

Market Access, Land Finance, and Growth Incentives: Evidence from High-Speed Rail in China

Kefan Chen

Department of Economics, McGill University

March 26, 2026

Abstract

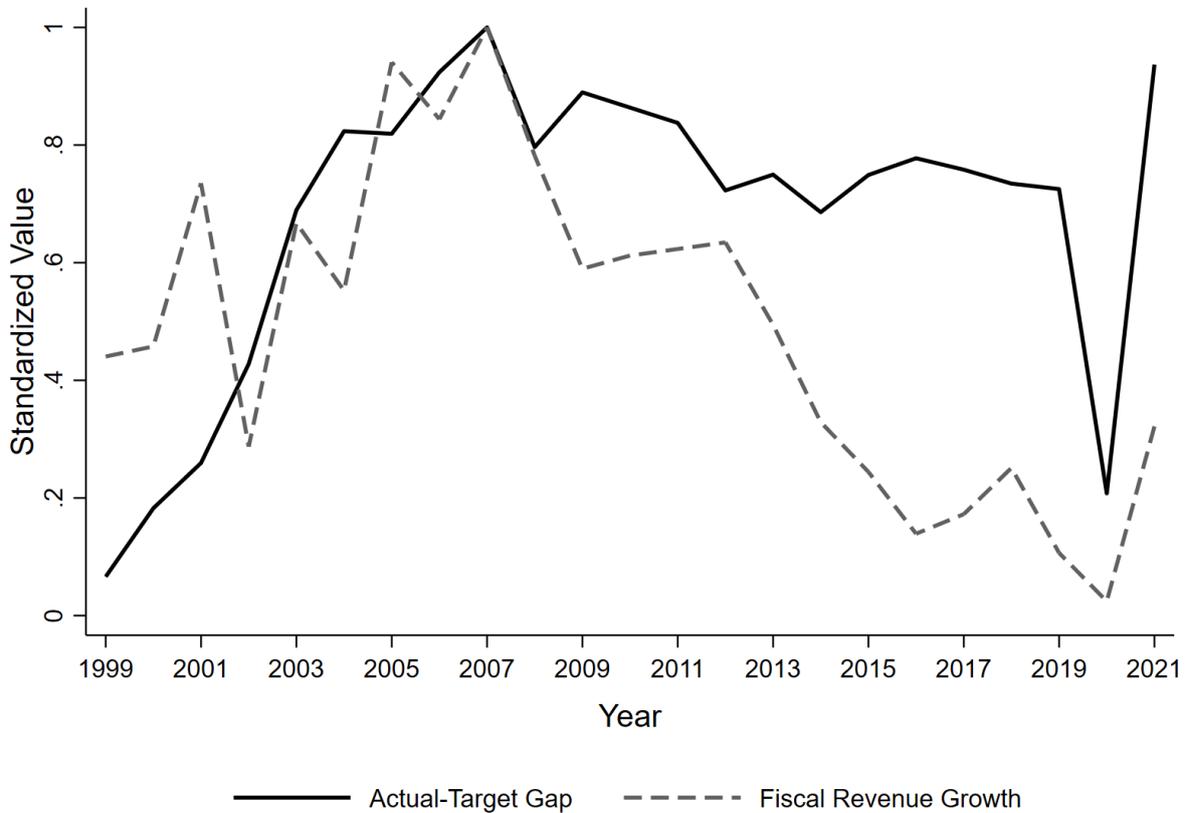
This paper studies how high-speed rail (HSR) affects local public finance through the land market in China. I combine more than 3 million land transaction records with county fiscal data and a county-year measure of market access constructed from a multimodal transport network. I find that improvements in market access increase land transfer prices and local fiscal revenue, and that HSR-driven accessibility gains are capitalized into land values. Parcels located closer to HSR stations also command higher prices. Mediation analysis further shows that this fiscal effect operates mainly through higher land conveyance revenue rather than through unit land prices alone. The results point to a fiscal channel through which transport infrastructure strengthens local state capacity and supports growth-oriented local governments in a target-driven system.

1 Introduction

Large-scale transportation infrastructure reshapes accessibility, market integration, and the spatial distribution of economic activity. In China, the rapid expansion of the high-speed rail (HSR) network since 2003 has become one of the most important infrastructure transformations of the past two decades. By substantially reducing inter-city travel time, HSR has altered the effective geography of economic interaction, strengthened connections between cities, and changed the relative attractiveness of different locations. More broadly, the literature has emphasized that transportation improvements can affect productivity, agglomeration, specialization, and spatial redistribution, but their aggregate and local fiscal consequences remain actively debated (Faber, 2014; Duranton and Turner, 2012; Redding and Turner, 2015; Redding and Rossi-Hansberg, 2017). In particular, a central question is whether HSR generates new value through stronger connectivity or mainly reallocates activity across space. This debate is especially salient in China, where HSR expansion was extraordinarily rapid and capital intensive, and where local governments have strong incentives to translate improved accessibility into fiscal and economic gains.

This paper studies how HSR affects local public finance through the land market. I argue that HSR matters not only because it changes mobility, but because it changes market access. Better market access raises the value of locations by improving their connection to surrounding economic mass, lowering effective transport costs, and increasing the attractiveness of land for development and production (Donaldson, 2018). This mechanism is especially important in China, where the economic rationale for continued HSR expansion is not always obvious: despite its symbolic association with modernization, the network has also been criticized for heavy debt burdens and low utilization at many inland stations (Chang and Zheng, 2022; Wu et al., 2014; Lao, 2016). Since local governments rely heavily on land-based revenues, improvements in accessibility can be capitalized into higher land transfer prices and greater total land revenues, thereby relaxing fiscal constraints and expanding the local state's capacity to pursue policy objectives (Han and Kung, 2015; Mo, 2018; Rithmire, 2015). This mechanism creates a natural bridge between transportation infrastructure and the political economy of development: if HSR improves market access and strengthens local land finance, then frequent local support for HSR expansion may partly reflect not only its transport value, but also its fiscal value for governments operating under growth-oriented and target-based incentives. Figure 1 provides suggestive

Figure 1: Target Completion Gap and Fiscal Revenue Growth



Notes: This figure shows the time trends in the weighted average of the city-level target completion gap and the weighted average of city-level fiscal revenue growth. All values are standardized to the unit interval [0, 1]. Weighted averages are computed using city’s GDP.

descriptive evidence for this mechanism¹.

