p_i\lambda_i a_i - \mu - \mu_i). \tag{3}$$

Hence, the equilibrium participation rate p_i^* is a fixed point of Equation 3. We focus on the interior solution whose existence and uniqueness is proved in Appendix A.

We can express $p_i^* = H_i(a_i)$, with other parameters subsumed in the $H_i(\cdot)$ function. The comparative statics of Equation 3 implies:

$$H_i' = \frac{\partial H_i(\cdot)}{\partial a_i} = \frac{\partial p_i^*}{\partial a_i} = \frac{\lambda_i p_i f_i}{1 - a_i\lambda_i f_i} \tag{4}$$

By Assumption A2, $1 - a_i\lambda_i f_i > 0$, i.e., $H_i^{'} = \frac{\partial p_i^*}{\partial a_i} > 0$. Hence, H_i is strictly increasing in a_i, which means the protest rate is higher with stronger aggrievement. Hence, people protest less when faced with less corruption or receiving a higher surplus.

Equation 4 implies that $\frac{\partial^2 p_i^*}{\partial a_i \partial \lambda_i} = \frac{a_i f_i}{(1-a_i\lambda_i f_i)^2} > 0$. Thus, participation is more sensitive to aggrievement with larger λ_i, i.e., there is a greater number of potential protesters in the group. With stronger economic agglomeration, an individual expects more people will be involved and would be more willing to join.

Similarly, we have

$$\frac{\partial H_i(\cdot)}{\partial \lambda_i} = \frac{\partial p_i^*}{\partial \lambda_i} = \frac{a_i p_i f_i}{1 - a_i\lambda_i f_i}. \tag{5}$$

It is evident that $\frac{\partial p_i^*}{\partial \lambda_i} > 0$. This shows more potential protesters can give rise to a higher protest rate. Also, $\frac{\partial^2 p_i^*}{\partial a_i \partial \lambda_i} > 0$ means common aggrievement plays a pivotal role in launching protests given the number of potential protesters. In all, this is how complementarity leads to amplification, which is the key insight of Le Bon (1897).

5.3 Agglomeration Effect or Spillover Effect

Before HSR construction, a representative individual in city i can gain $c_{ii} = w_i - R_i$ or $c_{i0} = w_0 - R_0 - 2T_i^0$, where T_i^0 is the commuting cost via traditional means of transportation (usually buses or trains). An individual would not migrate so long as the utility difference does not exceed a certain threshold, η_{ij}, which captures the idiosyncratic preference for their hometown. η_{ij} follows a distribution $G_i(\cdot)$, which can be interpreted as a common hometown attachment or the city's stickness. Thus, his probability for migration is given by

$$\rho_i^0 = Pr(u_0 - u_i \geq \eta_{ij}) = G_i(u(w_0 - R_0 - 2T_i^0) - u(w_i - R_i)).$$

We assume $w_0 - R_0 > w_i - R_i$, so $\rho_i^0 > 0$ at least for some $i \in \mathcal{N}$.[24] In equilibrium, there remains $(1 - \rho_i^0\alpha)N_i$ residents in city i, and $N_0 + \sum_{i=1}^n \rho_i^0\alpha N_i$ residents in the capital (city 0). For a protest occurring in city i, its potential protesters are as many as $\lambda_i^0 = N_0 + \sum_{i=1}^n \rho_i^0\alpha N_i + \sum_{|d_k - d_i| \leq r}(1 - \rho_k^0\alpha)N_k$ if $d_i \leq r$, or $\lambda_i^0 = \sum_{|d_k - d_i| \leq r}(1 - \rho_k^0\alpha)N_k$ if $r < d_i \leq D$.

HSR provides the residents with a new approach to reaching the capital. Denote $T_i^1(d_i)$ as the commuting cost via HSR. According to conventions in economic geography (See e.g., Pan et al. (2023)), HSR is more economical than buses or trains when the distance is far (above a threshold d^*).[25] Thus, we assume $(T_i^1(d_i) - T_i^0(d_i))(d_i - d^*) \leq 0, \forall d_i \in [0, D]$, and only those living in remote

24. This also helps to prevent "adverse migration": residents in the center will not migrate to other prefectures. Such simplification is proper as we focus on economically-driven migration that naturally favor the center.

25. We assume $d^* > r$ since a protest could hardly mobilize people far from the activity center. In particular, people living in remote areas would hardly participate in protests occurring in central regions, as shown by our empirical

areas ($i \in A_{d^*} = \{i : d^* < d_i \leq D\}$) would surely choose HSR in lieu of buses or trains. For these groups of people, their probability for migration is altered to

$$\rho_i^1 = Pr(u_0 - u_i \geq \eta_{ij}) = G_i(u(w_0 - R_0 - 2T_i^1) - u(w_i - R_i)).$$

Since both G_i and u are increasing functions, $T_i^1(d_i) < T_i^0(d_i), \forall d_i \in A_{d^*}$, it is evident that $\rho_i^1 > \rho_i^0$. Hence, the number of potential protesters in city i is $\lambda_i^1 =$

$$\begin{cases} N_0 + \sum_{d_i \leq d^*} \rho_i^0 \alpha N_i + \sum_{d_i > d^*} \rho_i^1 \alpha N_i + \sum_{|d_k - d_i| \leq r} (1 - \rho_k^0 \alpha) N_k > \lambda_i^0, & \forall d_i \leq r \\ \sum_{|d_k - d_i| \leq r} (1 - \rho_k^0 \alpha) N_k = \lambda_i^0, & \forall r < d_i \leq d^* \\ \sum_{|d_k - d_i| \leq r} (1 - \rho_k^1 \alpha) N_k < \lambda_i^0, & \forall d^* < d_i \leq D \end{cases}$$

Given Equation 4, $\frac{\partial p_i^*}{\partial \lambda_i} > 0$, we have the following proposition:

Proposition 1 (Agglomeration Effect) *HSR opening can foster migration, thus*

- *increasing protests in central areas by attracting more migrants ($\lambda_i^1 > \lambda_i^0$);*
- *having little (ambiguous) influence for regions ($\lambda_i^1 \approx \lambda_i^0$);*
- *reducing protests in remote areas by pushing residents away ($\lambda_i^1 < \lambda_i^0$).*

The above analysis shows how agglomeration contributes to HSR's influence. We further take into consideration the potential spillover in the long run. In spatial equilibrium, individuals should be indifferent between migration or staying in their hometown. With the decrease in transportation cost ($T_i^1(d_i) \leq T_i^0(d_i)$), $w_i - R_i$ should increase, with a larger rise in more distant regions. Alternatively, $w_0 - R_0$ should decrease. In the former case, people gain a much higher surplus ($c_i^1 < c_i^0$), thus lower aggrievement ($a_i^1 < a_i^0$). Hence, they are less willing to participate in protests both in aggregation and in margin ($p_i^1 < p_i^0$, $\frac{\partial p_i^1}{\partial \lambda_i} < \frac{\partial p_i^0}{\partial \lambda_i}$). The latter is just the reverse, with reduced utility and more protests in central regions.

Proposition 2 (Spillover Effect) *HSR opening can foster resource spillover, thus*

- *increasing protests for central areas with lower wages or higher housing prices;*
- *reducing protests in remote areas with higher wages or lower housing prices.*

Analogous results can be obtained by considering the general equilibrium of $n + 1$ labor markets and $n + 1$ housing markets. For instance, more migrants provide the central area with more labor supply and housing demand, giving rise to R_0 while reducing w_0. With smaller $w_0 - R_0$, the

evidence later. We roughly estimate $d^* \in [120, 160]$ in China while most literature shows $r < 20$.

migrant's utility $u(w_0 - R_0 - 2T_i^x), x = 0, 1$ is reduced, leading to higher aggrievement and higher protest rate. Nevertheless, such an analysis would bring about excessive words and unnecessary difficulties in illuminating our key results, so we choose a simpler version.

5.4 Monitoring Effect or Deterrence Effect

Aside from its economic implications, HSR acts as an instrument for increasing state presence. The provincial capital is definitely the political center, and the provincial officials manage to project their power to every region, whether for enhancing public interest or exerting personal power. HSR construction reduces the cost (time/money) of reaching local regions, endowing them with greater capacity both in monitoring local corruption and in repressing local protests.

Consider an inspector a choosing the optimal city for anti-corruption.Her preference is shaped by two major factors, local corruption rate (q_i^c), and the cost to reach there ($T_i^x, x = 0, 1$). By conducting inspections in more corrupt cities, her probability of detecting (and eradicating) corruption is higher, which not only fulfills her commission but also acts as her achievements that facilitate her future promotion. Her utility is written by $V_{ia} = (\phi q_i^c - T_i^x(d_i))\sigma_{ia}$, where σ_{ia} captures the inspector's personal responsibility and her preference for particular regions (for instance, her own hometown). Following conventions in modeling city choices, we assume σ_{ia} follows the Frechet distribution $F_a(\sigma_{ia}) = exp(-L_a\sigma_{ia}^{-\beta})$, where $L_a > 0$ is the level and $\beta > 1$ is the dispersion. Therefore, before HSR opening, the probability of being inspected for officials in city i's (the inspection rate) is given by

$$q_i^I = Pr(V_{ia} = \max_{k\in\{1,\dots,n\}} V_{ka}) = \frac{(\phi q_i^c - T_i^0(d_i))^\beta}{\sum_{k\in\{1,\dots,n\}}(\phi q_k^c - T_k^0(d_k))^\beta}.$$

Consider a local government official (e.g., the mayor or party secretary), her optimal corruption rate q_i^C should be as high as possible without incurring inspection. Once she becomes highly corrupted vis-à-vis her counterparts (officials in other cities), she would be inspected, put off, and even accused. Such disutility is too low for her to bear, which facilitates them to compete to reduce the corruption rate like a Bertrand game. In equilibrium, the inspection rate should be equalized to $q_i^{I0} = \frac{1}{n+1}$ and $q_i^{C0} = T_i^0(d_i)/\phi + q_0^{C0}$. After HSR opening, the transportation cost is reduced for remote areas, which also reduces the equilibrium corruption rate: $q_i^{C1} = T_i^1(d_i)/\phi + q_0^{C1} < T_i^0(d_i)/\phi + q_0^{C0} = q_i^{I0}$ if $d^* < d_i \leq D$. In consequence, residents there develop lower aggrievement ($a_i^1 < a_i^0$), reducing both the equilibrium protest rate and marginal protest occurrence ($p_i^1 < p_i^0, \frac{\partial p_i^1}{\partial \lambda_i} < \frac{\partial p_i^0}{\partial \lambda_i}$).

Proposition 3 (Monitoring effect) *HSR opening can facilitate investigations into local officials, alleviating corruption and reducing protests in remote areas.*

Similarly, the public security leader b is also choosing the city for anti-protest. Her preference is shaped by local protest rate p_i and the difficulty in reaching there $T_i^x(x = 0, 1)$, written by $V_{ib} = (\psi p_i - T_i^x(d_i))\sigma_{ib}$, with σ_{ib} capturing her idiosyncratic characteristics. We still assume σ_{ib} following the Frechet distribution $F_b(\sigma_{ib}) = exp(-L_b\sigma_{ia}^{-\gamma})$, where $L_b > 0$ is the level and $\gamma > 1$ is the dispersion. Before HSR opening, the repression probability of a protest in city i is given by

$$q_i^R = Pr(V_{ib} = \max_{k\in\{1,\dots,n\}} V_{kb}) = \frac{(\psi p_i - T_i^0(d_i))^\gamma}{\sum_{k\in\{1,\dots,n\}}(\psi p_k - T_k^0(d_k))^\gamma}.$$

As the cost of launching protests hinges directly upon the repression rate, we can substitute it into Equation 3: $p_i = F_i(p_i\lambda_i a_i - \mu - \mu_i(q_i^R))$. Since $\mu_i^{'} > 0$ and $\frac{\partial q_i^R}{\partial T_i} < 0$, with reduced transportation cost by HSR opening ($T_i^1(d_i) < T_i^0(d_i)$ for $d^* < d_i \leq D$), the repression rate (along with the cost of protest) is increased. In other words, residents are deterred by increasing state presence. For fear of being caught to jail, they would be more prudent and the protest rate is reduced.

Proposition 4 (Deterrence Effect) *HSR opening can extend state presence, deterring residents from launching protests, thus reducing protests in remote areas.*

In conclusion, there are four possible explanations for our baseline findings, which are tested by detailed empirical evidence in section 6.

6 Empirical Evidence for Possible Channels

6.1 Agglomeration or Spillover?

In Proposition 1 and Proposition 2, we propose two competitive explanations to our findings. The first suggests that HSR could facilitate migration and economic agglomeration, while the second emphasizes its influence to foster resource spillover. We investigate these two channels in four steps. First, we show that HSR opening does not decentralize resources to remote areas, thus falsifying the second channel. Next, we confirm its positive effect on both population growth and economic agglomeration in central regions, supporting the first channel. We also provide evidence that intensified agglomeration is positively related to increasing protests in China. Third, we focus primarily on migrants and show that low-skilled laborforce from rural areas indeed respond more to HSR. Finally, we show that HSR indeed increases protests related to migrants, and the effect is stronger in areas where labor discrimination is more severe. In sum, we highlight the role of A-to-NA migrants in driving our main findings.

We first test whether HSR decentralizes economic resources to remote areas. If so, we would expect significant growth in both population and economic activities in these regions, and we should observe a positive interaction term (with the dependent variables being population or

GDP). Columns (1) to (2) in Table 6 show a negative coefficient for the interaction term but a positive one for the HSR term, which means people flow primarily to central regions after HSR opening, with the effect diminishing as the distance increases. This means that HSR opening gives rise to economic agglomeration rather than spillover.

We further test the spillover effect using firm-level data. As mentioned by Gumpert, Steimer, and Antoni (2022), firm establishments should grow in peripheral regions with HSR opening. Table A17 presents the impact of HSR on firm flow using data on Chinese above-scale industries. While the effect for the number of firms is ambiguous, HSR opening increases industrial output in central regions at the expense of remote areas. This implies that HSR fosters resource agglomeration instead of spillover. In Table A18, we further compare the wages and housing prices before and after HSR opening, which shows an ambiguous effect.[26] Taken together, the results suggest that our findings are not due to improved economic conditions of peripheral regions proposed by Proposition 2. Instead, increasing job opportunities in central areas induced by HSR could attract more migrants, leading to ever-rising agglomeration.

Second, we construct measures to test whether HSR openings foster agglomeration. We measure population/economic agglomeration by the ratio of the prefecture's population/employment fraction to its administrative area fraction (The fraction is defined with regard to the national value). The results are presented in columns (3) to (5) in Table 6, showing that HSR opening leads to higher population, employment, and GDP in central regions, thus reshaping the economic geography of the whole province. We further provide suggestive evidence to check whether agglomeration is positively correlated with protest incidence. Using raw data on agglomeration, we observe an upward trend in protests, as shown in Figure A20, implying a positive correlation between the two. Table A19 further provides evidence that both economic and population agglomeration contribute to protests.[27] In sum, the agglomeration effect contributes to our findings.

To further explore this channel, we examine which groups are most attracted to provincial capitals due to HSR opening, using data on 900,000 migrants from 2011 to 2016 from the CMDS. We employ the number of HSR openings in other prefectures within the same province to proxy for the extension of HSR network from the provincial capital, and analyze its relationship with the migrant features in provincial capitals. Figure A21 reveals that, as more prefectures become connected to HSR within the province, the average education level of the floating population decreases, while the proportion with rural *hukou* increases. This suggests that HSR mainly drives the inflow of low-skilled labor from peripheral areas (A-to-NA migrants). We find no significant changes in terms of gender, age, or ethnicity.

26. An, Qin, Wu, and You (2024) show the relaxation of *hukou* system reduces wages on migrants instead of urban residents, which again corroborates our findings.

27. On the one hand, agglomeration provides more available participators for a protest, which in turn reduces others' psychological cost to join the protest. This corroborates the "complementarity" assumption in our model. On the other hand, the inflow of A-to-NA migrants may give rise to conflicts, as they are confronted with heavy working pressure, poor economic conditions, and limited access to public goods.

Finally, we turn to protests involving A-to-NA migrants and assess their response to HSR openings. As shown in Table A20, protests involving A-to-NA migrants show a similar trend with the baseline, increasing in central regions but decreasing in peripheral areas. Moreover, we conduct a heterogeneity analysis by discrimination against migrants. If A-to-NA migrants contribute mainly to our results, we expect a stronger increase in protests in regions with higher levels of discrimination, as migrant workers would face more unequal treatments in these areas. We measure discrimination through dialect and economic gaps between the center and other prefectures. Table A21 shows a stronger effect (larger intercept and higher slope) in high-discrimination regions. In sum, agglomeration can mostly explain our baseline findings.

6.2 Monitoring or Deterrence?

Aside from its economic impact, HSR serves as an extension of political power, enhancing state presence in remote areas, as discussed in Proposition 3 and Proposition 4. The former considers that HSR facilitates investigations into local corruption by allowing investigators to reach remote areas, thereby alleviating corruption and satisfying residents. The latter frames HSR as a signal of increased state coercive power, raising residents' fear of being caught. We discuss these two mechanisms in two steps. First, we utilize data on investigated officials to analyze whether HSR facilitates inspection into local corruption and find little evidence. Second, we use individual-level data to show that HSR reduced residents' political trust and government evaluation in peripheral areas. Thus, the reduction in protests should be possibly ascribed to the deterrence effect (reduced capability for protest) rather than to the monitoring effect (lower willingness to protest).

To begin with, we test the influence of HSR on investigations into local officials. We manually collect the data from local governments' websites, cross-verified by social media, to obtain a large dataset on whether the prefectural officials were investigated (*Investigate*), and the weighted average of their rankings (*Weighted Investigate*).[28] Since 2012, CPC has conducted a sweeping anti-corruption campaign, sending inspection teams to every province (usually stationed at the provincial center), followed by further investigation teams to local prefectures. If the monitoring effect holds, local officials in areas with HSR should be more exposed to investigation compared to those without HSR. However, columns (1) and (2) of Table 7 show little influence by HSR, whether in central regions or remote areas. We further include interaction terms to test their influence on protests. Columns (3) and (4) also show negligible effects. In general, HSR exerts little influence on investigations and investigations appear to make little difference to HSR's effect on protests.

28. The dataset covers all investigated officials ranking above the county level. Note that in the context of China, only those investigated to have violated party discipline or law will be made public, so "investigation" here is equivalent to prosecution and legal punishment. We denote a prefecture "investigated" if its main officials were investigated. The weighted average is calculated by averaging the ranking of the investigated officials in the prefecture. For prefecture p, $WI_p = \sum_{i \in I} i \frac{\#(\text{investigated officials with rank i in prefecture p})}{\#(\text{investigated officials in prefecture p})}$. The rank i is the official administrative range of the Chinese government, ranging from 1 to 10 ($I = \{1, 2, ..., 10\}$), representing from vice township level to country level. The ranks of prefecture officials lie primarily between 5 (vice-prefecture level) and 7 (vice-province level).

We further utilize individual-level data to corroborate our findings, testing the hypothesis with two key factors in Table 8. The first one is political trust, defined as the belief that the government will meet citizens' expectations (Hetherington, 1998). In CFPS, respondents are asked to rate their political trust in local government officials on a scale from 0 to 10. The second one is government evaluation, indicating how respondents view the performance of local government over the past few years, on a scale from 1 to 5. If residents benefit from less corruption after corrupt officials are investigated, they should develop higher political trust and government evaluation. Conversely, if they are deterred by state power and reduce protest to avoid potential punishment, their attitudes would worsen, as they perceive the government as exerting authority without addressing their grievances. Column (1) shows clearly that residents in peripheral regions experience trust loss while those in central regions trust the government more. Column (4) provides us with similar results in government evaluation, albeit with smaller statistical significance.

We further employ other micro datasets to shed light on how residents in peripheral regions respond to HSR opening. We obtain data on respondents' emotions from the CFPS. Results in Figure A22 show that residents in remote areas develop more negative emotions after HSR opening, which is contrary to the monitoring effect but endorse the deterrence effect. We further employ the ISCIU dataset to explore which channels individuals choose to express their opinions towards the government. We focus on two prominent forms of political expression: writing to public media and engaging in protests. The deterrence effect predicts a decline in these forms of expression in remote areas after HSR opening. Table A22 confirms the hypothesis: people in remote areas are less inclined to express their views after HSR opening, implying that stronger state presence deters political expression. Such reduction is unlikely to be driven by better life conditions, as the above evidence shows neither improvement in economic conditions nor better emotions.

6.3 Linking The Channels

We have tested the four explanations proposed by our model, establishing two main channels while falsifying the others. Nonetheless, one may wonder how these two channels interact. Are they mutually reinforcing or canceling one another? We attempt to link them below.

The agglomeration effect suggests that, after HSR opening, more residents from remote areas will migrate to central regions, leading to an increase in protests in these areas. This pattern divides residents into four groups: locals in remote areas (A), migrants to remote areas (B), locals in central regions (C), and migrants to central regions (D), as shown in a sketch map in Figure A3. The increase in protests following HSR opening is mainly attributed to "group D", which "transfer" protests that should have occurred in remote areas to central regions. Therefore, this group should experience the greatest loss of trust and the most negative government evaluation, as they face severe discrimination due primarily to the *hukou* system and poor living conditions as mentioned in subsection 4.3. Locals in central regions, however, may benefit from the agglomeration effect

and develop positive attitudes. Locals in remote areas are primarily affected by the deterrence effect, resulting in a negative response. Migrants to remote areas, being fewer in number and less concentrated, may show ambiguous result.[29]

Columns (2) and (3) in Table 8 examine the political implications of HSR for the four groups respectively. The results align perfectly with our expectations. HSR opening exerts a strong negative influence on the political trust of migrants in the center, with a small positive impact on locals in the center. This reflects differential treatment based on the *hukou* system. Also, locals in remote areas lose trust slightly due to stronger deterrence, whereas migrants to remote areas show little change. The results of government evaluation presented in columns (5) and (6) show similar trends. We further check the potential pre-trends of the effect on locals and migrants, respectively, in Figure A23 and Figure A24. These figures show that migrants to central regions (from remote areas) and locals in remote areas experience a sharp decline in political trust and government evaluation, which again reinforces the two channels.[30]

In summary, HSR opening can simultaneously alter residents' protest ability and participation willingness. On one hand, it facilitates within-province migration, which not only fosters economic agglomeration but transfers protests from remote areas to central regions. On the other, it enhances the state's coercive power in remote areas, repressing potential protests. Migrants from remote areas to the center, in particular, are prone to both effects, thus presenting the most reduction in political trust and government evaluation. Combined with the above evidence, we may conclude that these groups of people, mostly A-to-NA migrants, drive our main findings.[31]

6.4 Testing Alternative Explanations

Changes in public good provision. One possible explanation is that the provincial government may provide local governments with more transfers to support HSR construction, redistributing resources from the capital to peripheral regions. To rule out this hypothesis, we test the influence of HSR opening on the provision of public goods in Table A23, including the per capita number of primary and secondary schools, hospital beds, Internet access, parks (area), theaters and cinemas, public books, buses, the proportion of education expenditure or science and technology expenditure in fiscal revenue. The data primarily come from the *Chinese City Statistical Yearbook*. We find no evidence that HSR opening could increase the provision of these public goods.