The paper builds on the market access (MA) framework pioneered by [Donaldson and Hornbeck \(2016\)](#), which treats connectivity to surrounding markets as a sufficient statistic summarizing the direct and indirect effects of transportation networks. Recent work has increasingly applied this framework to modern transport systems, including HSR, and shows that improvements in market access can affect land values and regional outcomes ([Allen and Arkolakis, 2022](#); [Zheng et al., 2022](#); [Yoo et al., 2023](#)). The appeal of the MA

¹The standardized series for fiscal revenue growth and the actual–target gap move closely together over time, especially around the mid-2000s and during subsequent downturns, indicating that stronger local fiscal performance is closely associated with a greater ability to meet economic targets.

approach is particularly strong in a network setting. HSR does not simply treat some places and not others; rather, it changes relative accessibility throughout the network and generates spillovers across locations. As a result, reduced-form comparisons based on single corridors or city-level treatment indicators may miss important general-equilibrium and network effects. [Chang et al. \(2026\)](#) makes this point clearly in arguing that difference-in-differences designs can understate or mischaracterize network-wide impacts when spillovers are pervasive.

My analysis proceeds in three steps. First, I construct a county-year measure of market access using minimum travel time across four transport modes—high-speed rail, conventional rail, highways, and waterways—and show that improved accessibility is associated with higher land transfer prices. The estimates are robust across a range of specifications, including alternative weighting schemes based on nighttime lights and county-year aggregation of parcel-level outcomes. Second, I isolate the role of HSR more directly. I show that parcels located closer to HSR stations command systematically higher prices, and that the HSR-induced component of market access is positively associated with county-level average land prices. To address endogeneity, I further use historical (1962) railway exposure interacted with national HSR expansion as an instrument for the HSR-induced change in market access. The IV results confirm that the accessibility gains attributable specifically to HSR are capitalized into land prices. Third, I explore the fiscal mechanism linking accessibility to local government capacity. The evidence suggests that market access increases local fiscal revenue primarily through higher land conveyance revenue rather than through unit land prices alone.

The Chinese institutional context makes these effects particularly important. Local governments play a central role in land conversion, land leasing, infrastructure provision, and local development finance. They also operate under a target-based system in which economic performance remains an important dimension of political evaluation. Existing research has shown that HSR can affect land values, new town development, firm geography, and spatial redistribution in China ([Chang and Diao, 2022](#); [Chang and Zheng, 2022](#); [Chang et al., 2022](#); [Qin, 2017](#)). At the same time, research on China’s transport system emphasizes the dramatic expansion in both the scale and quality of national transport networks and the importance of measuring access points and transport quality carefully rather than relying on crude straight-line distance proxies ([Davis et al., 2025](#)). By connecting these strands, this paper highlights a channel that has received far less attention: HSR can strengthen local public finance by raising the value and aggregate revenue of land transactions, thereby

increasing the fiscal capacity of local governments to support growth-oriented policies.

This paper contributes to three related literatures. First, it contributes to the literature on HSR and regional development by shifting attention from output and redistribution alone to the fiscal consequences of transport-induced accessibility gains. Much of the existing evidence focuses on GDP, employment, housing prices, firm location, or redistribution across space (Faber, 2014; Qin, 2017; Baum-Snow et al., 2017; Chang and Zheng, 2022). I show that HSR also matters for the land-finance channel through which Chinese local governments fund development. Second, it contributes to the market-access literature by applying the MA framework to local land markets and local fiscal outcomes rather than only national output or aggregate land values. Third, it contributes to the political economy of target-based governance by identifying a mechanism through which transportation infrastructure can relax fiscal constraints and thereby support local governments' efforts to deliver growth. In this sense, the paper complements my broader research agenda on economic targets: if target pressure shapes local government behavior, then HSR-induced improvements in market access may matter not only because they raise economic fundamentals, but also because they increase the fiscal resources available to pursue and sustain those targets.

The rest of the paper proceeds as follows. Section 2 provides background on China's HSR expansion and the land-finance system. Sections 3 and 4 describe the data and the construction of market access. Section 5 explains the empirical strategy. Section 6 presents the baseline and IV results for land prices, land revenues, and HSR-specific accessibility. Section 7 examines the fiscal mechanism linking accessibility to local government capacity. Section 8 concludes.

2 Background

2.1 High-Speed Rail Expansion in China

China's HSR expansion has been one of the most ambitious transport infrastructure programs in the world. The modern network began with the 2004 *Mid-to-Long-Term Railway Network Plan*, which proposed a national 4×4 corridor system, and accelerated after the first 350 km/h commercial service between Beijing and Tianjin opened in 2008. By 2016, the initial grid was largely completed, and the subsequent 8×8 plan further expanded the network. By 2020, China had built nearly 38,000 kilometers of HSR, accounting for more

than two-thirds of the global total (Ollivier et al., 2014; National Development and Reform Commission, 2016; Xinhua News Agency, 2022).

The rapid expansion of HSR reflected not only rising demand for inter-city travel but also strong institutional support. During the 2008 global financial crisis, part of the national stimulus package was directed toward large-scale infrastructure investment, including HSR. Construction was financed primarily through state-backed borrowing, while local governments actively competed for station access and often launched station-area and new-town developments in anticipation of land appreciation and broader development gains (Bai et al., 2016; Wu, 2022; Chang and Diao, 2022; Chang et al., 2022). At the same time, the financial sustainability of HSR has remained contested. Although some major eastern corridors perform well, the system as a whole is highly capital intensive, and many inland lines and stations face relatively limited demand (Chang and Zheng, 2022; Wu et al., 2014; Lao, 2016). This tension makes it important to understand the broader local benefits of HSR beyond direct transport revenues alone.

2.2 Land Finance and Local Government Capacity

Land occupies a central position in China’s model of local development finance. Because urban land is owned by the state and local governments control the conveyance of land-use rights, they occupy a monopolistic position in the primary land market. Land conveyance revenue therefore became a major extra-budgetary funding source, especially after fiscal recentralization increased pressure on local public finance (Han and Kung, 2015; Bao et al., 2024; Rithmire, 2015). In practice, local governments use land not only to collect conveyance fees, but also to support borrowing, finance infrastructure, and facilitate urban expansion.

Existing research shows that this land-finance system is closely tied to local growth incentives. Land conveyance revenue can improve local governments’ borrowing capacity, lower financing costs, and support infrastructure investment, while expected future land income often serves as a quasi-collateral base for development financing (Mo, 2018; Guo and Shi, 2018). More recent work further emphasizes that state-owned land in China is mobilized as a financial asset through land reserve systems, urban development corporations, and other state-led mechanisms of assetization (Feng et al., 2024). In this institutional context, any factor that raises the value of land or expands the total value of land transactions can directly strengthen local fiscal capacity.

3 Data

3.1 Land Transaction Data

The land transaction data are obtained from the official platform of the *China Land Market Network*, which publicly releases detailed information on state-owned land transfers across China. The dataset covers the period from January 2000 to December 2022 and contains more than 3 million land transaction records. Each observation corresponds to a specific parcel of land transferred through the public land market.

A key advantage of this dataset is its detailed geographic and transactional information. For each land parcel, the data provide the precise administrative location at the county level, along with the specific site description of the parcel. The dataset also records the transaction date (e.g., contract signing or approval date), the size of the parcel (measured in hectares), the transaction price (in ten thousand RMB), and the designated land use category (e.g., residential, commercial, industrial, or mixed use). Beyond these core variables, the dataset also contains additional attributes of each transaction, such as the land transfer method, land use term, floor area ratio requirements, building density constraints, project approval information, and geographic coordinates (longitude and latitude).

Overall, the richness and nationwide coverage of the micro-level land transaction data make it possible to examine land market dynamics and their relationship with regional economic development at a fine spatial and temporal resolution.

3.2 Transport Network Data

To measure access to different transportation modes, I use GIS data from the China Surface Transport System Database constructed by [Davis et al. \(2025\)](#). This database provides a comprehensive geospatial representation of China's surface transportation network, including modern motorways, regular railways, high-speed railways, and inland waterways at an annual frequency from 1993 to 2020. The database compiles digitized transport maps and administrative boundary files into standardized GIS shapefiles, enabling spatial analysis of transport infrastructure across locations and over time.

The GIS files contain both transportation routes and transport access points. For road networks, access points correspond to motorway entrances and exits, while for rail systems they correspond to railway stations and high-speed railway (HSR) stations. Each access point is geocoded with precise geographic coordinates (longitude and latitude), allowing

me to identify the spatial location of transport facilities and measure distances between transport nodes and land parcels. The dataset also provides shapefiles of transport routes for each year, which can be layered with administrative boundary files to construct county-level measures of transport connectivity.

Following [Davis et al. \(2025\)](#), I focus on four major surface transport modes: motorways, conventional railways, high-speed railways, and waterways. High-speed railways are defined as passenger-dedicated lines with typical operating speeds between 250 and 350 km/h, while conventional railways include standard passenger and freight rail lines with lower maximum speeds.

4 Construction of Market Access

To examine how improvements in transportation connectivity affect land transfer prices, a measure of market access is constructed following the spatial equilibrium literature ([Donaldson, 2018](#); [Chiovelli et al., 2018](#); [Donaldson and Hornbeck, 2016](#)).²

Market access is computed annually for each county between 2000 and 2020 using a GIS-based multimodal transport network. The network incorporates four transportation modes: high-speed rail, conventional rail, motorways, and waterways. For each pair of counties c and d in year t , the bilateral trade cost $\tau_{c dt}$ is defined as the minimum travel time across these alternative transport routes.

Empirically, market access is commonly approximated by aggregating the economic size of other locations weighted by bilateral trade costs ([Donaldson, 2018](#)). Following this approach, the market access of county c in year t is defined as

$$MA_{ct} = \sum_{d \neq c} \tau_{c dt}^{-\theta} S_{dt},$$

where d indexes destination counties, $\tau_{c dt}$ denotes bilateral trade costs between counties c and d in year t , and S_{dt} measures the economic size of destination county d . The parameter θ represents the elasticity of trade with respect to trade costs.³ S_{dt} is measured by county-level GDP (with nighttime light intensity used as robustness checks).

²In spatial equilibrium frameworks, local economic outcomes depend on access to other markets. Accessibility increases when trade costs to economically large destinations fall. Improvements in transportation infrastructure therefore raise market access by lowering bilateral trade costs and expanding the set of reachable markets.

³Consistent with the literature, θ is set to four.

This measure captures the effective market size accessible to a county after accounting for transportation costs. Counties connected to larger economic centers through faster transport routes exhibit higher market access. Improvements in transport infrastructure reduce travel times between counties, thereby increasing weighted access to other markets. As emphasized in the spatial economics literature, changes in market access summarize both the direct and indirect effects of transportation networks on regional economic outcomes (Donaldson and Hornbeck, 2016).

In the empirical analysis, the logarithm of GDP-weighted market access, denoted $\ln MA_{ct}^{gdp}$, is used as the key explanatory variable to examine how improvements in transportation connectivity affect land transfer prices.

5 Empirical Strategy

The baseline specification relates the logarithm of the unit price of land parcel i in county c and year t to the logarithm of market access in the corresponding county-year.

$$\ln price_{ict} = \beta \ln MA_{ct} + \mathbf{X}_{ict}\gamma + \alpha_c + \lambda_t + u_{ict}$$

$\ln price_{ict}$ denotes the logarithm of the unit land transfer price for parcel i in county c and year t . The key explanatory variable, $\ln MA_{ct}$, is the logarithm of county-level market access. In the baseline specification, market access is weighted by the GDP of destination counties. As a robustness check, an alternative measure is constructed using nighttime light intensity to proxy for the economic size of destination markets.

The vector \mathbf{X}_{ict} includes parcel-level and county-level control variables that may affect land transfer prices, including local population size, geographic location, and terrain ruggedness, among other socioeconomic characteristics. α_c , λ_t are city/county fixed effects⁴ and year fixed effects. The error term u_{ict} captures unobserved determinants of land transfer prices, and standard errors are clustered at the county level to account for within-county correlation over time.

⁴The baseline specification includes city fixed effects rather than county fixed effects. Market access varies across counties within the same city as well as over time, and county fixed effects would absorb most of this cross-county variation. City fixed effects therefore control for time-invariant urban characteristics while preserving meaningful variation in market access within cities. As a robustness check, specifications including county fixed effects are also reported in the appendix.

6 Results

6.1 Baseline Results

[Table 1](#) reports a robust positive relationship between market access and land transfer prices. Across specifications, the coefficient on log GDP-weighted market access remains positive and highly statistically significant, with estimates ranging from 0.043 to 0.103. In economic terms, this implies that a 1 log point increase in market access is associated with roughly a 4 to 7 percent increase in the unit price of land transfer. Although the magnitude declines after introducing richer fixed effects and controls, the coefficient remains stable, suggesting that the positive association between market access and land prices is not merely driven by cross-city differences, industrial composition, or observable parcel and county characteristics.