29. Since inter-province migration mainly targets central cities (e.g., the capital), migrants from outside to peripheral regions are few. While the graph shows migrants from outside areas, they can also be migrants from central cities. These are usually rich people seeking better amenities, which are also small in scale.

30. The result also helps to explain why the HSR term in columns (1) and (4) is positive. Since locals account for the majority of residents, who are the beneficiaries of HSR opening, they trust the government more and evaluate the officials more positively.

31. Admittedly HSR opening could foster high-skilled teamwork (Dong et al., 2020), it can hardly affect our findings as A-to-NA migrants are disproportionately more than high-skilled workers like researchers. Also, they suffer particularly from improper treatment in provincial capitals thus being inclined to protest, while researchers enjoy much higher social status and economic gains.

More stability-maintenance institutions. As more population mobility may disturb social stability, local governments may respond to HSR opening by building up more stability-maintenance institutions. Such institutions, like public bureaus, could also deter residents away from protests. We obtain data on such institutions (including courts, CMPS, industry and commerce bureaus, and national tax bureaus) from Amap in 2016 following Chang and Wang (2024). Among these, CMPS is the most relevant, responsible for suppressing protest events and coordinating law enforcement power to arrest, prosecute, and jail offenders (Wang and Minzner, 2015). Table A24 provides suggestive evidence that HSR opening did not affect the establishment of local political stability or suppressive institutions. This suggests that the reduction in protests in peripheral regions is not driven by local repressive institutions but by stronger state presence.

Changes in disamenities. Brinkman and Lin (2024) highlight the heterogeneous effects of highways driven by local disamenities. Similarly, if HSR opening adversely affects the environment, such as through increased air pollution, then it may be more detrimental in central regions (where disamenities outweigh access benefits), while less harmful in peripheral areas (where access benefits exceed disamenities), thus changing the protest patterns. We directly analyze the relation between HSR and air pollution in Figure A25 and find little effects either in central regions or peripheral areas. Table A12 further shows that environmental factors can hardly drive our results.

HSR-related protests. We consider protests launched directly related to here, as the construction may trigger unrest due to route choices or improper compensation for land requisition. These protests may have peaked shortly after HSR opening and declined over time. However, this is inconsistent with our findings reported in Figure 3 that protests in central regions increased gradually over time. We further test this explanation by two approaches. First, we classify those protest related to HSR construction, examining its variation with HSR opening, and exclude them to show the effect on non-HSR protests. Table A25 shows that the effect is insignificant for HSR-related protests, but highly significant for the remaining non-HSR protests. Second, we code HSR access as non-absorbing to assess its immediate impact. Column (7) shows a insignificant result, which again shows that instant HSR-related protests can hardly drive our baseline findings.

Commuting for protest. Another possible explanation is that HSR facilitates the movement of protesters to central regions for petitioning to the upper-level government (commuting for protest), which holds more political power and can address more complex issues. However, the results in Table 4 suggest that this is unlikely, as the protests we observe are not related to high-ranked issues (ethnic conflicts or veteran problems). We also test the case by identifying protests relating to upward petitioning (the keyword "*shangfang*") and examine its variation with HSR opening. Figure A26 shows that these protests are hardly influenced by HSR opening. This excludes the possibility that protesters are merely commuting to central regions for petitioning.

7 Conclusion and Discussion

In this paper, we examine how HSR opening in China has reshaped the political geography of protests. Results from various protest data reveals a spatially heterogeneous effect of HSR opening: mitigating protests in remote regions while increasing them in areas closer to the center. We integrate the traditional monocentric model with individual rational participation in protests, providing four possible explanations for this effect. Empirical evidence primarily endorses the *agglomeration effect* and excludes the *spillover effect*, with supporting evidence for the *deterrence effect* but against the *monitoring effect*. The former emphasizes that migration from peripheral to central regions drives protests, whereas the latter highlights increased state presence in remote regions induced by HSR can suppress protests. The two channels comprehensively map out HSR's effect: while increased state presence reduces protest participation in peripheral regions, enhanced connectivity draws residents to the center, unwittingly giving rise to protests there.

This study differentiates itself by focusing on the spatial heterogeneity of HSR's impact, offering a more comprehensive understanding of the underlying dynamics. Our results can readily be generalized to other countries or different infrastructure projects, though caution is necessary when extending these results due to the assumption that economic and political centers overlap. In countries or regions where they are separated, political power and economic forces function independently, and even identical policy shock could exhibit distinct political implications and spatial patterns. Embedding our setup within a general framework with multiple centers or endogenizing the centripetal force of centers is an exciting avenue for future research.

It should be noted that the spillover effect we ruled out here is different from those established in the literature (Donaldson and Hornbeck, 2016; Donaldson, 2018). While their studies focus on trade and market access, we examine protest geography. Moreover, we adopt a different definition of spillover. In previous studies, the spillover effect is inversely related to transport cost, weakening with distance. In contrast, our spillover effect grows stronger with increasing distance. Hence, our findings are generally consistent with extant research, particularly the Fogelian view that transportation infrastructure by itself does not always promote economic growth, whose effect could vary by regions. In addition, we recognize the possible economic growth or expanded market access due to HSR openings, yet it may not present the particular geographical pattern that is crucial to bring about the change in protest geography documented in our study. In this sense, we extend the work of Banerjee et al. (2020) that focuses primarily on the effect of infrastructure for the *average location*. We show that HSR opening could bring about heterogeneous economic implications in *different locations*, which is key to engendering the changes in protest geography documented in our study.

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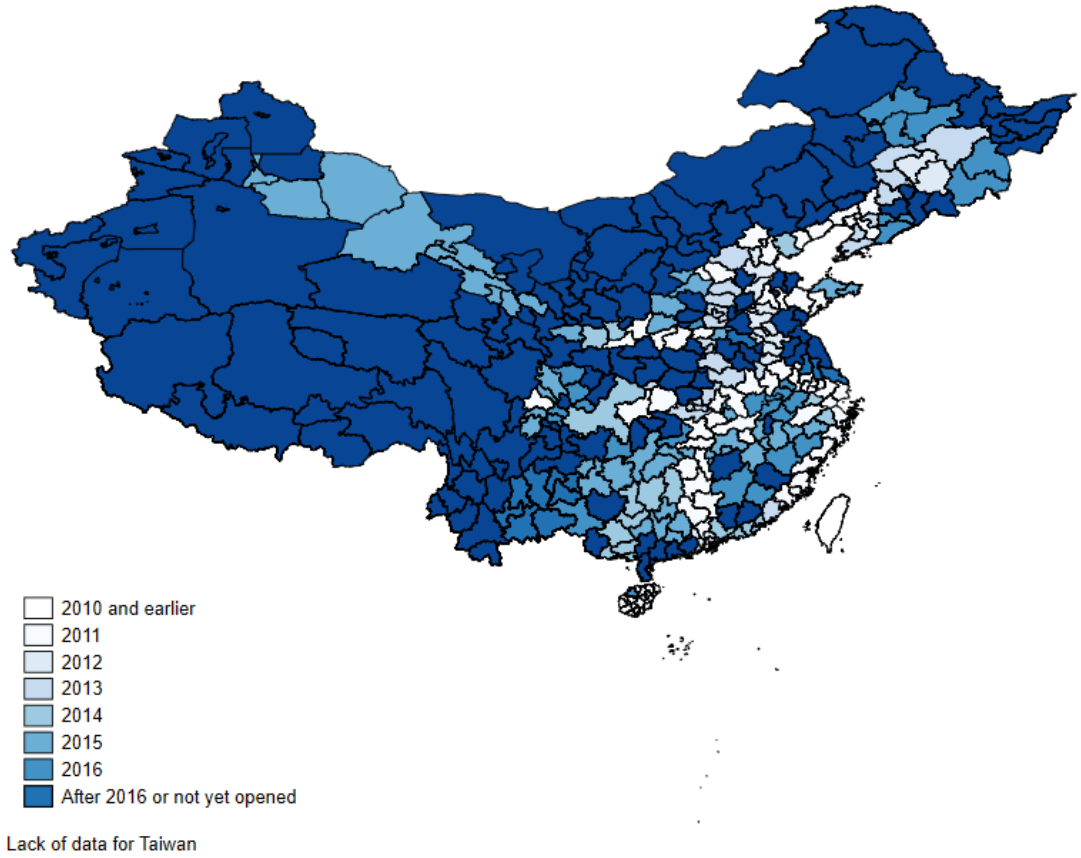
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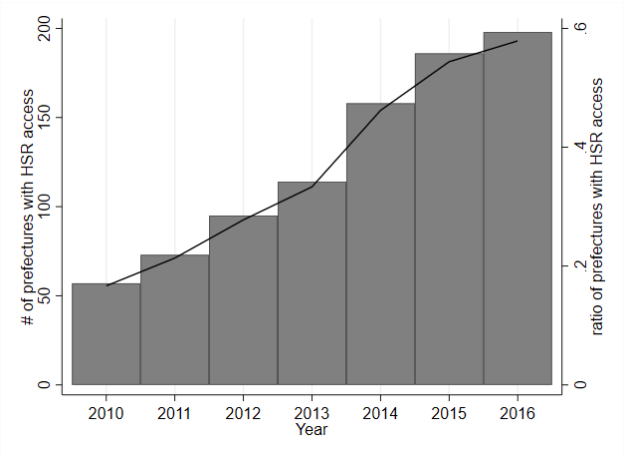
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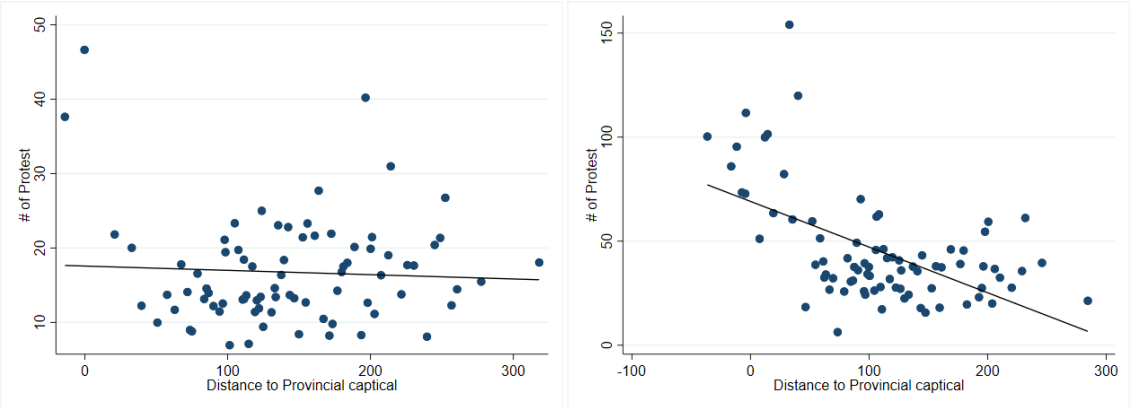
(A) **Distribution of HSR Opening Times Across Prefectures.**



(B) **Trends in Cities with HSR Openings.**

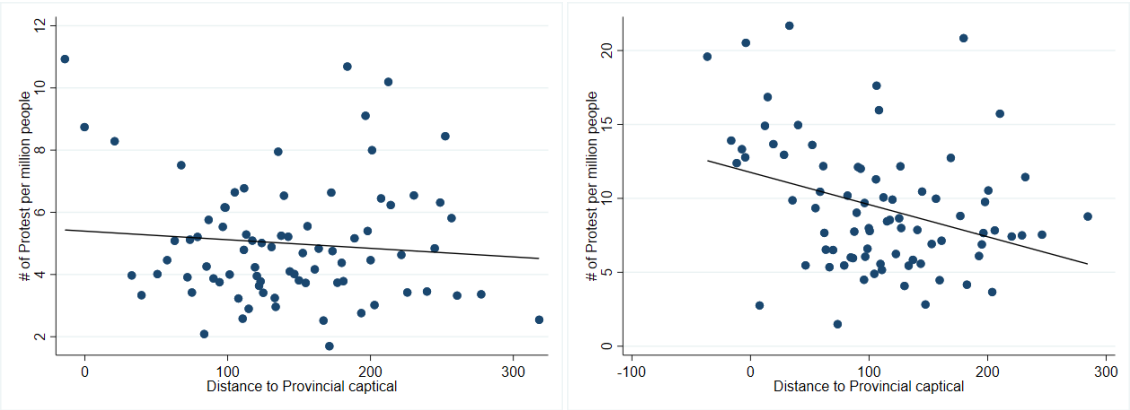
FIGURE 1 HSR Openings.

Notes: This figure illustrates the distribution of HSR openings across different regions and time periods in China. Panel A shows the variation among different prefectures, while Panel B provides an overview of the number and proportion of HSR-opening cities across different years.



(A) **The geographical distribution of protest events before HSR opening.**

(B) **The geographical distribution of protest events after HSR opening.**

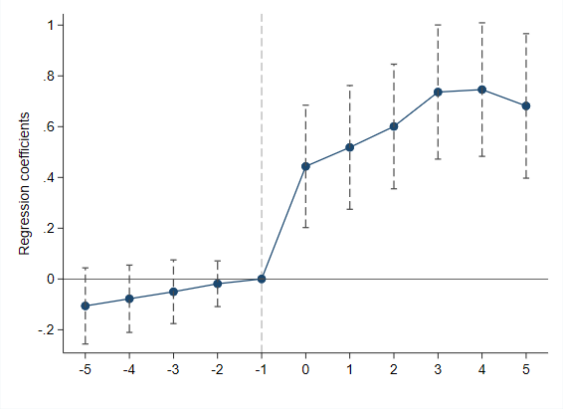


(C) **The geographical distribution of protest events per million people before HSR opening.**

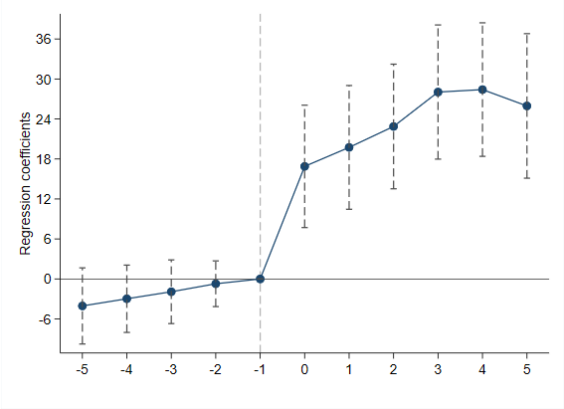
(D) **The geographical distribution of protest events per million people after HSR opening.**

FIGURE 2 The geographical distribution of protest events before and after HSR opening.

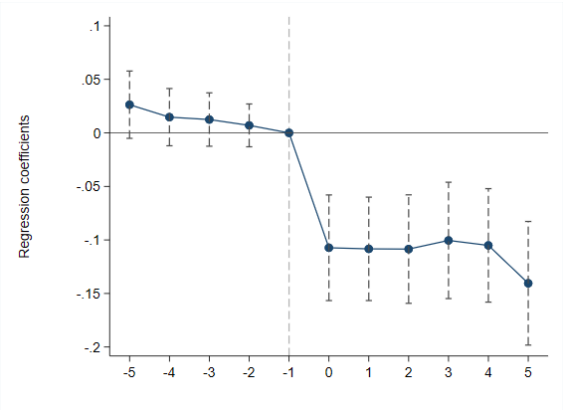
Notes: This figure illustrates the geographical distribution of protest events before and after HSR opening. Panel A-B display the normalized number of protest events at the prefecture-year level on the y-axis, while Panel C-D show the number of protest events per million people. The x-axis in all panels represents the distance from the prefecture to the provincial capital. Panels A and C illustrate the spatial distribution pattern of protests before HSR opening, while Panels B and D depict that after HSR opening. We control for regional population and province fixed effects before plotting the distribution.



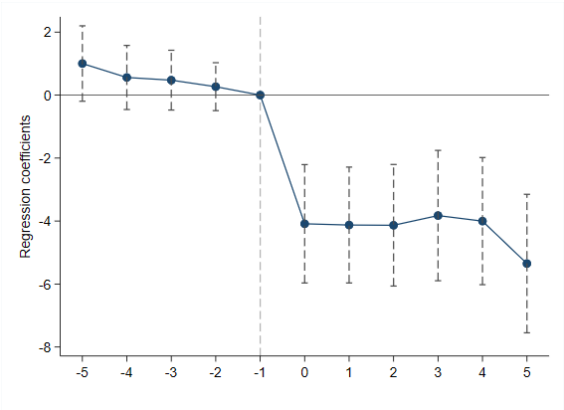
(A) **Pre-trend tests for *HSR* term using the standardized number of protests.**



(B) **Pre-trend tests for *HSR* term using the number of protests.**



(C) **Pre-trend tests for interaction term using the standardized number of protests.**



(D) **Pre-trend tests for interaction term using the number of protests.**

FIGURE 3 Pre-trend tests using prefecture-year level data.

Notes: This figure plots pre-trend tests using prefecture-year level data. The dependent variable is the standardized number of protests at the prefecture level (*Protestsd*) in Panel A and Panel C, while we use the actual number of protests (*Protest*) in Panel B and Panel D. Panel A and Panel B test for single *HSR* term. Panel C and Panel D test for the interaction term *HSR*×*lndistance* in equation (2); All panels control for Province-year, predetermined-year, and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.

TABLE 1 Summary Statistics

	(1)	(2)	(3)	(4)	(5)
Variable	Obs	Mean	Std.Dev.	Min	Max
Panel A: Prefecture-year Data					
Protest	1,896	28.790	37.910	0	374
Protestsd[a]	1,896	0	1	-0.759	9.105
HSR	1,896	0.412	0.492	0	1
Distance	1,896	130.992	72.897	0	301.709
lndistance	1,896	4.425	1.483	0	5.713
Panel B: Prefecture-month Data					
Protest(month)	22,752	2.399	3.719	0	50
Protestsd(month)	22,752	0	1	-0.645	12.801
Panel C: Prefecture-date Data					
Protest(day)	692,580	0.078	0.318	0	7
Protestsd(day)	692,580	0	1	-0.247	21.770
Panel D: Predetermined Control at 2010					
Primary industry(%)	279	3.641	7.656	0.030	56.180
Secondary industry(%)	279	42.456	13.980	7.240	81.850
GDP per capital(yuan)	279	33,266.47	22,771.95	5,304	175,125
Population (per 10,000 people)	279	440.880	310.639	21.8	3,303.45
Area[b]	279	9.363	0.818	7.015	12.442

Notes: Table 1 presents descriptive statistics.

[a]: We define $Protestsd$ as the standardized number of protests.

[b]: We define $Area$ as the logarithm of the prefecture's land area (unit: square kilometers).

TABLE 2 Baseline Results

Dependent variable	*# of Protest (std)*						Protest per million people
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HSR	0.023	0.005	-0.022	0.474***	0.771***	0.467***	4.364***
	(0.052)	(0.056)	(0.045)	(0.170)	(0.138)	(0.134)	(1.124)
	[0.066]	[0.063]	[0.040]	[0.160]	[0.163]	[0.126]	[1.077]
HSR×*lndistance*				-0.105***	-0.172***	-0.109***	-0.914***
				(0.035)	(0.030)	(0.027)	(0.227)
				[0.032]	[0.033]	[0.025]	[0.200]
Predetermined-year Control			✓			✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓	✓
Year FE	✓			✓			
Province-year FE		✓	✓		✓	✓	✓
Observations	1,994	1,984	1,910	1,957	1,943	1,896	1,896
R-squared	0.785	0.834	0.897	0.786	0.837	0.900	0.846

Notes: Table 2 reports the baseline regression results. The dependent variable in Column (1)-(6) is the standardized number of protests at the prefectural level (*Protestsd*). Column (7) divides the variables by the total population (in millions) (*Protest per million people*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital. The predetermined-year control variables include the interaction terms between the year dummy variables and the proportions of the primary sector, secondary sector, per capita GDP, population, and urban area in 2010. Robust standard errors in parentheses are clustered at the prefecture levels. Standard errors in brackets are Conley standard errors robust for spatial correlation, assuming a cutoff window of 500 km and a serial correlation of 6 years. ***p< 0.01, **p <0.05, *p < 0.1.