The control variables are also economically intuitive. The parcel-specific controls include land grade⁵, lease term, and the maximum floor area ratio, while the county-specific controls include distance to the prefecture-level city center, distance to the provincial capital, population, the regional development zone indicator, and terrain ruggedness. Positive coefficients are found for lease term and the maximum floor area ratio, indicating that parcels with longer use rights and greater development intensity command higher prices. By contrast, land grade and both distance measures enter negatively, suggesting that lower-quality parcels and those located farther from the prefecture-level city center or the provincial capital are sold at lower prices. Population has essentially no independent effect once market access and fixed effects are controlled for, while the coefficient on the regional development zone indicator is not statistically distinguishable from zero. Terrain ruggedness is negative and only marginally significant, consistent with the idea that more rugged areas face higher development costs and weaker land market demand. Overall, the control variables enter with broadly intuitive signs and do not alter the main finding that stronger market access is associated with higher land transfer prices.

As a robustness check, [Appendix Table A1](#) replaces GDP-weighted market access with illumination-weighted market access. The results are highly similar: the coefficient on market access remains positive and statistically significant across all specifications, with magnitudes (4-7%) very close to those in the baseline table. In addition, because the main

⁵In China's land transfer system, land parcels are classified into multiple administrative grades that reflect differences in location, infrastructure, and development conditions. In practice, the grading system often includes more than ten categories, with lower-numbered grades generally corresponding to parcels with better locational and development attributes.

Table 1: Market Access and Land Transfer Prices

	Dependent Variable: Log Unit Price of Land Transfer				
	(1)	(2)	(3)	(4)	(5)
Log GDP-weighted Market Access	0.103*** (0.011)	0.056*** (0.008)	0.074*** (0.008)	0.072*** (0.007)	0.043*** (0.007)
Land Grade				-0.009*** (0.001)	-0.009*** (0.001)
Lease Term (Years)				0.243*** (0.031)	0.245*** (0.034)
Maximum Floor Area Ratio				0.210*** (0.025)	0.202*** (0.024)
Distance to City Center					-0.090*** (0.010)
Distance to Provincial Capital					-0.103*** (0.027)
Population					-0.000 (0.000)
Regional Development Zone					-0.033 (0.209)
Terrain Ruggedness					-0.059* (0.035)
Year FE	✓	✓	✓	✓	✓
City FE		✓	✓	✓	✓
Industry FE			✓	✓	✓
Parcel/County Controls				✓	✓
Observations	1,390,453	1,333,501	1,267,958	918,975	658,654
R^2	0.1306	0.2464	0.4886	0.5409	0.5448

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Notes: The dependent variable is the log of the unit price of land transfer. The main explanatory variable is the log of GDP-weighted market access, constructed using the minimum travel time across four transportation modes (high-speed rail, conventional rail, motorways, and waterways). Columns progressively add fixed effects and controls. Controls include land grade, lease term, maximum floor area ratio (FAR), distance to the prefecture-level city center, distance to the provincial capital, population, whether the county belongs to a designated regional development zone, and terrain ruggedness. Standard errors clustered at the county level are reported in parentheses.

specification combines county-level market access with parcel-level land transaction data, Appendix [Table A2](#) reports a further robustness check based on county-year average land prices. In that specification, variables originally defined at the county level are retained directly, while parcel-level characteristics are aggregated to the county-year level using within-county averages. The estimated coefficient on market access remains positive and statistically significant, and is still around 4% in the more saturated specifications. As an additional robustness check, Appendix [Table A3](#) replaces the dependent variable with county-level land revenue, defined as the total annual value of land transfers within a county, rather than the average unit price of land transactions. This outcome is informative because market access may affect not only the price per unit of land sold, but also the total scale and aggregate value of land market activity. The results remain positive and highly significant, indicating that a one log point increase in market access is associated with roughly an 11–18% increase in land revenue. The larger magnitude relative to the unit-price regressions is intuitive, as improvements in accessibility may raise both land prices and the total value of land transacted.

6.2 The Role of High-Speed Rail

While the baseline specification uses market access as the main explanatory variable, that measure is defined at the county-year level and captures accessibility through the full transportation network, including high-speed rail, conventional rail, motorways, and waterways. As discussed above, this raises two related issues. First, the level of aggregation of the key explanatory variable differs from that of the dependent variable, which is observed at the parcel level. Although the county-level aggregation exercise shows that the baseline findings are robust, another natural approach is to construct a parcel-level measure of transportation exposure that better matches the spatial resolution of the transaction data. Second, because the market access index combines multiple transportation modes, it does not isolate the specific role of high-speed rail. To address both concerns, this subsection introduces a parcel-level measure of HSR exposure based on the annual distance from each land parcel to the nearest operating high-speed rail station. Using the yearly coordinates of land parcels and the yearly locations of HSR stations, including newly opened stations over time, I compute the straight-line distance from each parcel in each year to its nearest HSR station. This measure varies at the parcel-year level and is designed to more directly capture the capitalization of high-speed rail access into land transfer prices.

[Table 2](#) highlights the importance of high-speed rail by replacing the county-level market

Table 2: Proximity to High-Speed Rail Stations

	Dependent Variable: Log Unit Price of Land Transfer			
	(1)	(2)	(3)	(4)
Log Distance to the Nearest HSR Station	-0.177*** (0.020)	-0.075*** (0.010)	-0.062*** (0.010)	-0.066*** (0.009)
Land Grade				-0.010*** (0.001)
Lease Term (Years)				0.267*** (0.034)
Maximum Floor Area Ratio				0.231*** (0.026)
Year FE	✓	✓	✓	✓
City FE		✓	✓	✓
Industry FE			✓	✓
Parcel Controls				✓
Observations	1,429,705	1,429,704	1,360,223	988,517
R^2	0.1115	0.2483	0.4709	0.5198

Notes: The dependent variable is the log of the unit price of land transfer. The main explanatory variable is the log distance from each parcel to the nearest operating high-speed rail station. This variable is constructed by matching the annual coordinates of land parcels with the annual locations of HSR stations, allowing newly opened stations to enter the measure over time. Columns progressively add fixed effects and parcel-level controls. Standard errors clustered at the county level are reported in parentheses.

access measure with a parcel-level indicator of direct HSR exposure. Across all specifications, the coefficient on the log distance to the nearest HSR station is negative and highly statistically significant, indicating that parcels located closer to an operating HSR station command systematically higher land transfer prices. In the more saturated specifications, the coefficient remains very stable, a 1 log point reduction in distance to the nearest HSR station is associated with roughly a 6 to 7 percent increase in the unit price of land transfer. The magnitude is therefore remarkably similar to that obtained in the baseline market access regressions, suggesting that the capitalization of transportation accessibility into land prices is not only visible through the broader market access channel but also directly reflected in proximity to high-speed rail infrastructure itself. The parcel-level controls also enter with intuitive signs: parcels with better land grade, longer lease terms, and higher

allowable development intensity are more valuable, while the coefficient on HSR proximity remains robust to their inclusion. As a further sensitivity test, [Table A4](#) incorporates the idea of effective distance by restricting the sample to parcels located within 100 km and 30 km of the nearest HSR station. The results indicate that the estimated capitalization effect of HSR proximity becomes stronger as the effective radius narrows⁶.

A further way to assess the role of high-speed rail is to isolate the portion of accessibility gains that can be attributed specifically to the HSR network. To do so, I construct a counterfactual market access measure that excludes the HSR network while leaving all other transportation modes unchanged. This counterfactual network approach follows the logic in [Chiovelli et al. \(2018\)](#), who quantify the role of transportation access by comparing observed market access with a counterfactual measure constructed under alternative network configurations. Recall that market access is defined as

$$MA_{ct} = \sum_{d \neq c} \tau_{c dt}^{-\theta} S_{dt},$$

where d indexes destination counties, $\tau_{c dt}$ denotes bilateral trade costs between counties c and d in year t , and S_{dt} measures the economic size of destination county d , the counterfactual market access in the absence of high-speed rail is constructed as

$$MA_{ct}^{\text{noHSR}} = \sum_{d \neq c} \tilde{\tau}_{c dt}^{-\theta} S_{dt},$$

where $\tilde{\tau}_{c dt}$ is obtained by recalculating bilateral travel times after removing high-speed rail from the transportation network while keeping conventional rail, motorways, and waterways unchanged. The HSR-induced market access shock is then defined as

$$\Delta MA_{ct} = \ln(MA_{ct}) - \ln(MA_{ct}^{\text{noHSR}}).$$

Conceptually, it compares each county's realized accessibility with a counterfactual scenario in which the HSR network had never been introduced. [Table 3](#) shows that the HSR-induced change in market access is positively and significantly associated with land transfer prices, with an effect of about 3.5%⁷.

⁶the coefficient is larger within 100 km than in the full sample, and larger still within 30 km

⁷This magnitude is also broadly comparable to the estimates obtained earlier using both the overall market access measure and the direct high-speed-rail proximity specification.

Table 3: Counterfactual: High-Speed Rail-Induced Market Access

	Dependent Variable: Log Average Unit Price of Land			
	(1)	(2)	(3)	(4)
HSR-Induced Change in Market Access	0.340*** (0.023)	0.174*** (0.023)	0.037** (0.015)	0.036** (0.015)
Average Land Grade				-0.015*** (0.002)
Average Lease Term				0.229*** (0.035)
Average Maximum FAR				0.104*** (0.024)
Year FE		✓	✓	✓
City FE			✓	✓
Controls				✓
Observations	29,636	29,636	29,433	28,859
R^2	0.0324	0.2007	0.5004	0.5134

Notes: The dependent variable is the log of the county-year average unit price of land transfer. The main explanatory variable is the high-speed-rail-induced change in market access, measured as the difference between actual market access and the counterfactual market access constructed in the absence of high-speed rail. This table evaluates whether the portion of accessibility gains attributable specifically to high-speed rail is capitalized into county-level average land prices. Standard errors clustered at the county level are reported in parentheses.

6.3 Endogeneity

A key empirical concern is that market access may be endogenous to land prices. First, transport infrastructure is unlikely to be placed randomly. Counties with stronger economic fundamentals, higher expected growth, or greater strategic importance may be more likely to receive transport investments, which would induce a correlation between market access and unobserved determinants of land prices. Second, reverse causality may also be relevant: areas with rapidly rising land values and stronger development prospects may attract more infrastructure construction, public investment, and transport upgrading. Third, measurement error in the construction of market access may attenuate the baseline estimates. Taken together, these concerns imply that the positive association between market access and land prices in the baseline specifications should not automatically be interpreted as

causal.

To address this issue, I implement an instrumental variable strategy that exploits historical (1962) railway exposure (Baum-Snow et al., 2017) interacted with the nationwide expansion of high-speed rail. The logic is that counties located closer to the historical railway network were more exposed to subsequent high-speed-rail expansion because modern HSR construction in China often followed existing transport corridors (National Development and Reform Commission, 2016) or nearby engineering alignments (Chang et al., 2026). At the same time, the time variation in the instrument is driven by aggregate national HSR expansion rather than by county-specific land market conditions.

Rather than instrumenting the overall market access measure directly, I focus on the HSR-induced change in market access. This choice is guided by both theory and the data. The excluded instrument is constructed from historical railway exposure and national HSR growth, and therefore most naturally shifts the component of accessibility improvement attributable specifically to the HSR network, rather than the broader market access measure that also incorporates conventional railways, highways, and waterways.

The excluded instrument is constructed as

$$Z_{ct} = \text{OldRailProximity}_c \times \ln(1 + \text{HSRLength}_t),$$

where $\text{OldRailProximity}_c$ measures county c 's proximity to the 1962 railway network, and HSRLength_t is the total national operating high-speed-rail mileage in year t . Intuitively, proximity to the historical railway network captures predetermined exposure to long-standing transport corridors, so counties located closer to these corridors are more likely to experience larger accessibility gains when the national HSR network expands.

The identifying assumption is that, conditional on fixed effects and controls, historical railway proximity affects contemporary land prices only through its interaction with national HSR expansion and the resulting HSR-induced change in accessibility. Historical railway proximity itself is included directly in the regression so that identification comes from differential exposure to aggregate HSR growth over time, rather than from cross-sectional differences in historical transport endowments alone.

Table A5 reports the second-stage IV estimates using historical railway exposure interacted with national HSR expansion as an instrument for the HSR-induced change in market access. Across all specifications, the coefficient on HSR-induced market access remains positive and statistically significant, with point estimates ranging from about 0.81 to

1.18. In the richer specifications, the estimated coefficient is around 0.9, implying roughly a 9% increase in the county-year average unit price of land transfer for a 0.1 log point increase in ΔMA . This confirms that the accessibility gains generated specifically by high-speed rail are capitalized into land prices even after instrumenting for potential endogeneity. The other coefficients are broadly similar in sign to the baseline results.

7 Exploring Potential Mechanisms

A central question in this paper is not only whether market access improves local economic conditions, but also through which fiscal channel these gains may translate into stronger government capacity and, ultimately, a higher likelihood of meeting growth targets. If improved accessibility raises local fiscal resources, local governments may gain more room to finance infrastructure, support investment, facilitate industrial development, and sustain other growth-oriented policies. In the Chinese institutional context, one plausible mechanism is land-based finance. Better market access can increase the value of developable land, expand the scale of land conveyance, and thereby strengthen local fiscal revenue. To examine this mechanism more directly, [Table 4](#) reports mediation regressions that use county-year fiscal revenue as the outcome and compare the roles of land prices and land conveyance revenue⁸. A necessary condition for this exercise is that market access be systematically related to the proposed mediators⁹.