TABLE 3 Baseline Results using Prefecture-month Data

	(1)	(2)	(3)	(4)	(5)
HSR	0.000	0.252**	0.296***	0.317***	0.325***
	(0.039)	(0.117)	(0.112)	(0.121)	(0.124)
	[0.035]	[0.120]	[0.121]	[0.124]	[0.127]
HSR×*lndistance*		-0.063***	-0.067***	-0.072***	-0.074***
		(0.024)	(0.023)	(0.024)	(0.025)
		[0.026]	[0.025]	[0.026]	[0.027]
Predetermined-year Control	✓	✓	✓	✓	✓
Prefecture FE		✓	✓	✓	
Month FE		✓	✓		
Year FE		✓			
Province-year FE			✓		
Province-year-month FE	✓			✓	✓
Prefecture-month FE	✓				✓
Observations	22,920	22,836	22,836	22,752	22,752
R-squared	0.734	0.626	0.652	0.703	0.736

Notes: Table 3 reports the baseline regression results using prefecture-month level data. The dependent variable is the standardized number of protests at the prefecture-month level (*Protestsd(month)*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital. Robust standard errors in parentheses are clustered at the prefecture levels. Standard errors in brackets are Conley standard errors robust for spatial correlation, assuming a cutoff window of 500 km and a serial correlation of 6 years. ***p< 0.01, **p <0.05, *p < 0.1.

TABLE 4 Classification Based on Protest Contents

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	All	Unpaid wages	Homeowner	Land	Education	Medicine
HSR	0.467***	0.779***	0.733***	0.283	0.423**	0.602***
	(0.134)	(0.198)	(0.209)	(0.272)	(0.179)	(0.215)
	[0.126]	[0.185]	[0.186]	[0.252]	[0.181]	[0.602]
HSR×*lndistance*	-0.109***	-0.166***	-0.171***	-0.082	-0.109***	-0.129***
	(0.027)	(0.040)	(0.042)	(0.056)	(0.037)	(0.045)
	[0.025]	[0.039]	[0.037]	[0.054]	[0.035]	[0.047]
Observations	1,896	1,896	1,896	1,896	1,896	1,896
R-squared	0.900	0.823	0.821	0.785	0.716	0.732
Dependent variable	Taxi	Fraud	Environment	Pension	Ethnic	Veteran
HSR	-0.010	0.843*	-0.169	0.167	-0.098	-0.048
	(0.179)	(0.454)	(0.260)	(0.146)	(0.289)	(0.214)
	[0.185]	[0.431]	[0.235]	[0.129]	[0.341]	[0.266]
HSR×*lndistance*	0.001	-0.178*	0.006	-0.040	-0.011	0.007
	(0.038)	(0.093)	(0.052)	(0.031)	(0.056)	(0.042)
	[0.038]	[0.090]	[0.047]	[0.027]	[0.068]	[0.053]
Observations	1,896	1,896	1,896	1,896	1,896	1,896
R-squared	0.703	0.681	0.582	0.594	0.370	0.360
Predetermined-year Control	✓	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓

Notes: Table 4 reports the baseline regression results for different kinds of protest events based on contents. Column (1) reports the baseline results. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR connectivity and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital. Robust standard errors in parentheses are clustered at the prefecture levels. Standard errors in brackets are Conley standard errors robust for spatial correlation, assuming a cutoff window of 500 km and a serial correlation of 6 years. ***p< 0.01, **p <0.05, *p < 0.1.

TABLE 5 Baseline Results: using CLB dataset (Yearly data)

	(1) Strike(sd)	(2) Strike(sd)	(3) Pro-migrants industries	(4) Non-pro-migrants industries
HSR	0.014	0.399***	0.395***	0.403
	(0.049)	(0.125)	(0.141)	(0.328)
	[0.045]	[0.119]	[0.124]	[0.353]
HSR×*lndistance*		-0.086***	-0.084***	-0.095
		(0.026)	(0.029)	(0.068)
		[0.025]	[0.025]	[0.072]
Predetermined-year Control	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓
Observations	2,456	2,438	2,438	2,438
R-squared	0.801	0.814	0.806	0.362

Notes: Table 5 reports the baseline regression results using CLB dataset during 2010-2018. The dependent variable is the standardized total number of strike at the prefectural level in columns (1) to (2). Column (3) has as its dependent variable the standardized number of strikes in industries that are more attractive for migrant workers to participate in, such as construction, manufacturing, services, and mining. Column (4) has as its dependent variable the standardized number of strikes in industries that are less likely to accept migrant workers into the city, such as party and government agencies, and the education sector. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital. The predetermined-year control variables include the interaction terms between the year dummy variables and the proportions of the primary sector, secondary sector, per capita GDP, population, and urban area in 2010. Standard errors in brackets are Conley standard errors robust for spatial correlation, assuming a cutoff window of 500 km and a serial correlation of 6 years. ***p$<$ 0.01, **p $<$0.05, *p $<$ 0.1.

TABLE 6 The heterogeneous impact of HSR openings on agglomeration

Dependent variable	(1) *Float ratio*	(2) *Population density*	(3) *Population agglomeration*	(4) *Economic agglomeration*	(5) *GDP Per capita*
HSR	0.065***	5.605**	0.024*	0.083**	7.813***
	(0.021)	(2.520)	(0.013)	(0.032)	(1.563)
	[0.016]	[2.813]	[0.013]	[0.026]	[1.966]
HSR×*lndistance*	-0.015***	-0.538	-0.005*	-0.018**	-1.678***
	(0.004)	(0.527)	(0.003)	(0.007)	(0.316)
	[0.003]	[0.607]	[0.003]	[0.005]	[0.385]
Prefecture FE	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓
Observations	1,753	1,665	1,913	1,913	1,940
R-squared	0.826	0.997	0.999	0.990	0.923
Outcome mean	-0.044	425.556	5.730	3.389	44.678

Notes: Table 6 reports the heterogeneous impact of HSR openings on agglomeration. The dependent variables in columns (1)-(2) are the float ratio (the proportion of migrants) and population density (per person/square kilometer), respectively. The dependent variables in columns (3)-(4) are the indices of population agglomeration, economic agglomeration, which are measured by the ratios of year-end population, employment in the prefecture to their respective national totals, as well as the ratios of the prefecture's administrative area to the national total. In column (5), the dependent variable is per capita GDP (in thousands). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital. Robust standard errors in parentheses are clustered at the prefecture levels. Standard errors in brackets are Conley standard errors robust for spatial correlation, assuming a cutoff window of 500 km and a serial correlation of 6 years. ***p< 0.01, **p <0.05, *p < 0.1.

TABLE 7 Falsifying monitoring effects

Dependent variable	(1) *Investigate*	(2) *Weighted Investigate*	(3) *Protestsd*	(4)) *Protestsd*
HSR	-0.070	0.108	0.273**	0.278**
	(1.953)	(4.273)	(0.133)	(0.131)
	[2.258]	[5.097]	[0.114]	[0.113]
HSR×*lndistance*	-0.143	-0.328	-0.049*	-0.050*
	(0.427)	(0.915)	(0.028)	(0.027)
	[0.474]	[1.049]	[0.024]	[0.024]
HSR×*lndistance*×*Investigate*			-0.000	
			(0.000)	
			[0.001]	
HSR×*lndistance*×*Weighted Investigate*				-0.000
				(0.000)
				[0.000]
Controls	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓
Observations	1,354	1,354	1,354	1,354
R-squared	0.818	0.797	0.940	0.940
Outcome mean	9.902	21.820	0.201	0.201

Notes: Table 7 reports the results testing the relation between HSR opening and investigation into local government officials. The data covers the period from 2012 to 2016. The dependent variable in column (1) is the number of corruption cases involving officials investigated in the prefecture in each year (*Investigate*). In column (2), the dependent variable is the index of corruption cases involving officials investigated in each year, weighted by the officials' ranks (*Weighted Investigate*). The dependent variables in columns (3)-(4) are the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital. Robust standard errors in parentheses are clustered at the prefecture levels. Standard errors in brackets are Conley standard errors robust for spatial correlation, assuming a cutoff window of 500 km and a serial correlation of 6 years. ***p< 0.01, **p <0.05, *p < 0.1.

TABLE 8 The heterogeneous impact of HSR opening on trust and evaluation

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
	Political trust			*Government evaluation*		
	All	Locals	Migrants	All	Locals	Migrants
HSR	0.342***	0.377***	-2.500*	0.122	0.130	-0.480
	(0.113)	(0.113)	(1.435)	(0.095)	(0.099)	(0.305)
HSR×*lndistance*	-0.055**	-0.063***	0.410	-0.029*	-0.031*	0.090
	(0.023)	(0.023)	(0.309)	(0.017)	(0.018)	(0.067)
Individual Controls	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓
Observations	79,071	77,565	1,495	76,791	75,354	1,426
R-squared	0.070	0.071	0.161	0.061	0.061	0.179
Outcome mean	5.027	5.035	4.572	3.439	3.438	3.487

Notes: Table 8 reports the heterogeneous impact of HSR opening on political trust and government evaluation. The data is sourced from individual-year level data from the 2012-2018 China Family Panel Studies (CFPS). Robust standard errors are clustered at the prefecture levels. The dependent variables in columns (1)-(3) represent the respondents' political trust in local government (*Political trust*), while the dependent variables in columns (4)-(6) represent the respondents' evaluation of the performance of local government in the past year (*Government evaluation*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital. Robust standard errors in parentheses are clustered at the prefecture levels. Standard errors in brackets are Conley standard errors robust for spatial correlation, assuming a cutoff window of 500 km and a serial correlation of 6 years. ***p< 0.01, **p <0.05, *p < 0.1.

Appendix for " State Infrastructure and Political Geography of Protest"

(For Online Publication)

Siyuan Fan Wenyi Lu

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E.3 More on Alternative Explanations A46

Appendix A More on Conceptual Framework

To ensure the existence of the equilibrium, we must assume there is a positive mass of individuals who are willing to engage in protests even if they expect to be alone ($F_i(-\mu - \mu_i) > 0$), and a positive mass who never participates even if they expect the whole group to join the resistance ($F_i(\lambda_i a_i - \mu - \mu_i) < 1$). The former corresponds to the "initiators" of the resistance. As mentioned in Granovetter (1978), they are group loyalists who launch the protest and mobilize other members to participate. The latter consists of passive members who would never engage in resistance, like those civil servants who should always support the government.

Assumption A1 *$F_i(-\mu - \mu_i) > 0$ and $F_i(\lambda_i a_i - \mu - \mu_i) < 1$.*

Given the complementarity, multiple equilibria are possible. To rule out multiplicity, we assume enough heterogeneity within the group, at least in a neighborhood of the equilibrium participation rate p_i^* (following Passarelli and Tabellini (2017)).

Assumption A2 *$\lambda_i a_i f_i(p_i \lambda_i a_i - \mu) < 1$.*

Lemma A1 *Assumption A1 is necessary and sufficient for the existence of an equilibrium participation rate $0 < p_i^* < 1$. Both Assumption A1 and Assumption A2 are necessary and sufficient for the uniqueness of p_i^*.*

Proof. The inequalities in Assumption A1 ensure that the fixed-point(s) are not on the boundaries, i.e., $p_i^* > 0$ and $p_i^* < 1$, respectively. In addition, thanks to continuity of F_i, Equation 3 has at least one solution in $(0, 1)$, which is a direct application of the Brouwer's fixed-point theorem. Assumption A2 requires that F_i crosses the p_i line from the above side under all circumstances. Since F_i is continuous, it follows that the solution must be unique.

For necessity, observe that $\lim_{p_i \to -\infty} F_i = 0$ and $\lim_{p_i \to \infty} F_i = 1$. If there exist $p_i^* \in (0, 1)$, neither $p_i = 0$ nor $p_i = 1$ can be a solution. This implies Assumption A1. Since the solution lies in $(0, 1)$, F_i crosses p_i from above at least once. If p_i^* is unique, then the cross should be once, which implies Assumption A2. See Passarelli and Tabellini (2017) for detailed proofs. ■

Appendix B More on Data and Background

B.1 More on Data

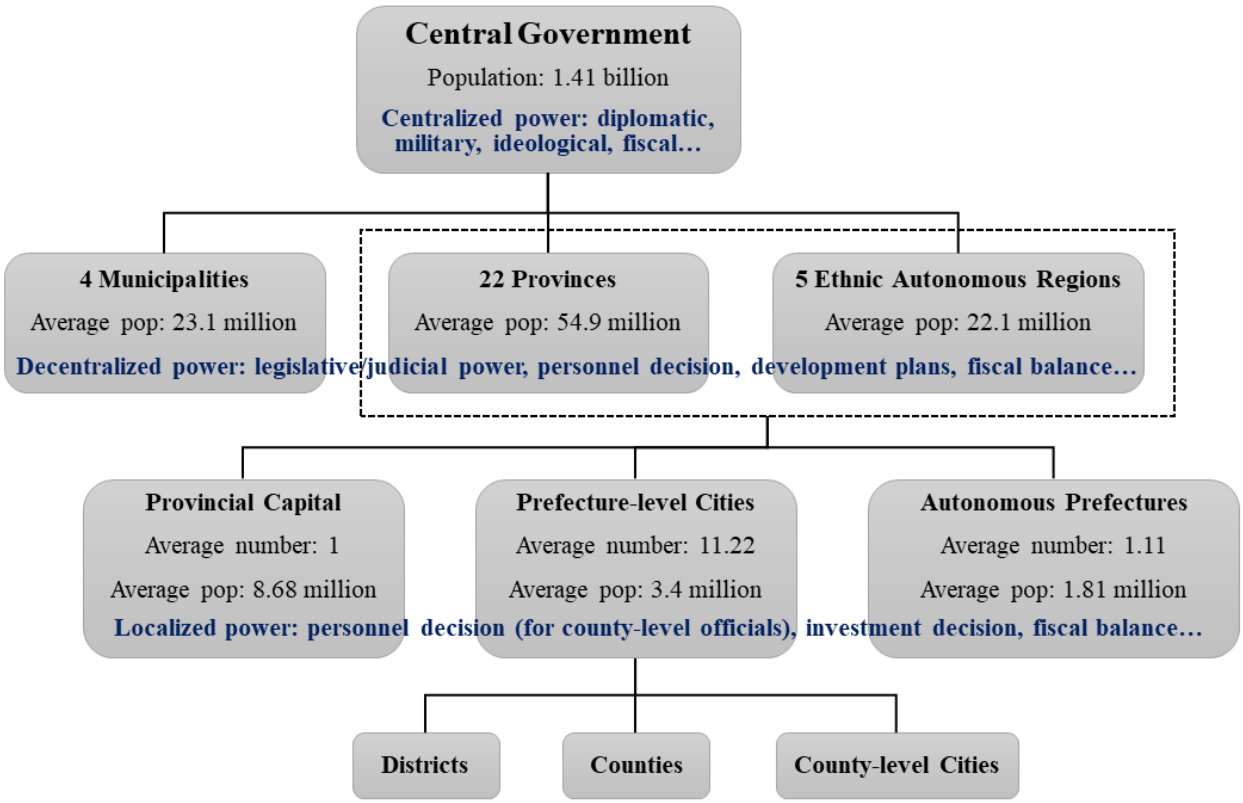


FIGURE A1
The Divisions of Chinese Bureaucracy.

Notes: This figure presents the administrative divisions in China and the relations between different divisions. The lowest level (town-level) is abbreviated for clearity.

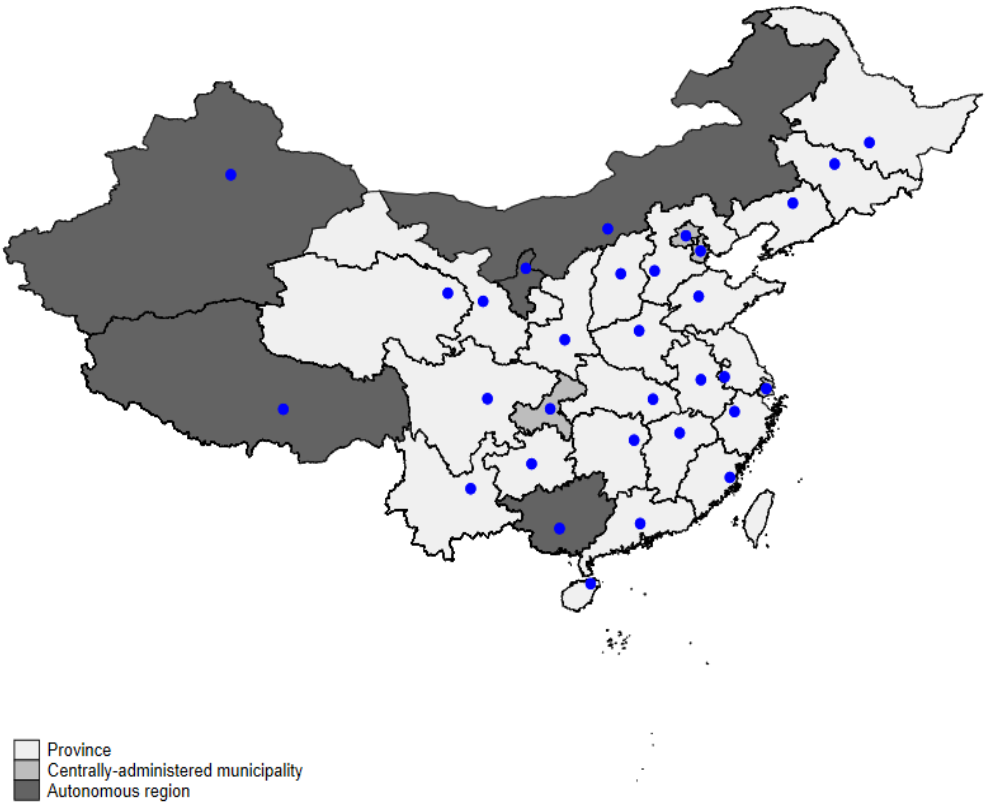


FIGURE A2 The Spatial Distribution of Provincial Regions.

Notes: This figure presents the spatial distribution of Chinese provinces and provincial captitals. The blue dots represent the political center (provincial capital) of each province.

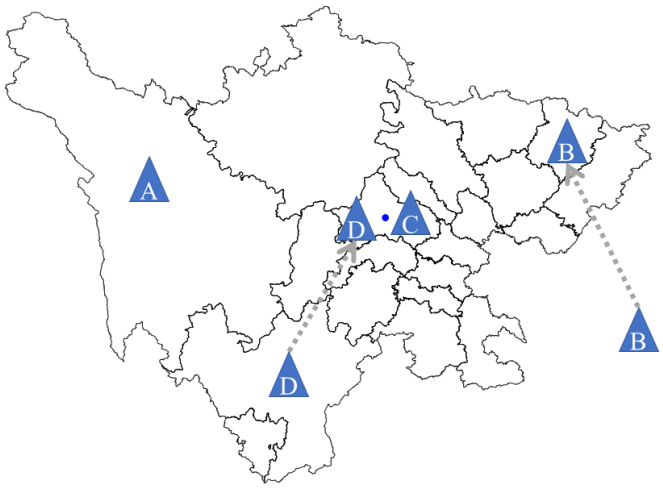


FIGURE A3 A sketch of different groups of people.

Notes: This figure presents four groups of people discussed in section 6, using Sichuan province as an example. The blue dot is the provincial capital (Chengdu).

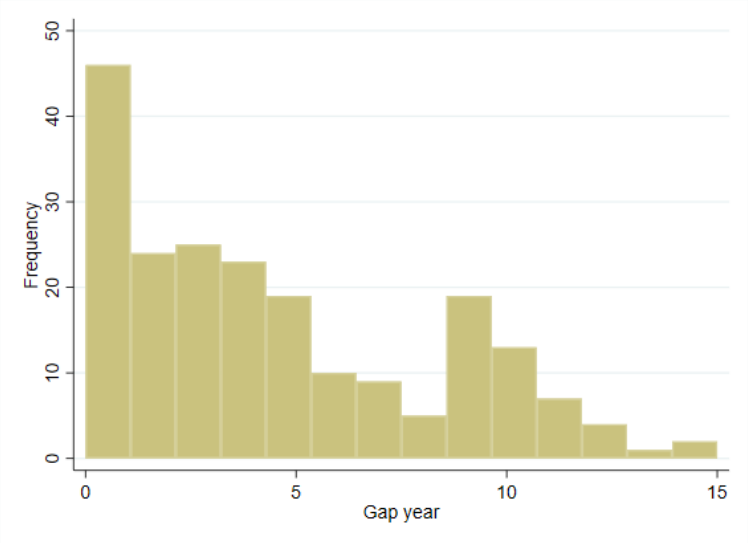


FIGURE A4
The HSR opening time gap between outer regions and capitals.

Notes: This figure presents the different time gap between the opening year of HSR stations and that in their provincial capitals during 2010-2022. Larger year means later HSR opening.

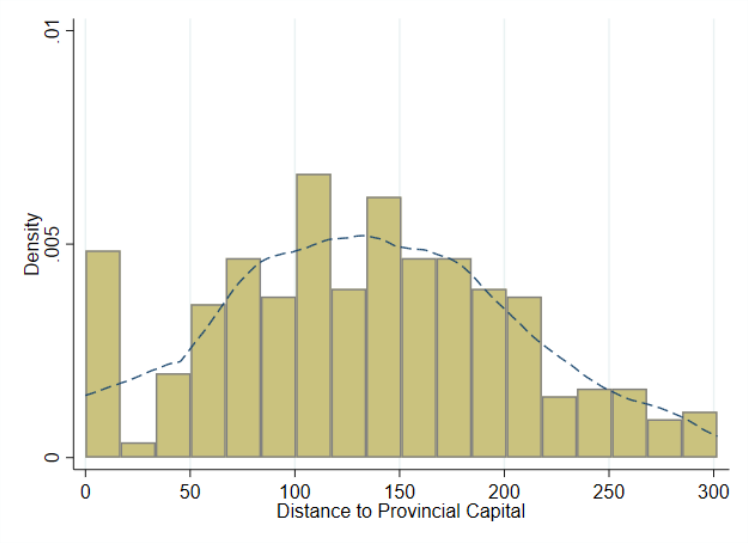


FIGURE A5
The density of geographical distances to provincial capital.

Notes: This figure presents the distribution of the geographical distance between prefectures and the provincial capital in China. The data for municipalities is excluded in our sample.