Panel A uses log GDP-weighted market access as the core explanatory variable. Column (1) reports the baseline relationship between market access and county fiscal revenue. The coefficient on log GDP-weighted market access is 0.128 and highly significant, indicating that counties with better market access tend to collect higher fiscal revenue. Column (2) adds the log unit price of land transfer. Land prices enter positively and significantly, but the coefficient on market access falls only slightly, from 0.128 to 0.122. This implies that land prices explain only a modest share of the fiscal effect, roughly 5 percent. Column (3) instead adds log land conveyance revenue. In this case, land conveyance revenue enters strongly and positively, with a coefficient of 0.228, while the coefficient on market access

⁸Because growth target attainment is only observed at the city-year level, while the land-market variables used in the mediation analysis are constructed at the county-year level, the two cannot be matched in a fully consistent way within the same empirical framework. I therefore focus the formal mediation analysis on county-level fiscal revenue and treat the link to target completion as suggestive rather than part of the main mediation exercise.

⁹This is indeed the case: [Table A2](#) shows that higher market access significantly raises county-level unit land prices, while [Table A3](#) shows that it also significantly increases county-level land conveyance revenue.

declines substantially, from 0.128 to 0.091. This attenuation implies that land conveyance revenue explains about 29 percent of the total fiscal effect of market access. Column (4) includes both log unit land prices and log land conveyance revenue jointly. The coefficient on land conveyance revenue remains large and highly significant at 0.224, while the coefficient on unit land prices becomes small and statistically insignificant. At the same time, the coefficient on market access remains essentially unchanged relative to Column (3), at 0.091. This pattern indicates that the land-based fiscal channel operates primarily through aggregate land conveyance revenue rather than through land price appreciation. Panel B repeats the same exercise using the HSR-induced change in market access. The results closely mirror those in Panel A, whether market access is captured by its overall level or by the component induced by high-speed rail expansion, the same conclusion emerges.

Taken together, the results support a mediated fiscal mechanism. Improved market access raises local fiscal revenue in part through land-based revenue expansion, and this channel is quantitatively important. At the same time, the coefficient on market access remains positive and significant even after controlling for land conveyance revenue, indicating that land-based finance is not the only pathway through which accessibility improvements strengthen local public finances. This is consistent with the broader idea that better market access can stimulate local business activity and production ([Donaldson and Hornbeck, 2016](#); [Herzog, 2021](#)), thereby expanding the underlying tax base and strengthening local fiscal capacity through channels beyond land transactions ([Annez et al., 2008](#)). This finding helps clarify why market access may matter for growth target attainment. The evidence suggests that accessibility gains do not simply raise land prices in a narrow asset-market sense; rather, they expand the fiscal resources available to local governments through stronger land conveyance revenue. In turn, stronger fiscal capacity can support the types of local spending and development efforts that make it easier for governments to meet ambitious growth objectives. In this sense, land-based revenue is an important intermediate link between transport-driven market integration and local political-economic performance.

8 Conclusion

This paper studies how high-speed rail affects local public finance through the land market in China. Rather than viewing HSR only as a transport technology, I emphasize its role in reshaping market access. By improving connections to surrounding economic mass and reducing effective transport costs, HSR increases the value of land and expands the fiscal

Table 4: Mediating Role of Land-Based Revenue

	Dependent Variable: Log County-Year Fiscal Revenue			
	(1)	(2)	(3)	(4)
Panel A: Overall Market Access				
Log GDP-weighted MA	0.128*** (0.009)	0.122*** (0.008)	0.091*** (0.007)	0.091*** (0.007)
Log Unit Price of Land Transfer		0.190*** (0.015)		0.018 (0.013)
Log Land Revenue			0.228*** (0.009)	0.224*** (0.009)
Observations	20,860	20,860	20,860	20,860
R^2	0.7198	0.7284	0.7633	0.7634
Panel B: HSR-induced Market Access				
HSR-induced Change in MA	0.131*** (0.021)	0.126*** (0.021)	0.092*** (0.018)	0.092*** (0.018)
Log Unit Price of Land Transfer		0.208*** (0.016)		0.017 (0.014)
Log Land Revenue			0.247*** (0.010)	0.243*** (0.010)
Observations	20,839	20,839	20,839	20,839
R^2	0.7021	0.7125	0.7546	0.7547
City FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓

Notes: This table examines whether land-market outcomes mediate the effect of market access on county-year fiscal revenue. Panel A uses log GDP-weighted market access, while Panel B uses the HSR-induced change in market access. Columns (2) and (4) add log unit land prices, and Columns (3) and (4) add log total county land revenue. The results show that land revenue substantially attenuates the coefficient on market access, whereas unit land prices account for only a modest share of the fiscal effect. All specifications include city and year fixed effects, and standard errors are clustered at the county level.

resources available to local governments. Using a county-year measure of market access constructed from a multimodal transport network, I show that better market access is associated with higher land transfer prices. This result is robust to alternative weighting schemes, county-level aggregation, and direct parcel-level measures of proximity to HSR

stations. I further isolate the HSR-induced component of market access and show that the accessibility gains attributable specifically to high-speed rail are capitalized into land prices. Instrumental variable estimates based on historical railway exposure and national HSR expansion confirm this positive effect.

The paper also explores the fiscal mechanism behind these effects. The evidence suggests that improved market access strengthens local public finance primarily through higher land conveyance revenue rather than through unit land prices alone. This finding highlights an important channel through which transportation infrastructure can increase local state capacity in a system where land-based finance remains central to development. More broadly, the results suggest that the value of HSR in China should be understood not only in terms of mobility or regional growth, but also in terms of its fiscal consequences for local governments. In a political and institutional setting where local officials face strong development incentives, transportation infrastructure may matter in part because it relaxes fiscal constraints and supports growth-oriented policy objectives.

References

- Allen, T. and Arkolakis, C. (2022). The welfare effects of transportation infrastructure improvements. *Review of Economic Studies*, 89(6):2911–2957.
- Annez, P. C., Huet, G., and Peterson, G. E. (2008). *Lessons for the Urban Century: Decentralized Infrastructure Finance in the World Bank*. World Bank Publications.
- Bai, C.-E., Hsieh, C.-T., and Song, Z. M. (2016). The long shadow of a fiscal expansion. Nber working paper, National Bureau of Economic Research.
- Bao, H. X. H., Wang, Z., and Wu, R. (2024). Understanding local government debt financing of infrastructure projects in china: Evidence based on accounting data from local government financing vehicles. *Land Use Policy*, 136:106964.
- Baum-Snow, N., Brandt, L., Henderson, J. V., Turner, M. A., and Zhang, Q. (2017). Roads, railroads, and decentralization of chinese cities. *Review of Economics and Statistics*, 99(3):435–448.
- Chang, Z. and Diao, M. (2022). Inter-city transport infrastructure and intra-city housing markets: Estimating the redistribution effect of high-speed rail in shenzhen, china. *Urban Studies*, 59(4):870–889.
- Chang, Z., Diao, M., Jing, K., and Zheng, L. (2026). High-speed rail and economic growth: a market access–based economic impact evaluation in china. *Transportation Research Interdisciplinary Perspectives*, page 101835.
- Chang, Z. and Zheng, L. (2022). High-speed rail and the spatial pattern of new firm births: Evidence from china. *Transportation Research Part A: Policy and Practice*, 155:373–386.
- Chang, Z., Zheng, L., Yang, J., and Long, F. (2022). High-speed rail, new town development, and the spatial mismatch of land leases in china. *Land Use Policy*, 115:106014.
- Chiovelli, G., Michalopoulos, S., and Papaioannou, E. (2018). Landmines and spatial development. Nber working paper, National Bureau of Economic Research.
- Davis, S. J., Qian, M., and Zeng, W. (2025). A comprehensive gis database for china’s surface transport network with implications for transport and socioeconomics research. NBER Working Paper 33515, National Bureau of Economic Research. Revised March 2025.
- Donaldson, D. (2018). Railroads of the raj: Estimating the impact of transportation infrastructure. *American Economic Review*, 108(4-5):899–934.
- Donaldson, D. and Hornbeck, R. (2016). Railroads and american economic growth: A “market access” approach. *Quarterly Journal of Economics*, 131(2):799–858.
- Duranton, G. and Turner, M. A. (2012). Urban growth and transportation. *Review of Economic Studies*, 79(4):1407–1440.
- Faber, B. (2014). Trade integration, market size, and industrialization: Evidence from china’s national trunk highway system. *Review of Economic Studies*, 81(3):1046–1070.

- Feng, Y., Wu, F., and Zhang, F. (2024). Turning land into assets: Local government borrowing through land assetization in china. *Urban Geography*.
- Guo, S. and Shi, Y. (2018). Infrastructure investment in china: A model of local government choice under land financing. *Journal of Asian Economics*, 56:24–35.
- Han, L. and Kung, J. K.-s. (2015). Fiscal incentives and policy choices of local governments: Evidence from china. *Journal of Development Economics*, 116:89–104.
- Herzog, I. (2021). National transportation networks, market access, and regional economic growth. *Journal of Urban Economics*, 122:103316.
- Lao, J. (2016). High-speed rail profitability map: Eastern china booms while central and western china suffer heavy losses. *China Economic Weekly*, (30):62–64. In Chinese. Original title: .
- Mo, J. (2018). Land financing and economic growth: Evidence from chinese counties. *China Economic Review*, 50:218–239.
- National Development and Reform Commission (2016). Medium and long-term railway planning. https://www.gov.cn/xinwen/2016-07/20/content_5093165.htm. Accessed online.
- Ollivier, G., Bullock, R., Jin, Y., and Zhou, N. (2014). High-speed railways in china: A look at traffic. *China Transport Topics*, (11):1–12.
- Qin, Y. (2017). “no county left behind?” the distributional impact of high-speed rail upgrades in china. *Journal of Economic Geography*, 17(3):489–520.
- Redding, S. J. and Rossi-Hansberg, E. (2017). Quantitative spatial economics. *Annual Review of Economics*, 9(1):21–58.
- Redding, S. J. and Turner, M. A. (2015). Transportation costs and the spatial organization of economic activity. In Duranton, G., Henderson, J. V., and Strange, W. C., editors, *Handbook of Regional and Urban Economics*, volume 5, pages 1339–1398. Elsevier, Amsterdam.
- Rithmire, M. E. (2015). *Land Bargains and Chinese Capitalism: The Politics of Property Rights under Reform*. Cambridge University Press.
- Wu, F. (2022). Land financialisation and the financing of urban development in china. *Land Use Policy*, 112:104412.
- Wu, J., Nash, C., and Wang, D. (2014). Is high speed rail an appropriate solution to china’s rail capacity problems? *Journal of Transport Geography*, 40:100–111.
- Xinhua News Agency (2022). China’s high-speed rail mileage continues to expand. News report.
- Yoo, S., Kumagai, J., Kawasaki, K., and Kato, H. (2023). Double-edged trains: Economic outcomes and regional disparity of high-speed railways. *Transport Policy*, 133:120–133.
- Zheng, L., Chang, Z., and González-Navarro, M. (2022). High-speed rail, market access, and the rise of consumer cities: Evidence from china. *Transportation Research Part A: Policy and Practice*, 165:454–470.

Appendix A Robustness Tests

Table A1: Robustness 1: Illumination-weighted Market Access

	Dependent Variable: Log Unit Price of Land Transfer				
	(1)	(2)	(3)	(4)	(5)
Log Illumination-weighted Market Access	0.075*** (0.009)	0.050*** (0.007)	0.068*** (0.007)	0.067*** (0.006)	0.040*** (0.007)
Land Grade				-0.009*** (0.001)	-0.009*** (0.001)
Lease Term (Years)				0.243*** (0.032)	0.245*** (0.034)
Maximum Floor Area Ratio				0.210*** (0.025)	0.202*** (0.024)
Distance to City Center					-0.088*** (0.010)
Distance to Provincial Capital					-0.093*** (0.027)
Population					-0.000 (0.000)
Regional Development Zone					-0.011 (0.208)
Terrain Ruggedness					-0.054 (0.035)
Year FE	✓	✓	✓	✓	✓
City FE		✓	✓	✓	✓
Industry FE			✓	✓	✓
Controls				✓	✓
Observations	1,390,550	1,333,598	1,268,055	919,020	658,699
R^2	0.1290	0.2465	0.4893	0.5420	0.5449

Notes: As a robustness check for [Table 1](#), the dependent variable is the log of the unit price of land transfer. The main explanatory variable is the log of illumination-weighted market access (rather than GDP weighted). Standard errors clustered at the county level are reported in parentheses.