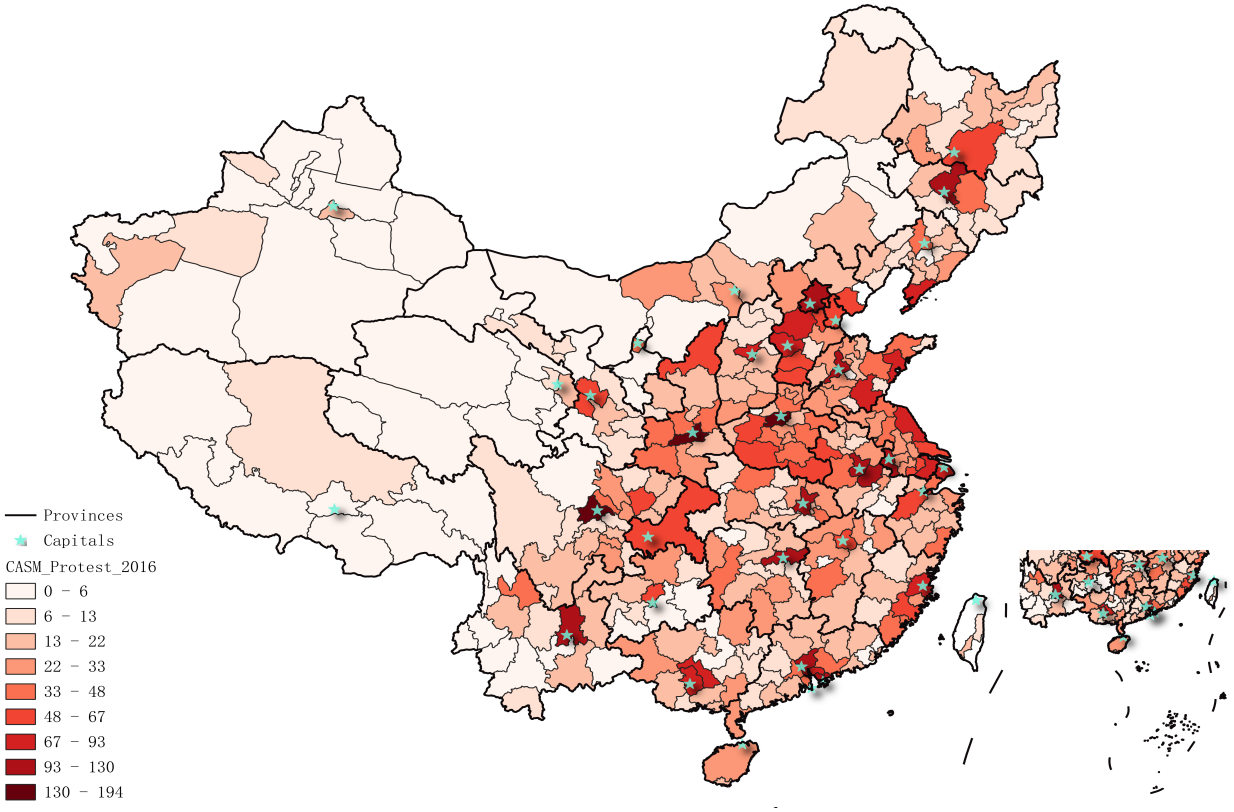
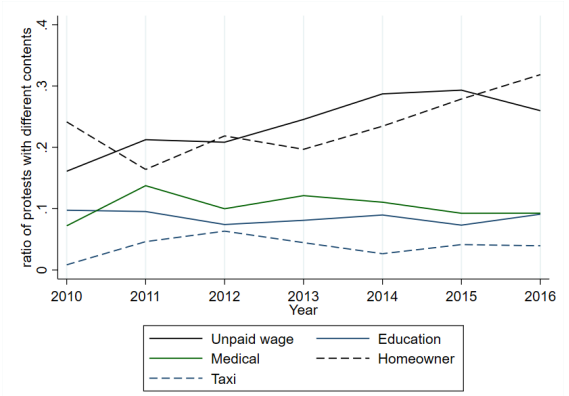
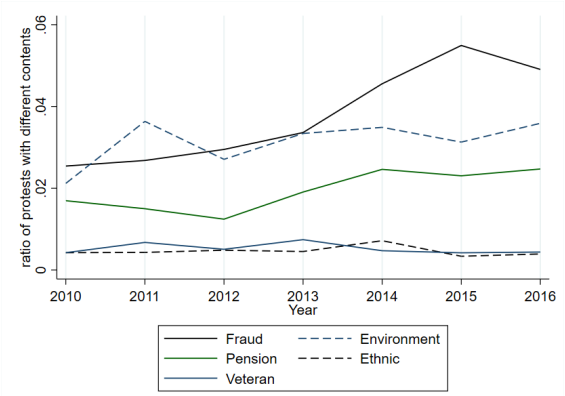


FIGURE A6
The spatial distribution of protest events in 2016.

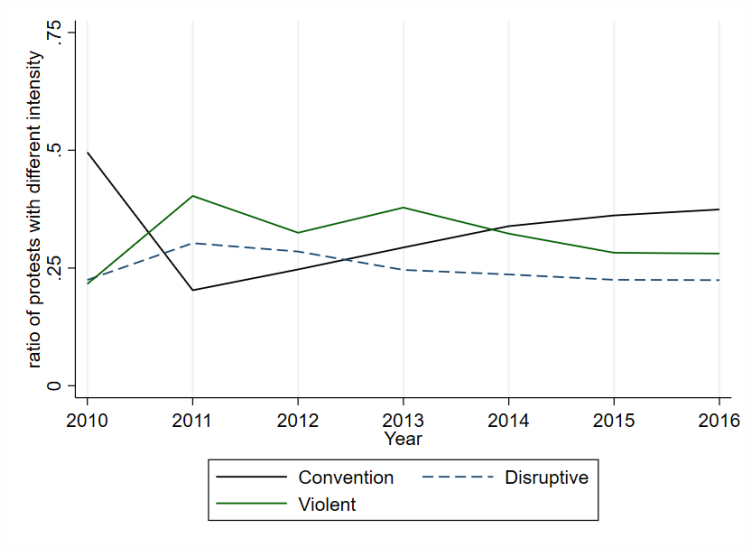
Notes: This figure presents the spatial distribution of protest events in 2016 (the end of our sample period). The color signal the frequency of protest events in each prefecture, with deeper red color representing more protests while lighter color for fewer protests. The blue stars are the capital cities of different provinces.



(A) **The proportion of protests of different contents (1).**



(B) **The proportion of protests of different contents (2).**



(C) **The proportion of protests of different intensity.**

FIGURE A7
The proportion of protests of different contents and intensity.

Notes: This figure plots the proportion of protests of different contents (motives) and forms (intensity) from 2010 to 2016.

B.2 More on Background and Anecdotal Evidence

***Hukou* System in China** In 1958, the CPC established the *hukou* (household registration) system in China to facilitate social control, under which every citizen is assigned a *hukou* type, agricultural or non-agricultural, and affiliated with a specific locality. Before 1978, the *hukou* served as a prerequisite for anyone to live and work in the designated locality. In addition, conversions from agricultural *hukou* to non-agricultural *hukou* or changing the *hukou* locality were strictly restricted, and the *hukou* of a newborn is inherited from its parents. Hence, citizens were strictly prohibited from migration.

The restrictions were partially relaxed since the Reform and Opening-up in 1978. Since then, people were gradually allowed to migrate from rural areas to urban areas without a local *hukou*. With huge rural-urban income disparity, Chinese cities witnessed a dramatic increase in the number of agriculture-to-non-agriculture migrants (A-to-NA migrants).[1] In addition, due to strict restriction on inter-provincial movement, intra-provincial migration dominates the general migration pattern in China (taking up about 55% of all migrants). However, despite the gradual relaxation of the household registration system in China, it continues to profoundly influence the mindset of the Chinese people and poses significant policy resistance. For instance, the rural bias inherent in the *hukou* system still hinders the integration of migrant workers into urban life; this cultural barrier has long impeded the transformation of policies that are friendly to migrant workers.

Despite becoming more relaxed after 2013, the *hukou* system still prevents most A-to-NA migrants from receiving equal treatment vis-à-vis their urban counterparts. For instance, they receive fairly unjust treatment in children's education, parents' healthcare, and housing for themselves, since enrollment in local schools, access to public health care, urban pension plans, and subsidized housing is all conditional on being a local urban dweller (Imbert et al., 2022; An et al., 2024). What's more, they face discrimination in the labor market (Afridi, Li, and Ren, 2015). Most of them overwork for long, with poor living conditions, a few of whom suffer from wage arrears that incur severe economic vulnerability, as shown in the 2016 migrant worker monitoring survey report.[2] Faced with unequal treatments, they may develop strong grievance and protest for their own rights.[3]

1. The proportion of A-to-NA migrants to all migrants is at least 76% in 2000-2020. See Table 1 of Tombe and Zhu (2019) or China's seventh national census for details.

2. The report shows the demographic features of A-to-NA migrants: 65.5% of them are male; 73.6% have less than 9 years of education. It also shows their labor protection condition: 64.9% of them have never signed a labor contract; 84.4% work over 44 hours per week, with 8.7 working hours per day; 0.84% (2.37 million) have unpaid wages, with average wage arrear being 11,941 RMB, equal to their three months' earnings (Considering daily expenditure, such wage arrear may lead to severe economic vulnerability of their families.). As for living conditions, 62.4% of them rent a room, with the average housing area being $19.4m^2$; nearly half of them have no washing machines or fridges; 13.5% even have no water access. See https://www.stats.gov.cn/sj/zxfb/202302/t20230203_1899495.html for details.

3. Protests of A-to-NA migrants due to wage arrears are prevalent in China. Notable examples include the Ja-

Protest of A-to-NA Migrants HSR opening has expedited the migration of rural populations to urban centers. However, as mentioned before, the persistent urban-rural divide and poor labor protection systems have engendered many unjust treatments for A-to-NA migrants. The deeply ingrained discrimination of the *hukou* system, coupled with inadequate institutional support, may have provoked these migrants, who are drawn to the cities by convenient transportation, to engage in protests in central regions.

A-to-NA migrants in China frequently confront systemic discrimination that permeates various aspects of urban life. The *hukou* system undermines the socioeconomic status of migrant workers by capping their income, restricting their access to social insurances, and eventually hindering their integration into urban life. Such institutional bias not only impacts their financial prospects but also constructs a broader social narrative that positions them at severe disadvantage, nurturing an environment conducive to dissatisfaction and collective resistance.

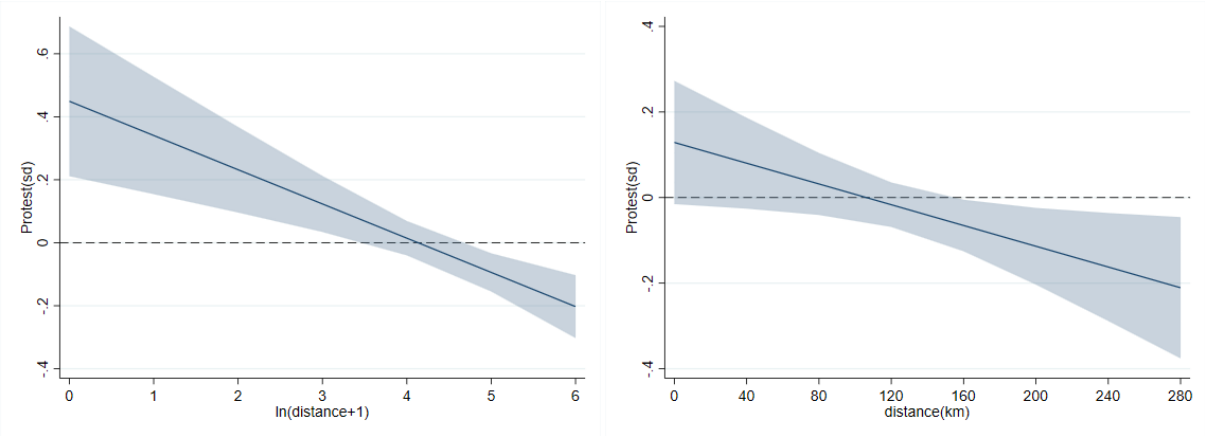
Further, the plight of migrant workers is intensified by the social stigma and exclusion they encounter in urban environments. Despite easier access to cities fostered by HSR, poor labor protection and inequitable wages remains as HSR could by no way change their *hukou* status, which leads to high levels of dissatisfaction. Their initial hope-filled migration is gradually overshadowed by the growing awareness of daunting urban-rural disparities. For instance, *Xiaoyu*, a male migrant worker from Sichuan province, despite changing jobs multiple times and moving from one city to another, found no substantial improvement in his life. This reflects limited upward mobility in Chinese society and the marginalized status of A-to-NA migrants (Rho, 2023). Therefore, while moving to central regions with hope, most of the migrants would soon recognize their poor status and face numerous unjust treatments. Such ongoing mistreatment, alongside the recognition of the systemic roots of their struggles, can ignite strong sense of relative deprivation, leading to conflicts and protests to voice their grievances.

Eventually, the uprisings of A-to-NA migrants may transcend the realm of economic affairs, becoming a resounding call for social acknowledgment and equal rights. Rho (2023) notes that "Social grievances take center stage over economic ones in turning the tide of labor discontent among the rank and file". The ferment of their discontent is not just a reaction to personal tribulations but a profound awakening to the systemic rural-urban disparity of the Chinese society, which propels them toward unified action for equal treatments. Their protests, while initially oriented to personal interests, may become a testament to the human spirit's unwavering quest for equality and respect, even in the shadow of inequality and injustice under authoritarian governance.

sic incident in 2018. See https://www.theguardian.com/world/2018/nov/12/ten-student-activists-detained-in-china-for-supporting-workers-rights for detail.

Appendix C More on Empirical Results

C.1 More on Baseline



(A) **The heterogeneous impact for different distance (logged) from provincial capital.**

(B) **The heterogeneous impact for different actual distance from provincial capital.**

FIGURE A8 The heterogeneous impact of HSR opening with variation in distances to the provincial capital.

Notes: This figure plots the heterogeneous impact of HSR opening on residents with varied distances to the provincial capital. In Panel A, we use the distance (logged) to capture heterogeneity. In Panel B, we replace it with actual distance (per kilometer) and re-estimate the result. The blue line represents the impact of HSR opening on the number of protests at different distances. The dependent variable is the standardized number of protests at the prefecture level (*Protestsd*). Both panels control for Province-year fixed effects, predetermined-year and prefecture fixed effects. The shaded blue area represents the 95% confidence interval.

TABLE A1 Baseline using different distance bins.

	(1)	(2)
HSR	0.523***	0.524***
	(0.141)	(0.141)
	[0.142]	[0.142]
HSR×*Segment2*	-0.552***	-0.568***
	(0.142)	(0.148)
	[0.144]	[0.147]
HSR×*Segment3*	-0.654***	-0.601***
	(0.141)	(0.139)
	[0.138]	[0.139]
HSR×*Segment4*	-0.567***	-0.550***
	(0.150)	(0.151)
	[0.145]	[0.141]
Predetermined-year Control	✓	✓
Prefecture FE	✓	✓
Province-year FE	✓	✓
Observations	1,896	1,896
R-squared	0.900	0.900

Notes: Table A1 reports baseline regression results for different distance bins. The dependent variables are the prefecture level standardized counts of protests. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. Column (1) reports the different distances between the prefecture center and its provincial capital, grouped by quartiles; Column (2) reports the impact of HSR on the number of regional protests for four groups, which are 0-20, 20-100, 100-200, and greater than 200 kilometers distances between the prefecture center and its provincial capital. Robust standard errors in parentheses are clustered at the prefecture levels. Standard errors in brackets are Conley standard errors robust for spatial correlation, assuming a cutoff window of 500 km and a serial correlation of 6 years. ***p< 0.01, **p <0.05, *p < 0.1.

TABLE A2 Baseline Results using Heterogeneous Robust DID estimator

(1) Group	(2) Estimate	(3) SE	(4) LB CI	(5) UB CI
Full sample	0.092	0.059	-0.024	0.208
Closest	0.620	0.225	0.179	1.062
Near	-0.049	0.050	-0.146	0.048
Mid	-0.102	0.083	-0.265	0.061
Far	-0.129	0.091	-0.307	0.050

Notes: Table A2 reports baseline regression results using Heterogeneous Robust DID estimator from De Chaisemartin and d'Haultfoeuille (2020). Robust standard errors are clustered at the prefecture levels. The dependent variable is the standardized number of protests at the prefecture-year level (*Protestsd*). The first row reports the impact coefficient of high-speed rail opening (*HSR*) on the standardized protest frequency for the full sample. The second to fourth rows report the sub-sample results, from closest to farthest from the provincial capital, for the impact coefficient of *HSR* on *Protestsd*. The stratification is based on the prefecture's distance from the provincial capital, divided equally into four quartiles. To follow the heterogeneity robust estimates of De Chaisemartin and d'Haultfoeuille (2020), we excluded prefectures that are always treated. Column (3) reports the standard errors of the estimations, while columns (4)-(5) report the lower and upper bounds of the 95% confidence interval, respectively.

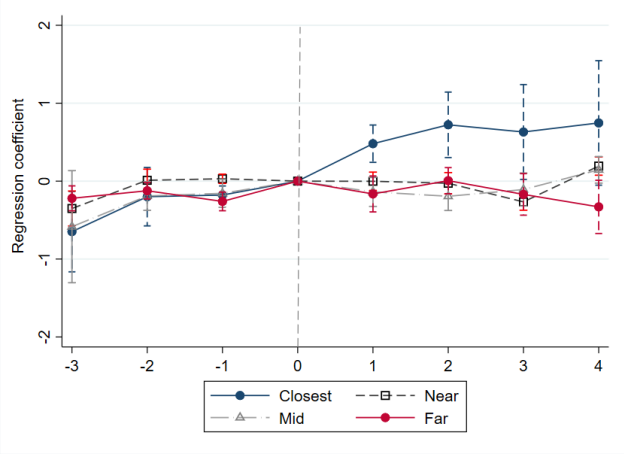
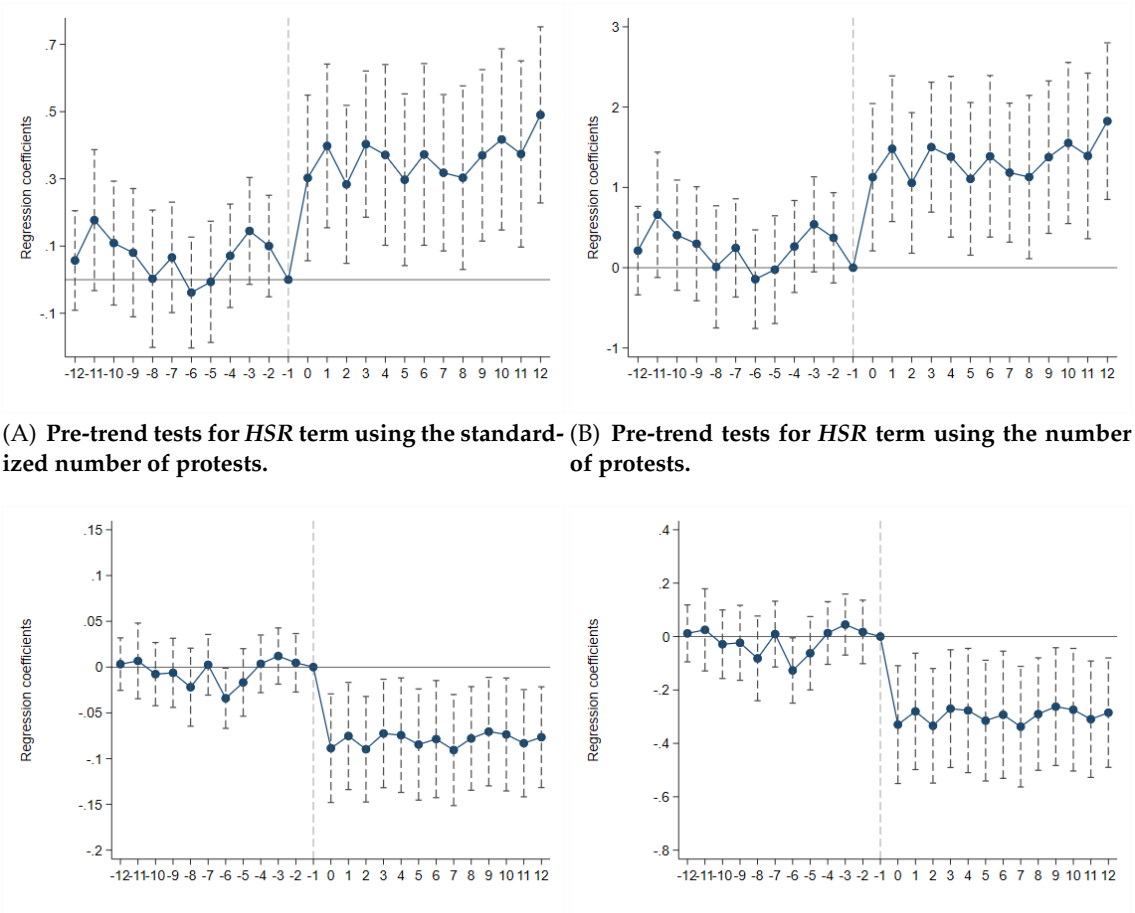


FIGURE A9
Event study in different groups with different distance to provincial capital.

Notes: This figure presents the changes in the frequency of protests (standardized) for different types of prefectures (divided into four groups based on their distance to the provincial capital, from closest to farthest) over various years since the opening of high-speed rail using De Chaisemartin and d'Haultfoeuille (2024)'s estimator. The dependent variables are the standardized number of protests at the prefecture-year level (*Protestsd*). The dotted line shows a 95% confidence interval.