Table A2: Robustness 2: Using County-Level Average Land Prices

	Dependent Variable: Log Average Unit Price of Land			
	(1)	(2)	(3)	(4)
Log GDP-weighted Market Access	0.123*** (0.005)	0.043*** (0.006)	0.043*** (0.006)	0.015*** (0.006)
Average Land Grade			-0.014*** (0.002)	-0.015*** (0.002)
Average Lease Term (Years)			0.214*** (0.035)	0.233*** (0.040)
Average Maximum FAR			0.098*** (0.024)	0.102*** (0.026)
Distance to City Center				-0.048*** (0.010)
Distance to Provincial Capital				-0.113*** (0.026)
Population				-0.000 (0.000)
Regional Development Zone				0.700*** (0.190)
Terrain Ruggedness				-0.087*** (0.029)
Year FE	✓	✓	✓	✓
City FE		✓	✓	✓
Controls			✓	✓
Observations	30,768	29,788	29,204	21,257
R^2	0.2938	0.5027	0.5147	0.5124

Standard errors clustered at the county level are reported in parentheses.

Notes: This table reports a robustness check based on a county-year aggregation of the parcel-level transaction data. Variables that are originally defined at the county-year level are carried over directly, while parcel-level characteristics are converted into county-year measures by taking within-county averages. Accordingly, land grade, lease term, and maximum floor area ratio (FAR) enter as county-year averages, whereas distance to the prefecture-level city center, distance to the provincial capital, population, the regional development zone indicator, and terrain ruggedness remain in their original county-level form. Industry fixed effects are not included in this specification, since land-use categories cannot be cleanly aggregated to the county-year level in a way that preserves the original parcel-level industry classification.

Table A3: Market Access and Land Revenue

	Dependent Variable: Log Land Transfer Revenue				
	(1)	(2)	(3)	(4)	(5)
Log GDP-weighted Market Access	0.388*** (0.011)	0.347*** (0.012)	0.163*** (0.014)	0.180*** (0.012)	0.107*** (0.012)
Average Land Grade				0.004 (0.003)	0.006* (0.003)
Average Lease Term				0.313*** (0.073)	0.270*** (0.078)
Average Maximum FAR				0.055 (0.050)	0.075 (0.053)
Distance to City Center					-0.135*** (0.023)
Distance to Provincial Capital					-0.119*** (0.046)
Population					-0.000 (0.000)
Regional Development Zone					0.648** (0.305)
Terrain Ruggedness					-0.386*** (0.050)
Year FE		✓	✓	✓	✓
City FE			✓	✓	✓
Controls				✓	✓
Observations	27,380	27,378	26,479	26,243	19,011
R^2	0.2420	0.3369	0.6076	0.6193	0.6328

Standard errors clustered at the county level are reported in parentheses.

Notes: The new dependent variable is log land revenue. The main explanatory variable is the log of GDP-weighted market access, constructed using the minimum travel time across four transportation modes (high-speed rail, conventional rail, highways, and waterways).

Table A4: Sensitivity to Maximum Effective Distance from High-Speed Rail Stations

Dependent Variable: Log Unit Price of Land Transfer				
	(1)	(2)	(3)	(4)
Panel A: Parcels within 100 km of the Nearest HSR Station				
Log Distance to the Nearest HSR Station	-0.146*** (0.032)	-0.110*** (0.013)	-0.090*** (0.012)	-0.100*** (0.011)
Land Grade				-0.009*** (0.001)
Lease Term (Years)				0.236*** (0.053)
Maximum Floor Area Ratio				0.322*** (0.036)
Observations	871,971	871,968	809,884	597,004
R^2	0.0440	0.1819	0.4872	0.5521
Panel B: Parcels within 30 km of the Nearest HSR Station				
Log Distance to the Nearest HSR Station	-0.140*** (0.042)	-0.199*** (0.021)	-0.112*** (0.018)	-0.119*** (0.017)
Land Grade				-0.006*** (0.002)
Lease Term (Years)				0.209** (0.090)
Maximum Floor Area Ratio				0.292*** (0.048)
Observations	440,911	440,904	404,266	295,534
R^2	0.0265	0.1911	0.4956	0.5513
Year FE	✓	✓	✓	✓
City FE		✓	✓	✓
Industry FE			✓	✓
Parcel Controls				✓

Notes: This table examines the sensitivity of the parcel-level HSR proximity results to imposing a maximum effective distance from the nearest high-speed rail station. Panel A restricts the sample to parcels located within 100 km of the nearest operating HSR station, while Panel B restricts the sample to parcels within 30 km. Standard errors clustered at the county level are reported in parentheses.

Table A5: IV Estimates of HSR-Induced Market Access and Average Land Prices

	Dependent Variable: Log Average Unit Price of Land Transfer				
	(1)	(2)	(3)	(4)	(5)
HSR-induced Change in Market Access	1.183*** (0.408)	1.129*** (0.386)	0.807** (0.316)	0.901*** (0.321)	0.930** (0.392)
Historical Railway Proximity	0.263** (0.109)	0.282*** (0.105)	0.194** (0.093)	0.130 (0.093)	0.028 (0.094)
Land Grade				-0.015*** (0.002)	-0.015*** (0.002)
Lease Term (Years)				0.223*** (0.038)	0.222*** (0.045)
Maximum Floor Area Ratio				0.082*** (0.027)	0.079*** (0.030)
Distance to City Center					-0.036*** (0.013)
Distance to Provincial Capital					-0.109*** (0.031)
Population					-0.000 (0.000)
Regional Development Zone					0.684*** (0.208)
Terrain Ruggedness					-0.047 (0.040)
Year FE		✓	✓	✓	✓
City FE			✓	✓	✓
Controls				✓	✓
Observations	29,345	29,345	29,344	28,770	21,221
KP rk Wald F statistic	18.42	18.75	19.08	18.75	15.70

Notes: This table reports second-stage IV estimates of the effect of the HSR-induced change in market access on county-year average land prices. The endogenous variable is the HSR-induced change in market access, defined as the difference between actual market access and the counterfactual market access computed in the absence of high-speed rail. The excluded instrument is constructed as the interaction between historical railway proximity in 1962 and national HSR expansion. Historical railway proximity is included directly as an exogenous control. Parcel-average controls include average land grade, average lease term, and average maximum floor area ratio (FAR). County controls include distance to the prefecture-level city center, distance to the provincial capital, population, whether the county belongs to the Yangtze River Economic Belt, and terrain ruggedness. Standard errors clustered at the county level are reported in parentheses.

Figure A1: High Speed Rail Expansion



(a) 2005



(b) 2010



(c) 2015



(d) 2020