C.2 Detailed Specification



(A) **Pre-trend tests for *HSR* term using the standardized number of protests.**

(B) **Pre-trend tests for *HSR* term using the number of protests.**

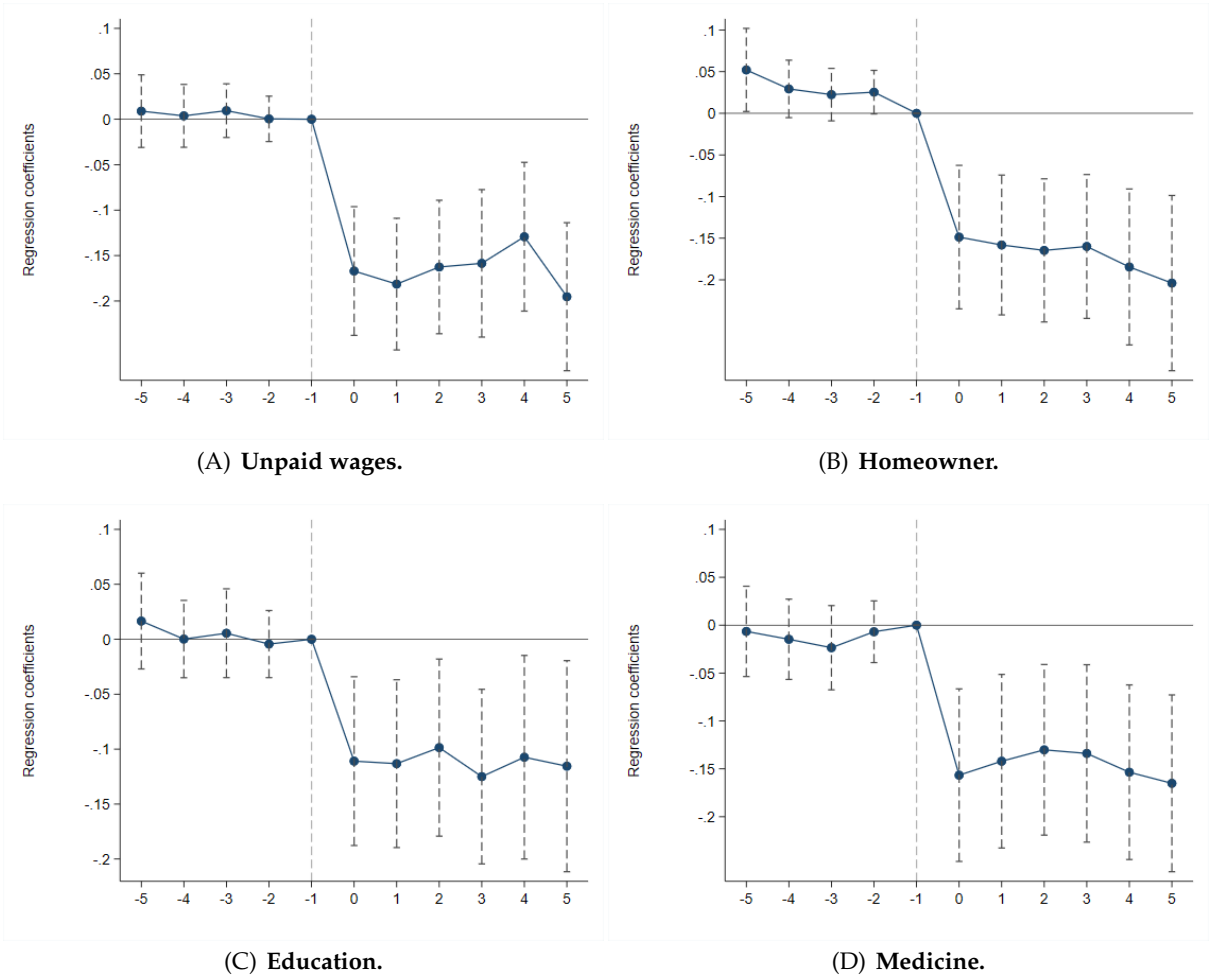
(C) **Pre-trend tests for interaction term using the standardized number of protests.**

(D) **Pre-trend tests for interaction term using the number of protests.**

FIGURE A10 Pre-trend tests using prefecture-month level data.

Notes: This figure plots pre-trend tests using prefecture-month level data. The dependent variable is the standardized number of protests at the prefecture-month level (*Protestsd(month)*) in Panel A and Panel C, while we use the actual number of protests (*Protest(month)*) in Panel B and Panel D. Panel A and Panel B test for single *HSR* term. Panel C and Panel D test for the interaction term *HSR*×*lndistance* in equation (2); Each point represents a month, with the leftmost and rightmost points representing all dates before the 12th month and after the 12th month, respectively. All panels control for Province-year-month, predetermined-year, and prefecture-month fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.

C.3 Further Classification

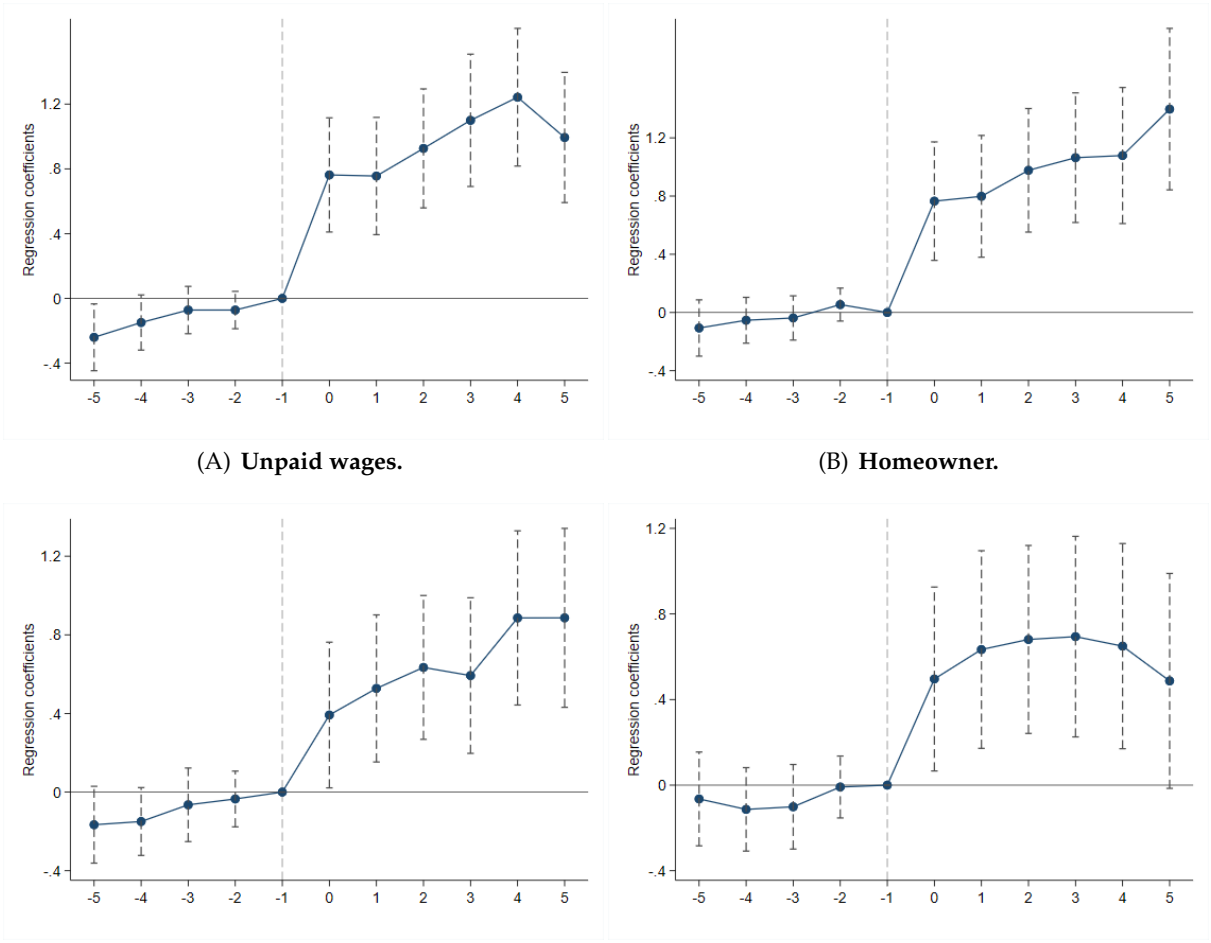


(A) **Unpaid wages.** (B) **Homeowner.**

(C) **Education.** (D) **Medicine.**

FIGURE A11 Pre-trend tests for different protest issues (Interaction term).

Notes: This figure plots pre-trend tests for interaction term *HSR*×*lndistance* in equation (2) using different kinds of protests based on motives. The dependent variables for Panels A-D are standardized prefecture-level protest counts associated with unpaid wages, homeowner, education, and medicine, respectively. All panels control for Province-year fixed effects, predetermined-year and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.



(A) **Unpaid wages.** (B) **Homeowner.**

(C) **Education.** (D) **Medicine.**

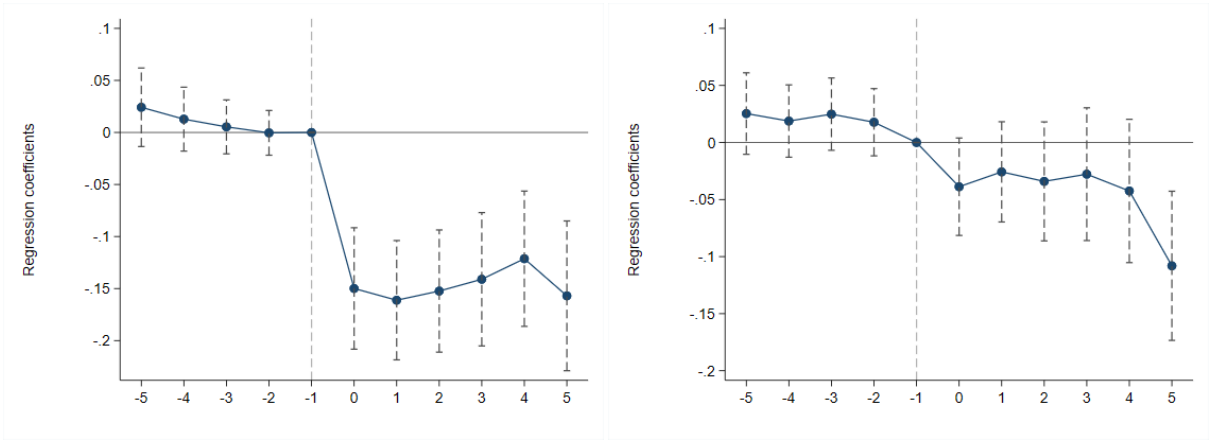
FIGURE A12 Pre-trend tests for different protest issues (*HSR* term).

Notes: This figure plots pre-trend tests for *HSR* in equation (2) using different kinds of protests based on contents. The dependent variables for Panels A-D are standardized prefecture-level protest counts associated with unpaid wages, homeowner, education, and medicine, respectively. All panels control for Province-year fixed effects, predetermined-year and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.

TABLE A3 Classification Based on Protest Intensity

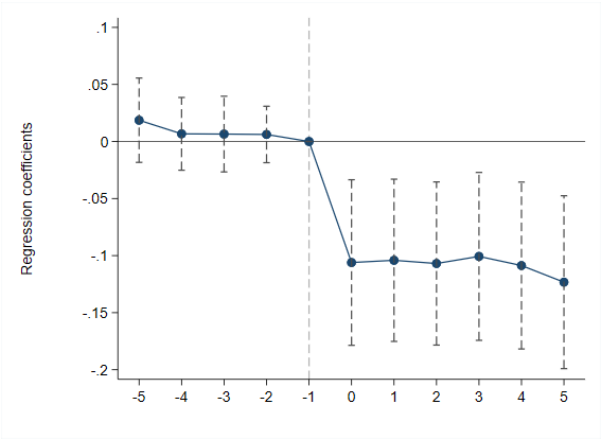
	(1) Baseline	(2) Convention	(3) Disruptive	(4) Violent
HSR	0.467***	0.649***	0.180	0.436**
	(0.134)	(0.146)	(0.113)	(0.185)
	[0.126]	[0.145]	[0.123]	[0.436]
HSR×*lndistance*	-0.109***	-0.146***	-0.042*	-0.106***
	(0.027)	(0.030)	(0.023)	(0.037)
	[0.025]	[0.031]	[0.024]	[0.035]
Predetermined-year Control	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓
Observations	1,896	1,896	1,896	1,896
R-squared	0.900	0.855	0.821	0.838

Notes: Table A3 reports baseline regression results for different classifications based on protest intensity. Column (1) reports the baseline results. The dependent variables in columns (2) to (4) are the prefecture level standardized counts of protests of different intensities, including conventional, disruptive, and violent protests. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital. Robust standard errors in parentheses are clustered at the prefecture levels. Standard errors in brackets are Conley standard errors robust for spatial correlation, assuming a cutoff window of 500 km and a serial correlation of 6 years. ***p< 0.01, **p <0.05, *p < 0.1.



(A) **Convention events.**

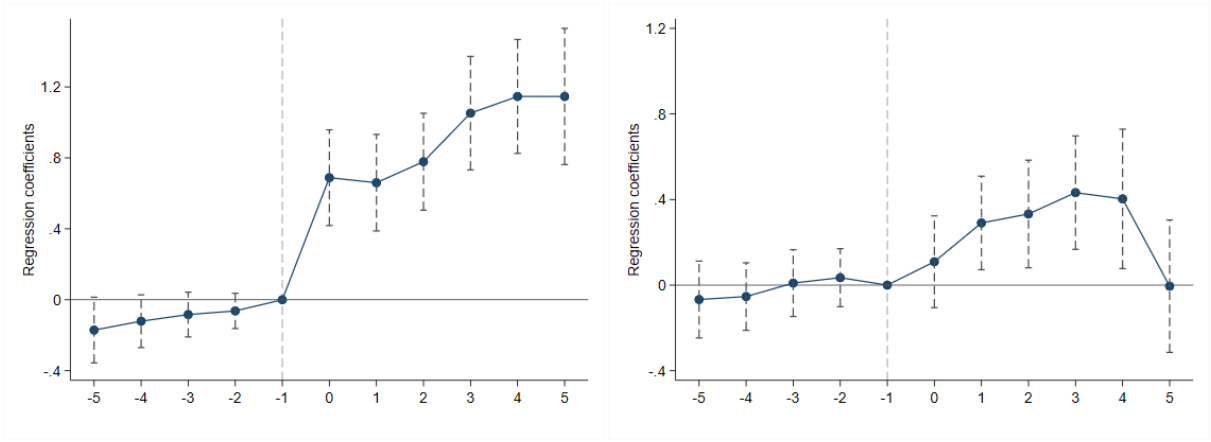
(B) **Disruptive events.**



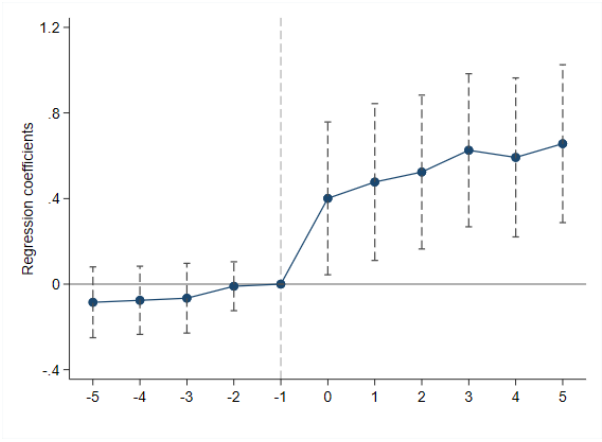
(C) **Violent events.**

FIGURE A13 Pre-trend tests for different protest intensity (Interaction term)

Notes: This figure plots pre-trend tests for interaction term $HSR \times lndistance$ in equation (2) using different classifications based on intensity. The dependent variables for Panels A-C are standardized prefecture-level protest counts of different intensities, namely conventional, disruptive, and violent protests. All panels control for Province-year fixed effects, predetermined-year and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.



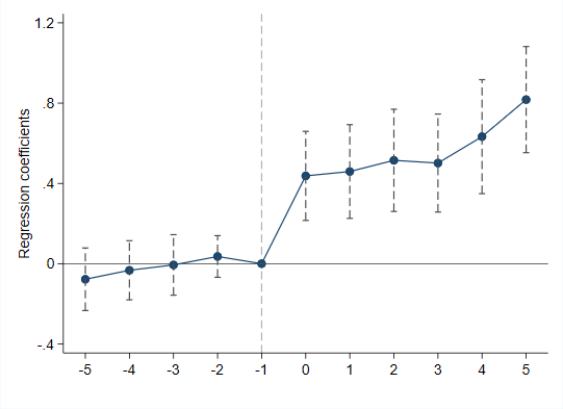
(A) **Convention events.** (B) **Disruptive events.**



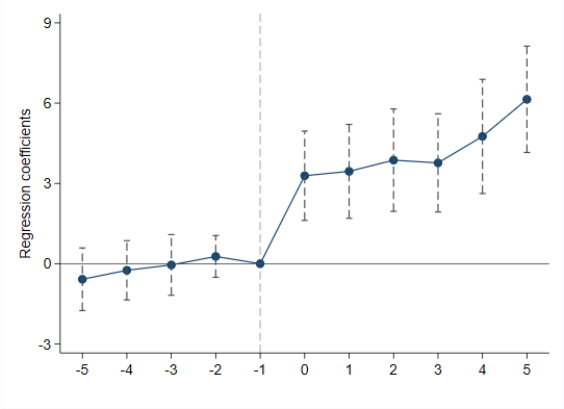
(C) **Violent events.**

FIGURE A14 Pre-trend tests for different protest issues (HSR term)

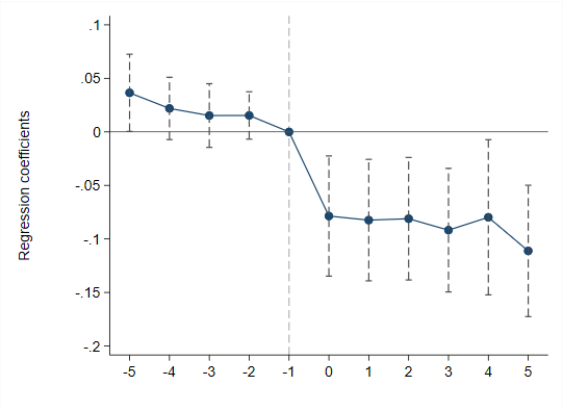
Notes: This figure plots pre-trend tests for single term *HSR* in equation (2) using different classifications based on intensity. The dependent variables for Panels A-C are standardized prefecture-level protest counts of different intensities, namely conventional, disruptive, and violent protests. All panels control for Province-year fixed effects, predetermined-year and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.



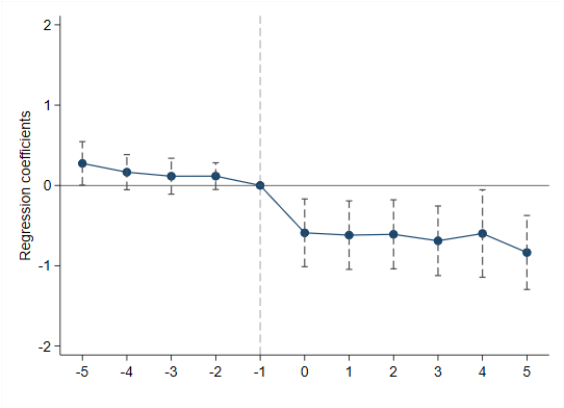
(A) **Pre-trend tests for *HSR* term using the standardized number of protests.**



(B) **Pre-trend tests for *HSR* term using the number of protests.**



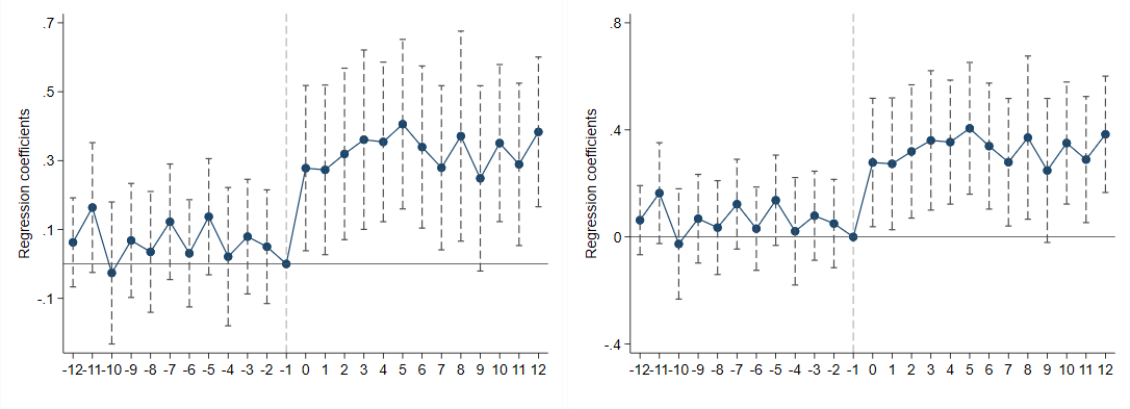
(C) **Pre-trend tests for interaction term using the standardized number of protests.**



(D) **Pre-trend tests for interaction term using the number of protests.**

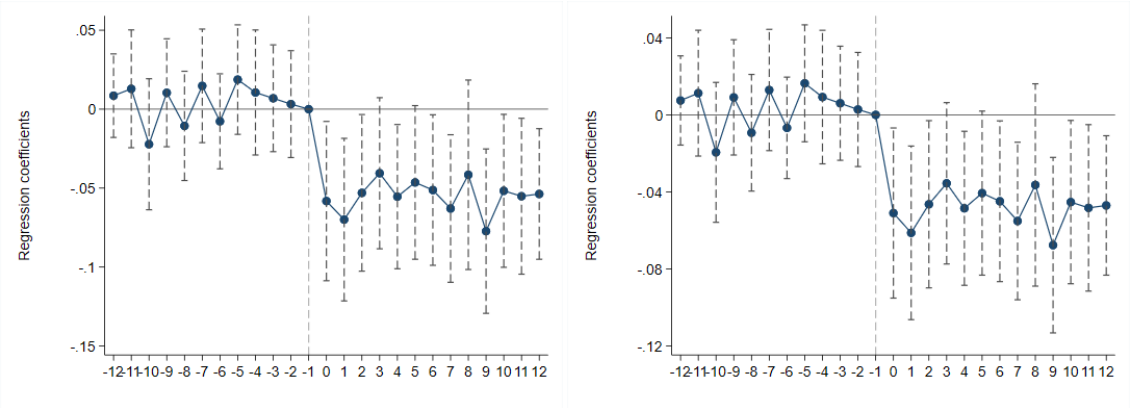
FIGURE A15 Pre-trend tests using CLB dataset.

Notes: This figure plots pre-trend tests using prefecture-year level CLB dataset. The dependent variable is the standardized number of strikes at the prefecture level in Panel A and Panel C, while we use the actual number of protests (*Protest*) in Panel B and Panel D. Panel A and Panel B test for single *HSR* term. Panel C and Panel D test for the interaction term $HSR \times lndistance$ in equation (2); All panels control for Province-year, predetermined-year, and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.



(A) **Pre-trend tests for *HSR* term using the standardized number of protests.**

(B) **Pre-trend tests for *HSR* term using the number of protests.**



(C) **Pre-trend tests for interaction term using the standardized number of protests.**

(D) **Pre-trend tests for interaction term using the number of protests.**

FIGURE A16 Pre-trend tests using prefecture-month level data in CLB dataset.

Notes: This figure plots pre-trend tests using prefecture-month level data in CLB dataset. The dependent variable is the standardized number of protests at the prefecture-month level (*Protestsd(month)*) in Panel A and Panel C, while we use the actual number of protests (*Protest(month)*) in Panel B and Panel D. Panel A and Panel B test for single *HSR* term. Panel C and Panel D test for the interaction term *HSR*×*lndistance* in equation (2); Each point represents a month, with the leftmost and rightmost points representing all dates before the 12th month and after the 12th month, respectively. All panels control for Province-year-month, predetermined-year, and prefecture-month fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.

C.4 Placebo Tests

TABLE A4 Placebo Tests (1)

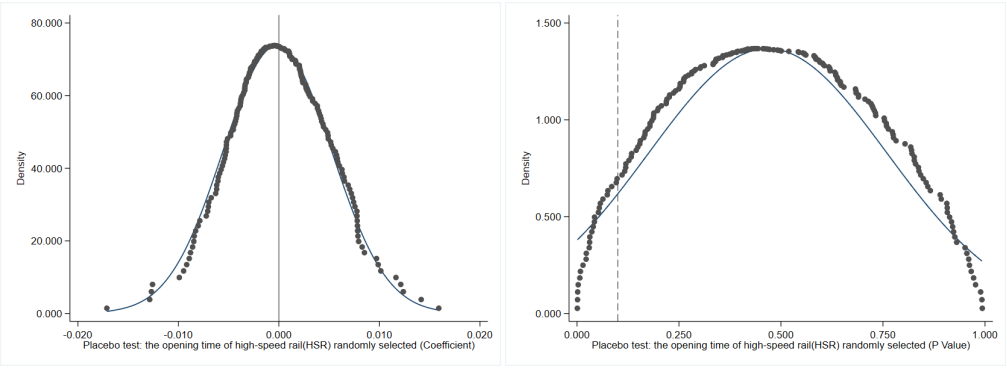
	(1)	(2)	(3)	(4)	(5)	(6)
HSR	-0.382	-0.275	0.440	0.609	0.068	0.051
	(0.588)	(0.546)	(0.429)	(0.433)	(0.078)	(0.171)
HSR×lndistance(Beijing)	0.052					
	(0.083)					
HSR×lndistance(Shanghai)		0.037				
		(0.078)				
HSR×lndistance(Guangzhou)			-0.067			
			(0.061)			
HSR×lndistance(min BSG)				-0.099		
				(0.066)		
HSR×lndistance(min capital)					-0.001*	
					(0.000)	
HSR×lndistance(min largest city)						-0.015
						(0.032)
Predetermined-year Control	✓	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓
Observations	1,910	1,910	1,910	1,910	1,910	1,910
R-squared	0.897	0.897	0.897	0.897	0.897	0.897

Notes: Table A4 reports results for placebo tests. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance(Beijing)*, *lndistance(Shanghai)*, *lndistance(Guangzhou)* represent the distance (logged) between the prefecture center and Beijing, Shanghai, Guangzhou, respectively. *lndistance(min BSG)* represents the logarithm of the shortest distance between the prefecture center and three megacities. *lndistance(min capital)* represents the logarithm of the shortest distance between the prefecture center and all provincial capitals in China, while *lndistance(min largest city)* represents the logarithm of the shortest distance between the prefecture center and the largest non-capital city within a province.

TABLE A5 Placebo Tests (2)

	(1)	(2)	(3)	(4)
HSR	0.811	-0.482	-0.096	-0.138
	(0.921)	(0.587)	(0.085)	(0.110)
HSR×lndistance(Qing)	-0.069			
	(0.076)			
HSR×lndistance(Large Cities)		0.040		
		(0.051)		
HSR×lndistance(Silk)			0.007	
			(0.007)	
HSR×lndistance(Tea)				0.010
				(0.008)
Predetermined-year Control	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓
Observations	1,616	1,616	1,616	1,616
R-squared	0.901	0.901	0.901	0.901

Notes: Table A5 reports results for placebo tests. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance(Qing)*, *lndistance(Large Cities)*, *lndistance(Silk)*, *lndistance(Tea)* represent the logarithmic distance of the prefecture to the provincial capital during the Qing Dynasty, the nearest major metropolitan area in 1920, the nearest silk trade center, and the nearest tea trade center, respectively.



(A) **Placebo test for coefficients.** (B) **Placebo test for p-values.**

FIGURE A17 Placebo test.

Notes: This figure reports the coefficient distribution of "pseudo change effect" of the opening time of HSR (HSR) estimated by equation (2) after randomly setting the opening year. The dependent variable is the standardized number of protests (*Protestsd*). This process was repeated 200 times so as to improve the confidence of the placebo test. Panel A reports the distribution of coefficients from the randomization permutation test for the interaction terms (*HSR×lndistance*). Panel B reports the corresponding p-values. Both panels control for Province-year fixed effects, predetermined-year and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels.

Appendix D More on Robustness Checks

D.1 More Controls

In this section, we examine whether our baseline results are threatened by several potential confounding factors.

Firstly, we exclude the potential influence of officials' personal characteristics. The officials who take office in their hometown ("locals") might be more adept with local governance, thus inducing fewer protests. Meanwhile, locals may spend more budget on welfare rather than infrastructure (Persson and Zhuravskaya, 2016). Our results may be driven once the above two arguments hold simultaneously. We examine such effect in Table A6. In columns (1)-(3), we add control variables indicating whether the party secretary or governor of the prefecture or province is local, showing that they pose little threat to our baseline results. In columns (4)-(5), we interact them with HSR opening and distance. The coefficients are small and ambiguous, showing possibly little effect on our results. Further, we analyze the possible effect of other official features, including birthplace, age, gender, ethnicity, and education level, which are believed to affect the likelihood of official promotion (Li and Zhou, 2005). We control them respectively in Table A7. The results are similar to our baseline, showing that they can hardly drive our main results. We also control the influence of officials' bargaining power by controlling for those party secretaries being in the upper-level CPC Standing Committee (mentioned by Ma (2022)), with similar results.

Secondly, we account for the potential impact of local fiscal factors. Due to HSR construction, local governments may receive additional funding from the central government. One concern is that the change in fiscal conditions from HSR construction could affect regional infrastructure and welfare expenditures, thereby influencing protests. In Table A8, we consider the effect of local fiscal deficits and fiscal structures, finding that they pose little threat to our conclusion.

Thirdly, we exclude the influence of alternative transportation modes, such as highways and air travel, which may also have emerged in the prefectures during the same time period (thus affecting the protest geography in the same pattern). We test their influence in Table A9. Specifically, from column (2) to column (5), we control for the opening of airport, annual airline passenger traffic, annual highway passenger traffic, and all above, respectively. The results suggest that the effect of HSR opening persists despite controlling for other transportation modes.

Fourthly, we address concerns that our measurement of protests may be associated with the development of regional Internet access, which expands simultaneously with HSR. To alleviate the bias caused by the lower Internet penetration in some areas, we control for the Internet penetration rate and China's "Broadband China" strategy to promote Internet access in Table A10. The results indicate that our baseline regression results are not influenced by such factors. We also test the influence of HSR opening on Internet infrastructure later in Table A23, and find weak relation.

What's more, we address concerns on the influence of local culture and organizations. Traditional cultural norms, like Confucian culture or clan culture, may influence residents' protest willingness by shaping their values for long (Kung and Ma, 2014). As noted by abundant research (McCarthy and Zald, 1977; McAdam, 1999), organizations may either foster or palliate protests. Meanwhile, they may influence residents' reluctance to HSR opening. In Table A11, we control for Confucian culture, the number of official organizations, clan density interacted with year dummies. The results are similar to the baseline. We also consider the possible influence of political connections. With more regional members in the Central Committee, the region may possess stronger political importance. The result in column (5) shows minor difference. We control all above in column (6), finding that these factors do not affect our conclusion.

Lastly, we exclude the influence of natural geographical factors. On the one hand, they are important factors influencing the decision-making and the construction process of HSR. On the other hand, previous studies have highlighted that adverse natural conditions may exacerbate protests (Unfried et al., 2022; Li and Meng, 2023). We control for terrain, average slope and average elevation interacted with year dummies, precipitation, PM2.5, and all above in Table A12. We find that our conclusion remains highly robust even considering these factors.

TABLE A6 Controlling for locals.

	(1)	(2)	(3)	(4)	(5)
HSR	0.467***	0.433***	0.431***	0.437***	0.473***
	(0.134)	(0.136)	(0.134)	(0.138)	(0.132)
HSR×*lndistance*	-0.109***	-0.106***	-0.107***	-0.107***	-0.111***
	(0.027)	(0.027)	(0.027)	(0.028)	(0.027)
HSR×*lndistance*×				0.041	
Province Local				(0.068)	
HSR×*lndistance*×					0.158
Prefecture Local					(0.097)
Province Local Controls		✓	✓	✓	
Prefecture Local Controls			✓		✓
Predetermined-year Control	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓
Observations	1,896	1,866	1,814	1,866	1,840
R-squared	0.900	0.905	0.905	0.905	0.901

Notes: Table A6 reports results controlling for the influence of locals. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Column (1) reports the baseline results. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. *Province Local* is a dummy variable indicating whether the birthplace of the provincial party secretary or governor (*Shengwei Shuji/ Shengzhang*) in the current year belongs to this prefecture-level city, while *Prefecture Local* indicates whether the birthplace of the municipal party secretary or mayor (*Shigwei Shuji/ Shizhang*) in the current year belongs to this prefecture-level city.

TABLE A7 Controlling for official characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Controlling for characteristics of the municipal party secretary				Controlling for characteristics of the mayor		
		Provincial CPC Standing Committee	Birthplace	Age	Other	Birthplace	Age	Other
HSR	0.467***	0.468***	0.442***	0.475***	0.509***	0.418***	0.323**	0.308*
	(0.134)	(0.136)	(0.123)	(0.131)	(0.137)	(0.139)	(0.162)	(0.183)
HSR×*lndistance*	-0.109***	-0.109***	-0.095***	-0.103***	-0.111***	-0.102***	-0.078**	-0.073*
	(0.027)	(0.028)	(0.029)	(0.030)	(0.031)	(0.029)	(0.034)	(0.038)
Predetermined-year Control	✓	✓	✓	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	1,896	1,628	1,552	1,472	1,733	1,584	1,512	
R-squared	0.900	0.927	0.932	0.933	0.923	0.934	0.937	

Notes: Table A7 reports results controlling for official characteristics. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Column (1) reports the baseline results. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. Columns (2) to (5) gradually control for the individual characteristics of the municipal party secretary (*Shigwei Shuji*) . Column (2) controls whether municipal party secretary also serves as a member of the provincial CPC standing committee. Column (3) introduces fixed effects for the birthplace of the municipal party secretary, while column (4) further controls for age and its square term, and column (5) additionally controls for municipal party secretary's gender, ethnicity, and education level. columns (6) to (8) gradually control for the individual characteristics of the mayor (*Shizhang*) . Column (6) introduces fixed effects for the birthplace of the mayor, while column (7) further controls for age and its square term, and column (8) additionally controls for mayor's gender, ethnicity, and education level.

TABLE A8 Controlling for fiscal conditions.

	(1)	(2)	(3)	(4)	(5)
		Controlling for			
	Baseline	Deficit ratio	Lagged deficit ratio	Fiscal structure	All
HSR	0.467***	0.470***	0.469***	0.469***	0.467***
	(0.134)	(0.133)	(0.133)	(0.132)	(0.133)
HSR×*lndistance*	-0.109***	-0.109***	-0.109***	-0.109***	-0.109***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Predetermined-year Control	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓
Observations	1,896	1,895	1,894	1,895	1,894
R-squared	0.900	0.900	0.900	0.900	0.900

Notes: Table A8 reports results controlling for fiscal conditions. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Column (1) reports the baseline results. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. Columns (2) to (4) respectively control for the current fiscal deficit ratio, the lagged one-year fiscal deficit ratio, and the proportion of fiscal revenue and expenditure. Column (5) controls for all the variables mentioned above.

TABLE A9 Controlling for alternative transportation modes.

	(1)	(2)	(3)	(4)	(5)
		Controlling for			
	Baseline	Airport station	Passenger Traffic (air)	Passenger Traffic (bus)	All
HSR	0.467***	0.443***	0.347**	0.475***	0.352**
	(0.134)	(0.133)	(0.143)	(0.133)	(0.144)
HSR×*lndistance*	-0.109***	-0.104***	-0.088***	-0.110***	-0.085***
	(0.027)	(0.027)	(0.029)	(0.027)	(0.029)
Predetermined-year Control	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓
Observations	1,896	1,896	862	1,892	861
R-squared	0.900	0.901	0.931	0.900	0.932

Notes: Table A9 reports results controlling for alternative transportation modes. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Column (1) reports the baseline results. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. In column (2), we incorporate a dummy variable indicating airport opening, along with its interaction with the distance from the prefecture to the provincial capital. Columns (3) and (4) respectively introduce local civil aviation passenger traffic or highway passenger traffic for each prefecture annually, along with their interactions with distance. Column (5) controls for all the variables mentioned above.

TABLE A10 Controlling for Internet.

	(1)	(2)	(3)	(4)
		Controlling for		
	Baseline	Internet penetration rate	Broadband policy	All
HSR	0.467***	0.439***	0.460***	0.430***
	(0.134)	(0.143)	(0.133)	(0.143)
HSR×*lndistance*	-0.109***	-0.103***	-0.108***	-0.102***
	(0.027)	(0.029)	(0.027)	(0.029)
Predetermined-year Control	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓
Observations	1,896	1,882	1,896	1,882
R-squared	0.900	0.902	0.900	0.902

Notes: Table A10 reports results controlling for Internet. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Column (1) reports the baseline results. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. Columns (2) to (3) respectively control for the Internet penetration rate and Chinese Broadband policy. Column (4) controls for both of the variables mentioned above.

TABLE A11 Controlling for local culture and organizations.

	(1)	(2)	(3)	(4)	(5)	(6)
		Controlling for				
	Baseline	Confucian culture	Organizations	Clan culture	Central committees	All
HSR	0.467***	0.623***	0.620***	0.642***	0.640***	0.629***
	(0.134)	(0.090)	(0.097)	(0.086)	(0.088)	(0.097)
HSR×*lndistance*	-0.109***	-0.141***	-0.142***	-0.146***	-0.145***	-0.143***
	(0.027)	(0.018)	(0.019)	(0.018)	(0.018)	(0.019)
Predetermined-year Control	✓	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓
Observations	1,896	1,616	1,616	1,616	1,616	1,616
R-squared	0.900	0.904	0.907	0.904	0.903	0.910

Notes: Table A11 reports results controlling for local culture and organizations. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Column (1) reports the baseline results. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. Columns (2) to (5) respectively control for the interaction terms between year dummy variables and the logarithm of the number of academies, the logarithm of the number of social organizations in 2008, the logarithm of the proportion of genealogy quantity to the total population, and the number of members in central committees (1978-2017). Column (6) controls for all the variables mentioned above.

TABLE A12 Controlling for natural geographical conditions.

	(1)	(2)	(3)	(4)	(5)	(6)
		Controlling for				
	Baseline	Average slope	Average elevation	Precipitation	PM2.5	All
HSR	0.467***	0.468***	0.471***	0.640***	0.639***	0.477***
	(0.134)	(0.136)	(0.137)	(0.086)	(0.088)	(0.139)
HSR×*lndistance*	-0.109***	-0.106***	-0.108***	-0.144***	-0.145***	-0.107***
	(0.027)	(0.028)	(0.028)	(0.018)	(0.018)	(0.028)
Predetermined-year Control	✓	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓
Observations	1,896	1,896	1,896	1,616	1,616	1,896
R-squared	0.900	0.902	0.902	0.904	0.903	0.903

Notes: Table A12 reports results controlling for natural geographical conditions. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Column (1) reports the baseline results. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise.Columns (2)-(3) respectively control for the interaction terms of year dummy variables with average slope and average elevation. Columns (4)-(5) respectively control for precipitation and annual average PM2.5 concentration. Column (6) controls for all the variables mentioned above.

D.2 Sub-sample Tests

A key assumption in our analysis is the overlapping of economic and political center of one province. Admittedly most of them exhibit this pattern, there remain some exceptions: some have economic centers other than the capital; some have a strong competitor with the capital; some are close to other economic centers that may possess stronger appeal; etc. We test them in detail in Table A13 to verify that the assumption does not restrict the validity of our conclusion.

A few provinces (7/29) have an economic center which is not the provincial capital, denoted by "decentralized". Intuitively, residents in such provinces may prefer to migrate to the economic center city, and HSR construction may even originates from that city instead of the provincial capital. This implies a distinct pattern of HSR's effect on protests, which should be carefully dealt with. We exclude samples from decentralized provinces in column (2), and exclude samples from the economic centers of these provinces in column (3). The results show little difference from the baseline in column (1).

Some cities are "separately planned cities" in China, including Qingdao, Dalian, Xiamen, Ningbo, and Shenzhen. They possess higher political levels (vice-provincial level), acting as a direct competitor to the provincial capital in attracting migrants and other economic resources. We exclude them in column (4), obtaining similar results. Many provinces have a sub-center city[4]. Albeit with lower centripetal force compared with the center, they may act as "small regional centers" that attract residents from adjacent prefectures. We exclude the 21 sub-centers in column (5) and find similar results.

Though inter-province migration costs more, many people still migrate to the "national/transregional economic centers" due to their strong centripetal force. Beijing and Shanghai, the economic and political center of China, have the strongest appeal to Chinese people. The four municipalities (provincial-level cities) also perform similar role. Major transregional centers[5], though not as attractive in the national scale, dominate other cities in the large region. For instance, Wuhan (shown in our case study) is the transregional center in central China (including three provinces), dominates other cities within the large region. We exclude samples from regions adjacent to Beijing/Shanghai, municipalities,and major transregional centers in column (6)-(8), respectively. The results are fairly robust.

As we have shown in Figure A1, there are five ethnic autonomous regions in China. They are generically similar to provinces in many fields, but differ mainly in governance. In other words, HSR construction may serve mainly as an extension of state power instead of fostering economic

4. There are 21 sub-centers in total, stipulated by the provincial governments. See https://www.ndrc.gov.cn/wsdwhfz/202311/t20231115_1361958.html for detail.

5. These include Shenyang (Northeast), Nanjing (East), Wuhan (Central), Shenzhen (South), Chengdu (Southwest) and Xi'an (Northwest), stipulated by the central government. See http://www.ciudsrc.com/webdiceng.php?id=156634 for detail.

development. We exclude samples from the ethnic autonomous regions in column (9). In general, the result holds robust.

D.3 Alternative Model Specifications

In this section, we examine whether model specification would pose a threat our conclusions.

Firstly, as our protest information mainly comes from Weibo, one may be concerned that the data may be biased (particularly in the early period) due to the limited number of users. To address this concern, Figure A18 reports the baseline results and parallel trend test with different time windows. The results show that our conclusions are not affected by the choice of time window.

Secondly, we examine whether different clustering choices for standard errors would change our conclusion. We employ two-way clustering method to cluster standard errors at the prefecture-year, province, and province-year levels in Figure A19 and find similar results, for both the baseline and the parallel trend results.

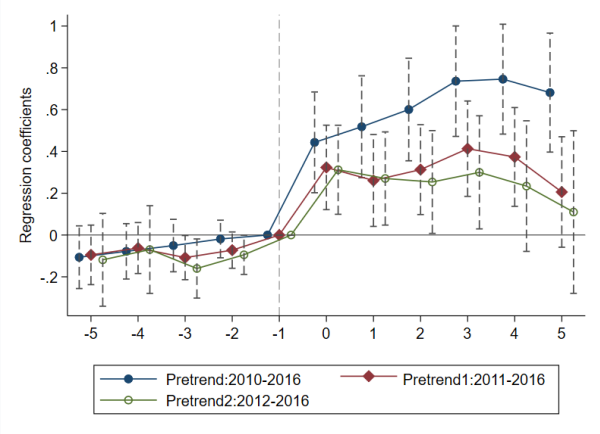
Thirdly, we examine whether different methods in the construction of dependent variables may affect our conclusion. In columns (2)-(5) of Table A14, we use the number of protests per year in each prefecture, the number of protests per million population, and the logarithm of the number of protests (plus one) as new dependent variables, respectively. This helps to rule out mechanical increase of protests due to rising population. We use a Poisson panel regression model in column (6). Furthermore, Table A15 presents results using alternative distance definitions. We find that all the results remain robust.

Last but not least, we exclude the potential expectation effect by re-centering correction in Table A16. Details are illustrated in the main text.

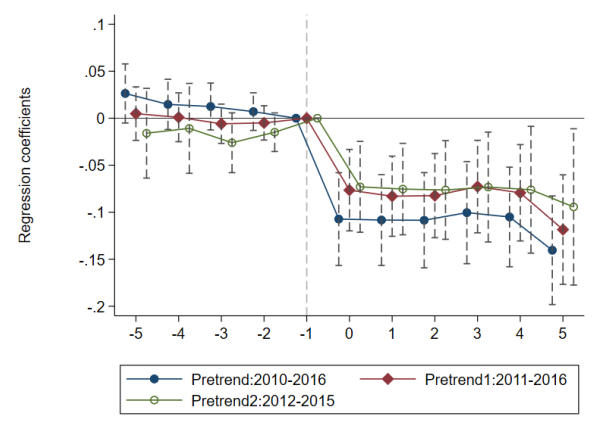
TABLE A13 Sub-sample tests.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HSR	0.467***	0.460***	0.456***	0.457***	0.384**	0.468***	0.431***	0.463***	0.412**
	(0.134)	(0.129)	(0.138)	(0.133)	(0.158)	(0.137)	(0.152)	(0.147)	(0.171)
HSR×*lndistance*	-0.109***	-0.108***	-0.109***	-0.111***	-0.095***	-0.111***	-0.104***	-0.112***	-0.097***
	(0.027)	(0.026)	(0.028)	(0.027)	(0.032)	(0.028)	(0.031)	(0.030)	(0.035)
Predetermined-year Control	✓	✓	✓	✓	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	1,896	1,260	1,847	1,861	1,679	1,833	1,763	1,596	1,693
R-squared	0.900	0.902	0.898	0.896	0.903	0.898	0.900	0.909	0.907

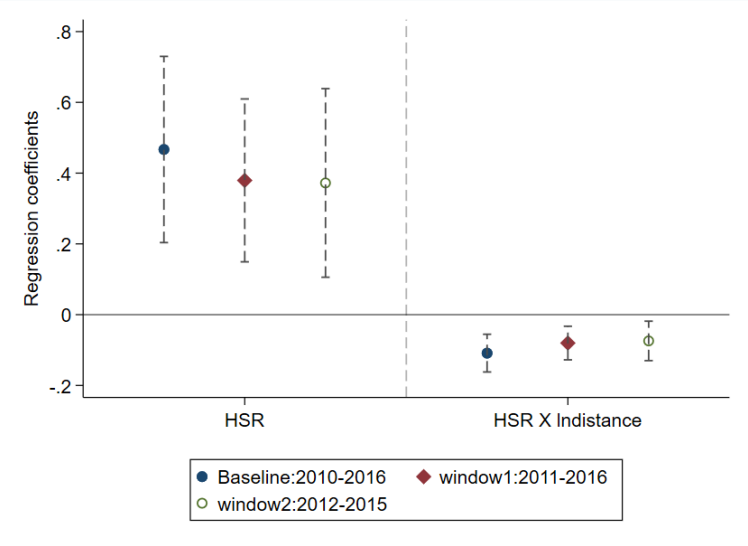
Notes: Table A13 reports results testing for subsample. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Column (1) reports the baseline results. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. Columns (2) to (9) respectively exclude the samples of provinces where the capital is not the economic center of the province, cities that are the best economically in their provinces but are not provincial capitals, separately planned cities, provincial sub-center cities, cities directly adjacent to Beijing and Shanghai, cities adjacent to the municipalities, cities adjacent to major regional centers, and ethnic autonomous regions.



(A) **Pre-trend tests for HSR term using alternative time windows.**



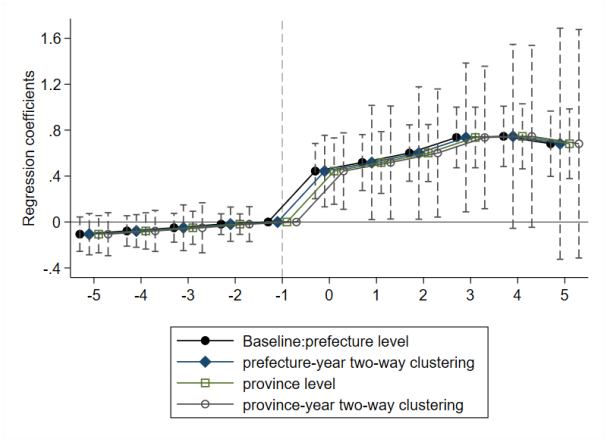
(B) **Pre-trend tests for interaction term using alternative time windows.**



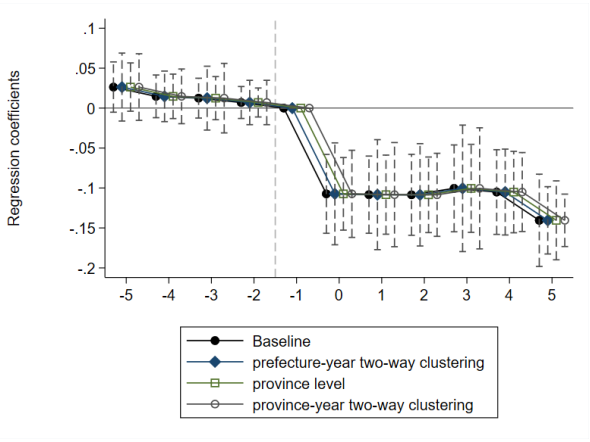
(C) **Baseline Results using alternative time windows.**

FIGURE A18
Testing for Alternative Time Windows.

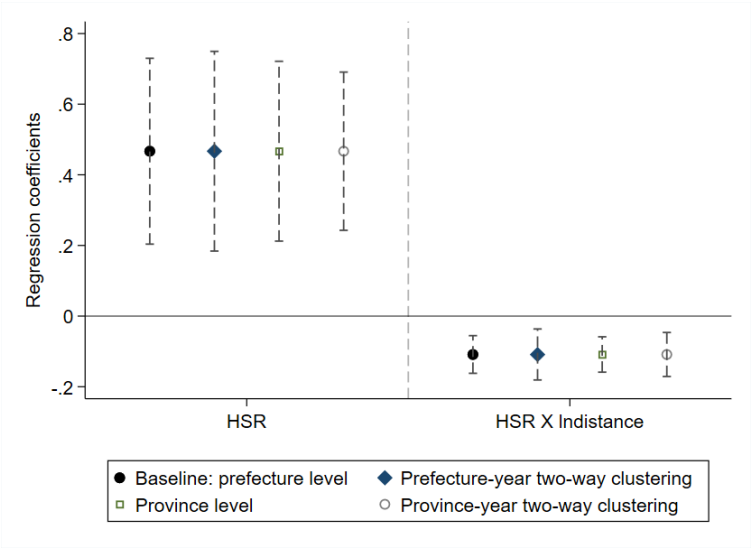
Notes: These figures plot baseline results and pre-trend tests using alternative time windows. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). In Panel A-B, we plot pre-trend tests for the standardized number of protests using alternative time windows (2010-2016; 2011-2016; 2012-2015). In Panel C, we plot baseline results using alternative time windows (2010-2016; 2011-2016; 2012-2015). Both panels control for Province-year fixed effects ,predetermined-year and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.



(A) **Pre-trend tests for HSR term using alternative clustering choices.**



(B) **Pre-trend tests for interation term using alternative clustering choices.**



(C) **Baseline Results using alternative clustering choices**

FIGURE A19
Testing for Alternative Clustering Choices.

Notes: These figures plot baseline results and pre-trend tests using alternative clustering choices. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). In Panel A-B, we plot pre-trend tests for the standardized number of protests alternative clustering choices. In Panel C, we plot baseline results using alternative clustering choices. Both panels control for Province-year fixed effects ,predetermined-year and prefecture fixed effects. The dotted line shows a 95% confidence interval.

TABLE A14 Robustness tests for alternative model specifications.

	OLS					Possion
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Protestsd*	*Protest*	*Protest per million people 1*	*Protest per million people 2*	ln*Protest*	*Protest*
HSR	0.467***	17.781***	4.364***	3.093***	0.267**	0.122*
	(0.134)	(5.089)	(1.124)	(1.019)	(0.103)	(0.068)
HSR×*lndistance*	-0.109***	-4.139***	-0.914***	-0.667***	-0.054**	-0.037***
	(0.027)	(1.031)	(0.227)	(0.209)	(0.022)	(0.014)
Predetermined-year Control	✓	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓
Observations	1,896	1,896	1,896	1,896	1,896	1,887
R-squared	0.900	0.900	0.846	0.835	0.938	0.850

Notes: Table A14 reports results testing for alternative model specifications. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Columns (1)-(4) employ the OLS fixed effects model, while column (5) utilizes the panel Poisson model. Column (1) represents the standardized number of protests (*Protestsd*), columns (2) and (5) denote the number of protests (*Protest*). Columns (3) and (4) divide the variables by the total population (in millions) (*Protest per million people*). Column (3) uses population data from the *Cities Statistical Yearbook*, while column (4) uses city population data from *Global Gridded Population Dataset* (Liu et al., 2024). Column (5) applies a logarithmic transformation to the dependent variable with an added constant of 1 (*lnProtest*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital.

TABLE A15 Robustness tests for alternative distance measurements.

	(1)	(2)	(3)	(4)
HSR	0.467***	0.178***	0.465***	0.131
	(0.134)	(0.068)	(0.133)	(0.088)
HSR×lndistance	-0.109***			
	(0.027)			
HSR×ln(0.001+distance)		-0.049***		
		(0.012)		
HSR×lndistance2			-0.109***	
			(0.027)	
HSR×Distance				-0.001**
				(0.001)
Predetermined-year Control	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓
Observations	1,896	1,896	1,896	1,896
R-squared	0.900	0.900	0.900	0.899

Notes: Table A15 reports results testing for alternative distance measurements. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Dependent variables is the standardized number of protests (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The baseline results are presented in column (1), where variable *lndistance* is the logarithm of the distance from the prefecture to the provincial center plus one (units: kilometers). In column (2), variable *ln(0.001+distance)* is the logarithm of the distance from the prefecture to the provincial center, plus 0.001. Column (3) introduces variable *lndistance2*, which represents the logarithm of the distance from the prefecture to the provincial center, after defining the distance from the provincial capital city itself as 1. Finally, in column (4), variable *Distance* represents the distance from the prefecture to the provincial center (units: kilometers).

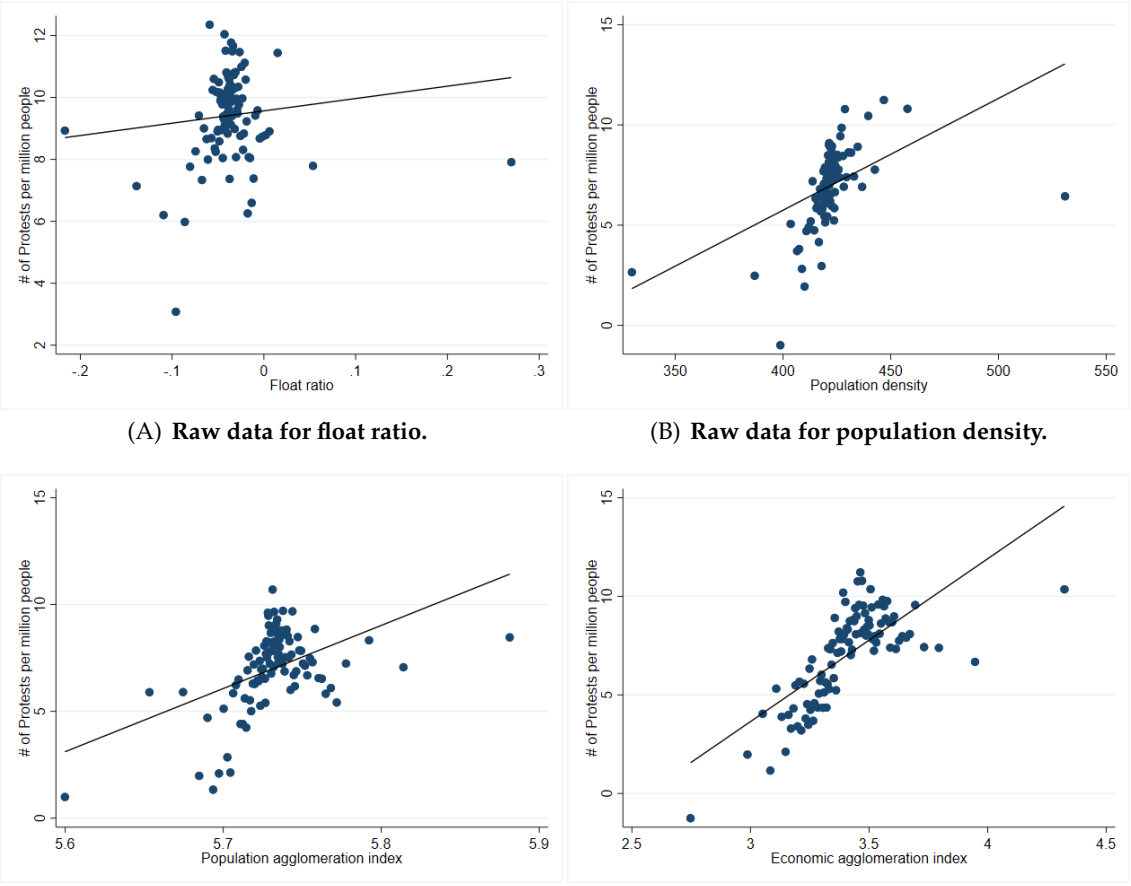
TABLE A16 Robustness tests for recenter correction.

	Baseline	Controlled OLS		Recentered IV
	(1)	(2)	(3)	(4)
HSR	0.467***	0.496***	0.666***	0.885***
	(0.134)	(0.136)	(0.150)	(0.226)
HSR×*lndistance*	-0.109***	-0.109***	-0.144***	-0.192***
	(0.027)	(0.028)	(0.032)	(0.049)
Expected HSR		-0.197*	-1.478**	
		(0.106)	(0.637)	
Expected HSR×*lndistance*			0.294**	
			(0.133)	
Predetermined-year Control	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓
Observations	1,896	1,896	1,896	1,896

Notes: Table A16 reports results testing for recenter correction following Borusyak and Hull (2023). ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Dependent variables is the standardized number of protests (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital. Column (1) reports the baseline results. In column (2), we introduce the expected probability of HSR opening at the prefecture level over the years. This probability is defined as follows: if there are no HSR stations opening in the city for the year before and after one year, the probability is set to 0. If there is an HSR station opening in the prefecture within the three-year span, the probability is calculated as the number of HSR stations opened for the year divided by the total number of HSR stations opened within the three-year period. Column (3) incorporates an interaction term between this variable and the logged distance to the province. In column (4), we employ the recentered IV method by using the difference between the actual HSR opening and the expected probability of HSR opening as instrument.

Appendix E More on Mechanism

E.1 More on Agglomeration or Spillover



(A) **Raw data for float ratio.** (B) **Raw data for population density.**

(C) **Raw data for Population agglomeration.** (D) **Raw data for Economic agglomeration.**

FIGURE A20
The relationship between agglomeration and protest.

Notes: This figure plots the relationship between agglomeration and protest. Panel A-D draws the raw data relationship between agglomeration and the number of protest per million people. The X-axes of panel A-B are the float ratio (the proportion of migrants) and population density (per person/square kilometer), respectively. The X-axes of panel C-D are respectively the indices of population, economic agglomeration, which are measured by the ratios of year-end population, employment in a prefecture to their respective national totals, as well as the ratios of the prefecture's administrative area to the national total.

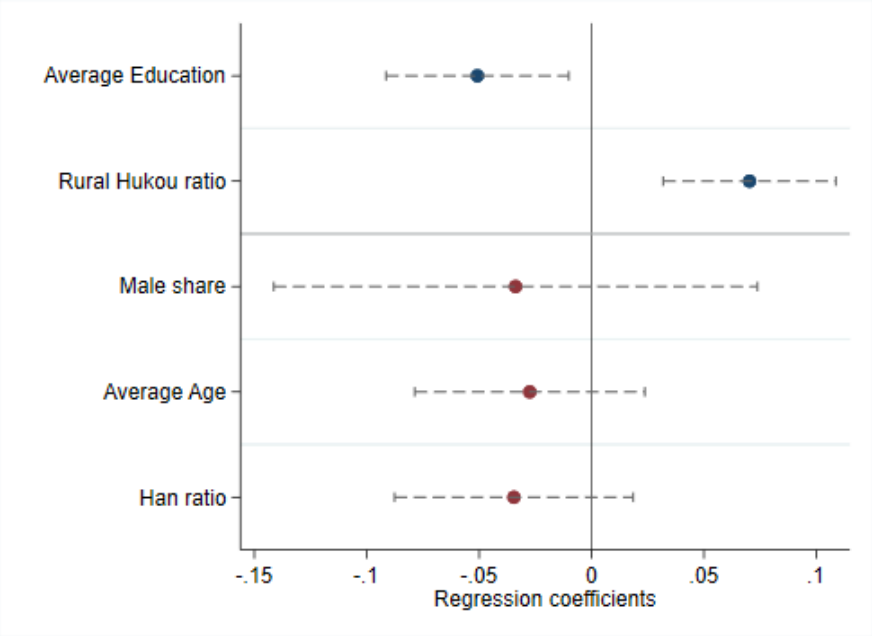


FIGURE A21
Relationship Between HSR Opening and the Average Characteristics of the Floating Population in Provincial Capitals.

Notes: This figure presents the relationship between the HSR opening and the average characteristics of the floating population in provincial capital cities using China Migrants Dynamic Survey (CMDS) 2011-2016 dataset. The dependent variables, listed from top to bottom, are the average years of education, the proportion of agricultural population, the male proportion, the average age, and the proportion of Han ethnicity in the floating population of provincial capitals over the years. All dependent variables are standardized. The independent variable is the number of in-province HSR stations connected to the provincial capital. Each point represents an estimated regression coefficient. The regression controls for fixed effects of provincial capitals and years. The dotted line indicates the 95% confidence interval.

TABLE A17 The heterogeneous impact of HSR openings on the scale and quantity of enterprises.

Enterprise category	(1) *All Above-scale industries*	(2) *Domestic-funded*	(3) *Hong Kong, Macao, and Taiwan-funded*	(4) *Foreign-funded*
Panel A: Number of industrial enterprises				
HSR	-67.603	-70.467	12.855	2.972
	(72.484)	(66.087)	(9.707)	(6.634)
HSR×*lndistance*	30.398	28.270	-2.439	-0.328
	(29.347)	(26.487)	(1.722)	(1.932)
Observations	1,943	1,942	1,839	1,838
R-squared	0.760	0.701	0.978	0.988
Outcome mean	1,213.703	1,044.369	84.649	90.993
Panel B: Gross industrial output value of industries				
HSR	51.780***	45.819**	9.672**	-4.174
	(17.403)	(21.544)	(4.045)	(7.239)
HSR×*lndistance*	-13.119***	-11.447**	-2.670***	1.061
	(3.883)	(4.725)	(0.893)	(1.583)
Observations	1,943	1,942	1,826	1,842
R-squared	0.975	0.956	0.972	0.988
Outcome mean	308.109	242.382	27.440	42.412
Predetermined-year Control	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓

Notes: Table A17 reports the heterogeneous impact of HSR openings on the scale and quantity of enterprises. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Panel A focuses on the impact of HSR openings on the number of above-scale enterprises of different types; Panel B focuses on the impact of HSR openings on the total scale of enterprises (per billion yuan). Column (1) represents the total scale of above-scale industrial enterprises, and columns (2)-(4) represent domestic, Hong Kong, Macao, Taiwan, and foreign-funded enterprises, respectively. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital.

TABLE A18 The heterogeneous impact of HSR openings on industrial structure and wages, housing prices.

	(1)	(2)	(3)	(4)	(5)
	The industry of			The logarithmic price of	
Dependent variable	*Primary*	*Secondary*	*Tertiary*	*Wage*	*House*
HSR	1.045	-1.259	0.231	-0.012	0.011
	(0.645)	(1.604)	(1.689)	(0.019)	(0.034)
HSR×*lndistance*	-0.218*	0.521	-0.308	0.004	-0.003
	(0.129)	(0.334)	(0.349)	(0.004)	(0.007)
Prefecture FE	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓
Observations	1,922	1,943	1,943	1,938	1,896
R-squared	0.948	0.934	0.928	0.969	0.918
Outcome mean	2.616	45.390	52.021	10.659	8.475

Notes: Table A18 reports the heterogeneous impact of HSR openings on industrial structure and wages, housing prices. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. In columns (1)-(3), the dependent variables represent the proportions of the primary, secondary, and tertiary industries in GDP. The dependent variables in columns (4)-(5) are the average wage and the logarithmic price of the house, respectively. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital.

TABLE A19 The impact of agglomeration on protest.

	(1)	(2)	(3)	(4)
Float ratio	0.742**			
	(0.359)			
Population density		0.002		
		(0.002)		
Population agglomeration			1.567**	
			(0.725)	
Economic agglomeration				0.239**
				(0.093)
Controls	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓
Observations	1,784	1,695	1,934	1,934
R-squared	0.835	0.834	0.835	0.835

Notes: Table A19 reports the impact of agglomeration on protest. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). The dependent variables panel in columns (1)-(2) are the float ratio (the proportion of migrants) and population density (per person/square kilometer), respectively. The dependent variables panel in columns (3)-(4) are respectively the indices of population, economic agglomeration, which are measured by the ratios of year-end population, employment in a prefecture to their respective national totals, as well as the ratios of the prefecture's administrative area to the national total.

TABLE A20 The impact of HSR opening on protest about migration.

	Migration1		*Migration2*	
	(1)	(2)	(3)	(4)
HSR	1.035***	0.840*	1.026***	0.830*
	(0.369)	(0.427)	(0.369)	(0.428)
HSR×*lndistance*	-0.222***	-0.178**	-0.221***	-0.177*
	(0.079)	(0.090)	(0.079)	(0.090)
Controls	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓
Observations	1,943	1,896	1,943	1,896
R-squared	0.568	0.618	0.569	0.619

Notes: Table A20 reports the impact of HSR opening on protest about migration. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. The dependent variables in columns (1)-(2) consist of the standardized number of protests related to A-to-NA migrant workers at the prefecture-year level (*Migration1*), whereas the dependent variables in columns (3)-(4) further add protests related to migration and *hukou* issues (*Migration2*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital.

TABLE A21 HSR opening, discrimination, and protest.

	(1)	(2)	(3)	(4)	(5)	(6)
	Dialect diversity		Predetermined capital inflow population ratio		Predetermined economic disparities	
	High	Low	High	Low	High	Low
HSR	0.534***	0.373	0.544***	0.405**	0.505**	0.435***
	(0.152)	(0.230)	(0.147)	(0.197)	(0.244)	(0.157)
HSR×*lndistance*	-0.119***	-0.093**	-0.132***	-0.093**	-0.114**	-0.106***
	(0.031)	(0.047)	(0.035)	(0.038)	(0.051)	(0.032)
Constant	0.003	-0.031	0.052*	-0.090***	0.007	-0.043*
	(0.029)	(0.027)	(0.027)	(0.026)	(0.028)	(0.025)
Predetermined-year Control	✓	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓
Observations	888	1,008	1,008	888	973	923
R-squared	0.907	0.905	0.903	0.903	0.921	0.903

Notes: Table A21 reports the heterogeneous treatment effects by discrimiation. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Column (1) reports the baseline results. The dependent variable is the standardized number of protests at the prefectural level (*Protestsd*). *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. Columns (1) and (2) group by the average number of distinct dialect areas per city at the provincial level. Columns (3) and (4) group by the proportion of population flowing into provincial capitals in 2010. Columns (5) and (6) group by the per capita GDP ratio between provincial capitals and regions farther from them (greater than the median distance). "High" refers to values above or equal to the median, and "Low" refers to values below the median.

E.2 More on Monitoring or Deterrence

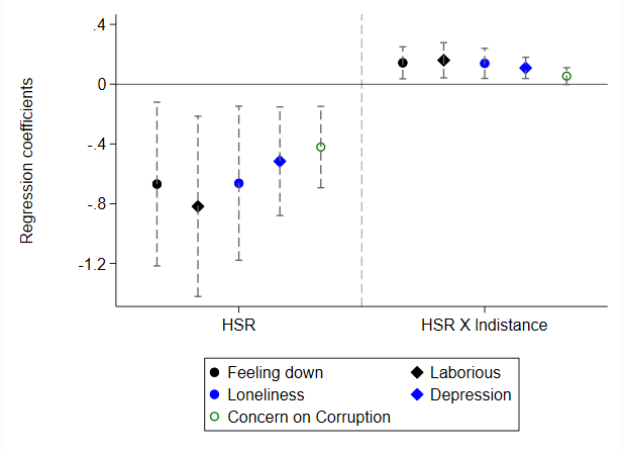


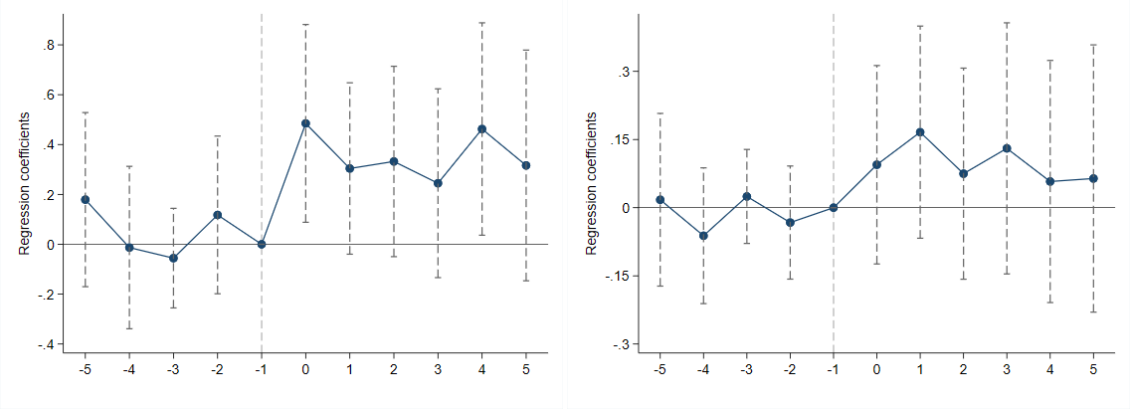
FIGURE A22 The heterogeneous impact of HSR openings on individual emotions.

Notes: This figure presents the heterogeneous impact of HSR openings on individual emotions and subjective attitudes, based on individual-year level data from the 2012-2018 China Family Panel Studies (CFPS). The two sections represent the estimated values of two independent variables under different dependent variables. In each section, from left to right, the dependent variables are whether the respondents feel down (*Feeling down*), have difficulty in functioning (*Laborious*), the degree of loneliness (*Loneliness*), the level of depression (*Depression*), and the degree of concern about the severity of current corruption issues (*Corruption*). The dotted line shows a 95% confidence interval.

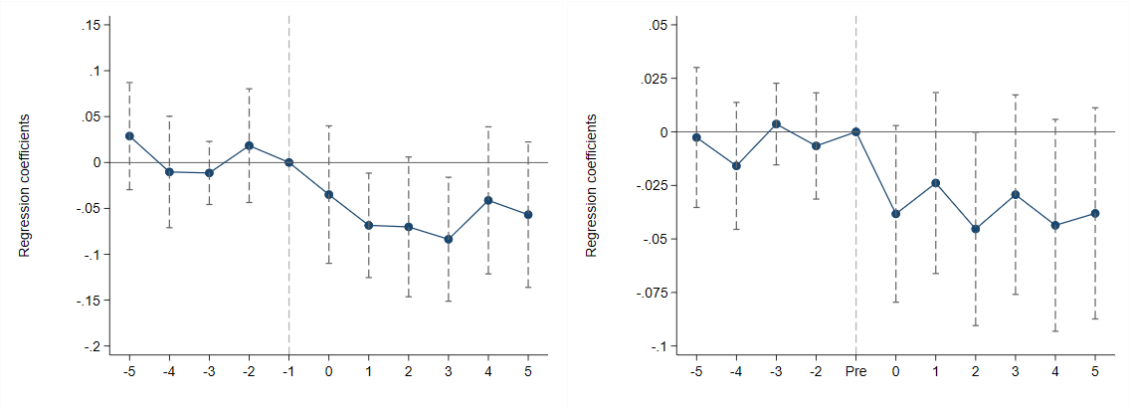
TABLE A22 Suggestive evidence for deterrence effects.

	(1)	(2)	(3)	(4)
	Expressing political opinions through			
Dependent variable	Writing articles to the media		Protests	
HSR	0.104	0.223***	0.079	0.231***
	(0.077)	(0.075)	(0.073)	(0.072)
HSR×*lndistance*	-0.028***	-0.036***	-0.017**	-0.032***
	(0.009)	(0.009)	(0.008)	(0.008)
Individual Controls		✓		✓
Province FE	✓	✓	✓	✓
Observations	2,339	2,339	2,339	2,339
R-squared	0.028	0.029	0.081	0.103
Outcome mean	1.745	1.745	1.696	1.696

Notes: Table A22 reports the suggestive evidence for deterrence effects. ***p< 0.01, **p <0.05, *p < 0.1. The data is primarily sourced from the Ideology Survey of Chinese Internet Users (ISCIU) dataset. Robust standard errors are clustered at the prefecture levels. The dependent variables in columns (1)-(2) represent the frequency at which individuals choose to express their political opinions through writing and submitting articles to the media. The dependent variables in columns (3)-(4) represent the frequency at which individuals express their political opinions through participating in protests and demonstrations. The variables range from 1 to 4, with higher values indicating a higher frequency. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital.



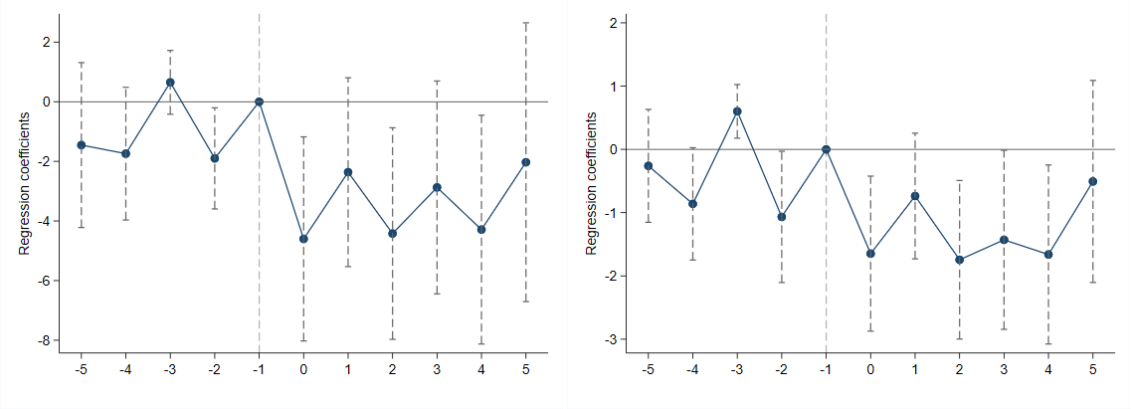
(A) **Pre-trend tests for *HSR* term (*Political trust*)).** (B) **Pre-trend tests for *HSR* term (*Government evaluation*).**



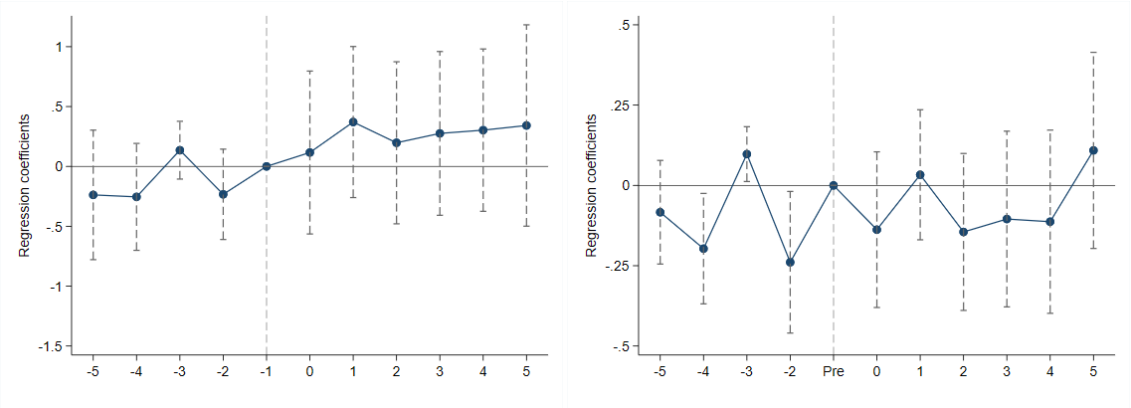
(C) **Pre-trend tests for interaction term (*Political trust*).** (D) **Pre-trend tests for interaction term (*Government evaluation*).**

FIGURE A23 Pre-trend tests for the impact of HSR on the political attitudes of locals.

Notes: This figure plots pre-trend tests for the impact of the HSR on the political trust and government evaluation of residents before and after its inauguration. The data is sourced from individual-year level data from the 2012-2018 China Family Panel Studies (CFPS). In Panel A and Panel C, the dependent variables are respondents' political trust in local government, (*Political trust*). In Panel B and Panel D, the dependent variables are respondents' evaluation of the government's performance in the past year. (*Government evaluation*). Panel A and Panel B test for interaction term *HSR*×*lndistance*; while Panel C and Panel D test for single *HSR* term. All panels control for individual characters, Province-year fixed effects, and county fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.



(A) **Pre-trend tests for *HSR* term (*Political trust*)).** (B) **Pre-trend tests for *HSR* term (*Government evaluation*).**

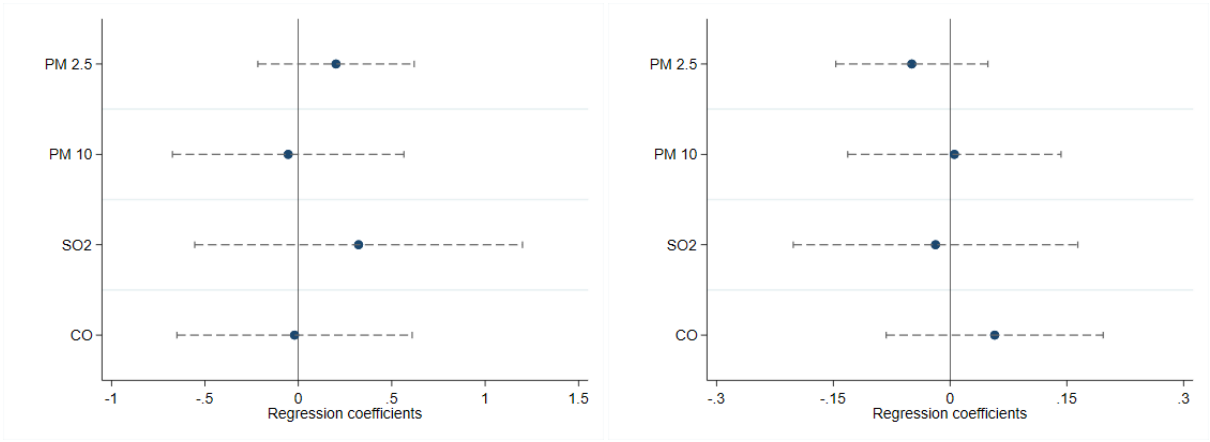


(C) **Pre-trend tests for interaction term (*Political trust*).** (D) **Pre-trend tests for interaction term (*Government evaluation*).**

FIGURE A24 Pre-trend tests for the impact of HSR on the political attitudes of migrants.

Notes: This figure plots pre-trend tests for the impact of the HSR on the political trust and government evaluation of migrants before and after its inauguration. The data is sourced from individual-year level data from the 2012-2018 China Family Panel Studies (CFPS). In Panel A and Panel C, the dependent variables are respondents' political trust in local government, (*Political trust*). In Panel B and Panel D, the dependent variables are respondents' evaluation of the government's performance in the past year. (*Government evaluation*). Panel A and Panel B test for single *HSR* term; while Panel C and Panel D test for interaction term *HSR*×*lndistance*. All panels control for individual characters, Province-year fixed effects, and county fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.

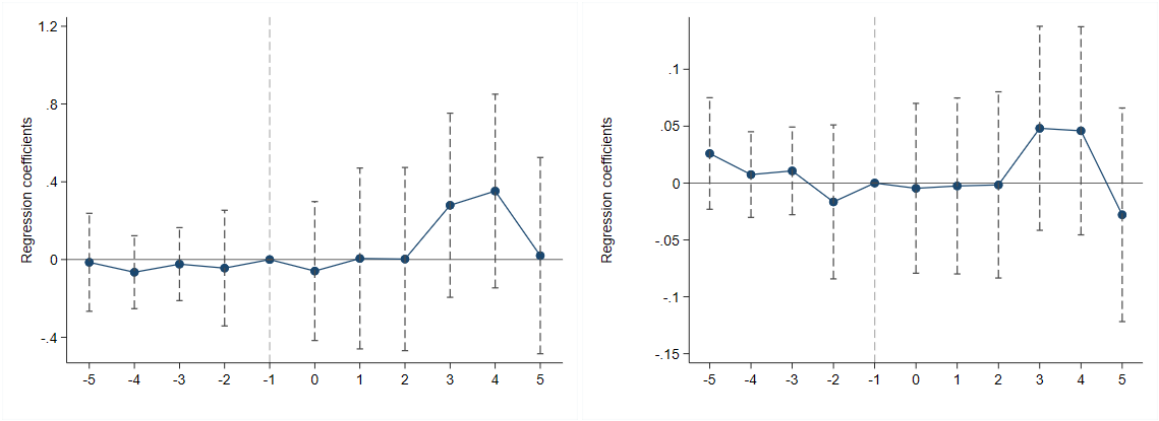
E.3 More on Alternative Explanations



(A) **Tests for *HSR* term (HSR).** (B) **Tests for the interaction term ($HSR \times lndistance$).**

FIGURE A25 HSR Opening, distance from the capital, and air pollution.

Notes: This figure presents the coefficients of the interaction term when regressing air quality to HSR opening and the distance to the provincial capital. The dependent variables are standardized prefecture-year level average concentrations of $PM2.5$, $PM10$, sulfur dioxide (SO_2), and carbon monoxide (CO). Each point represents a separate regression, reporting the coefficient of the High-Speed Rail (HSR) term in Panel A and the coefficient of the interaction term between High-Speed Rail (HSR) and the log-form distance to the provincial capital city in Panel B. All control for Province-year fixed effects, predetermined-year and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.



(A) **Pre-trend tests for *HSR* term (*Petition*).** (B) **Pre-trend tests for interaction term (*Petition*).**

FIGURE A26 Pre-trend tests for the impact of HSR on the protests about upward petitions.

Notes: This figure plots pre-trend tests for the impact of the HSR on protests about upward petitions. Dependent variables consist of the standardized number of protests related to petitions (*Petition*). We obtain these kinds of protest events by adding extra protest classifications. Panel A test for single *HSR* term; while Panel B test for interaction term *HSR*×*lndistance*. All panels control for pre-determined characters, Province-year fixed effects, and prefecture fixed effects. Robust standard errors are clustered at the prefecture levels. The dotted line shows a 95% confidence interval.

TABLE A23 Alternative explanations: financial welfare improvements after HSR opening.

Dependent variable	(1) School	(2) Social care	(3) Internet	(4) Park	(5) Film	(6) Book	(7) Bus	(8) Education finance (%)	(9) Science finance (%)
HSR	0.398**	1.504	-0.049	-99.39	0.014***	-7.973	2.862	-0.233	4.011
	(0.156)	(2.379)	(0.050)	(186.459)	(0.005)	(17.206)	(2.452)	(0.470)	(3.684)
HSR×*lndistance*	-0.062*	-0.429	0.008	-1.090	-0.002**	0.933	-0.431	0.010	-0.566
	(0.034)	(0.519)	(0.010)	(21.190)	(0.001)	(3.540)	(0.387)	(0.095)	(0.734)
Prefecture FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province-year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	1,941	1,936	1,929	1,931	1,359	1,664	1,663	1,942	1,943
R-squared	0.809	0.779	0.740	0.934	0.715	0.535	0.671	0.544	0.897
Outcome mean	2.180	42.615	0.121	195.347	0.032	9.929	9.078	2.907	38.416

Notes: Table A23 tests the alternative explanations for financial welfare improvements after HSR opening. ***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. The dependent variables in columns (1)-(9) are the number of primary and secondary schools per capita, the number of hospital beds per capita, the proportion of Internet access users, the per capita park area (unit: square kilometers), the number of theaters and cinemas per capita, the per capita number of public books, the per capita number of buses, the proportion of education expenditure in fiscal revenue, and the proportion of science and technology expenditure in fiscal revenue, all of which refer to per 10,000 people. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital.

TABLE A24 Alternative explanations: the relationship between HSR opening and the establishment of stability-maintenance institutions.

Dependent variable	(1) Court	(2) Stability	(3) Industry and commerce	(4) State tax
Panel A: County level data				
HSR	-0.041	0.114**	0.047	0.042
	(0.037)	(0.055)	(0.056)	(0.048)
HSR×*lndistance*	0.003	-0.024**	-0.008	-0.005
	(0.007)	(0.010)	(0.011)	(0.009)
Observations	2,155	2,155	2,155	2,155
R-squared	0.076	0.119	0.081	0.058
Panel B: Prefecture level data				
HSR	0.037	0.160**	0.124***	0.039
	(0.032)	(0.073)	(0.047)	(0.055)
HSR×*lndistance*	-0.007	-0.023*	-0.014	-0.005
	(0.007)	(0.013)	(0.009)	(0.011)
Observations	276	276	276	276
R-squared	0.187	0.249	0.206	0.191
Control	✓	✓	✓	✓
Province FE	✓	✓	✓	✓

Notes: Table A24 tests the alternative explanations for the relationship between HSR opening and the establishment of stability-maintenance institutions.***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. Panel A uses 2016 county-level data, with the dependent variables in columns (1)-(4) being the presence of courts, comprehensive governance committees, industry and commerce bureaus, and tax authorities at the county level. Panel B uses 2016 prefecture-level data, with the dependent variables being the presence of courts, comprehensive governance committees, industry and commerce bureaus, and tax authorities at the prefecture level. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital.

TABLE A25 Alternative explanations: HSR-related portest.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Standard Number of Protest			Number of Protest			
Dependent variable	All	Non HSR	HSR	All	Non HSR	HSR	Protestsd
HSR	0.467***	0.632***	0.348	17.781***	16.884***	1.073	
	(0.134)	(0.117)	(0.216)	(5.089)	(3.129)	(0.666)	
HSR×*lndistance*	-0.109***	-0.138***	-0.073*	-4.139***	-3.680***	-0.226*	
	(0.027)	(0.026)	(0.044)	(1.031)	(0.685)	(0.136)	
Instant HSR							-0.419
							(0.306)
Instant HSR×*lndistance*							0.078
							(0.063)
Observations	1,896	1,896	1,896	1,896	1,896	1,896	1,896
R-squared	0.900	0.896	0.393	0.900	0.896	0.393	0.900
Control	✓	✓	✓	✓	✓	✓	✓
Province FE	✓	✓	✓	✓	✓	✓	✓

Notes: Table A25 tests the alternative explanations for HSR-related protest.***p< 0.01, **p <0.05, *p < 0.1. Robust standard errors are clustered at the prefecture levels. The dependent variable in Columns (1) and (7) is the standardized total number of protests in each prefecture. The dependent variables in Columns (2) and (5) represent the total number of protests, both standardized and unstandardized, after excluding those related to HSR. The dependent variables in Columns (3) and (6) represent the total number of HSR-related protests, again both standardized and unstandardized. *HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access and 0 otherwise. *Instant HSR* is a dummy variable that takes the value of 1 if a prefecture has HSR access this year, and 0 otherwise. The variable *lndistance* represents the distance (logged) between the prefecture center and its provincial capital.