

JCER Working Paper
AEPR series
No. 2025-2-5

This paper is under review for possible publication in the Asian Economic Policy Review and is not the final peer reviewed version.

Large-Scale Infrastructure for Better Connectivity:
The Case of the Mumbai Trans-Harbour Link

Hana Ashida (JICA)
Tetsuya Harada (JICA)
Fumiaki Ishizuka (JICA)
Kentaro Nakajima (Hitotsubashi University)
Yasuyuki Sawada (University of Tokyo)
Annie Srivastava (JICA)

This paper was prepared for the Fortieth Asian Economic Policy Review (AEPR) Conference “Connectivity in Asia: Urbanization, Subregional Integration, and Global Value Chains” October 4, 2025, Tokyo.

October 2025

Asian Economic Policy Review
Japan Center for Economic Research



To authors

If you want to introduce the same working paper you wrote and presented at the AEPR conference held in Tokyo on October 4, 2025, in your own/your affiliation's website, please be aware the following requirements.

To ensure that all citations and references to your published article are captured by the SSCI (Social Sciences Citation Index), authors are required to amend the cover page of your working paper as soon as practical after publication in AEPR. The amended cover page should include the full article citation, journal name, volume and issue, and DOI, as well as a hyperlink to the published article. Here is an example of an amended working paper cover page.

JCER Working Paper

AEPR series

No.●●●

This is the pre-peer-reviewed version of the following article
"Japan's New Foreign Economic Policy: A Shift Toward a
Strategic and Activist Model?", *Asian Economic Policy Review*,
vol. 2, issue 2, which has been published in final form at
<http://onlinelibrary.wiley.com/doi/10.1111/j.1748-3131.2007.00071.x/abstract> and DOI: 10.1111/j.1748-3131.2007.00071.x.

Full
Cite

Link to final article

Large-Scale Infrastructure for Better Connectivity: The Case of the Mumbai Trans-Harbour Link

Hana Ashida[†], Tetsuya Harada[†], Fumiaki Ishizuka^{*},
Kentaro Nakajima[‡], Yasuyuki Sawada[§], Annie Srivastava[†]

October 6, 2025

Abstract

This paper evaluates the impact of the Mumbai Trans Harbour Link (MTHL) on land prices by employing variants of a difference-in-differences framework: (i) a continuous treatment using distance to MTHL, (ii) piecewise distance bands from MTHL, and (iii) a discrete treatment defined by a distance threshold from MTHL. Within Mumbai City District, land parcels closer to the bridge exhibit larger post-opening price increases. When the sample is expanded to include the Mumbai Suburban District, higher post-opening growth was occasionally observed farther from the bridge, arguably reflecting structural differences between the districts, such as faster baseline appreciation and recent metro investments in the Suburban District, and network effects arising from integration into the existing road system.

[†] Japan International Cooperation Agency (JICA)

^{*} JICA, corresponding author: ishizuka.fumiaki@jica.go.jp

[‡] Hitotsubashi University

[§] University of Tokyo

1 Introduction

The role of physical infrastructure in the process of industrialization and economic development has been recognized for decades. A substantial body of theoretical and empirical research consistently highlights its critical role in sustaining long-term growth and improving welfare. This research ranges from macroeconomic growth models to micro-level analyses (Munnell, 1992; Gramlich, 1994; Sawada, 2015; Foster et al., 2023a,b). Infrastructure is broadly classified into two categories: economic infrastructure and social infrastructure. The former encompasses transportation, telecommunications, irrigation systems, and electricity, while the latter includes water supply, sanitation, hospitals, and schools. Among them, large-scale transport infrastructure facilitates expeditious and substantial transportation between separate places, serving as a key driver of urban and regional connectivity and economic development. To illustrate, a long span bridge connects areas that are divided by bodies of water such as seas or large rivers. This development has the potential to profoundly alter the way individuals access employment opportunities and their daily commutes within a metropolitan area. Consequently, changes in accessibility exert a significant influence on local economic activities, including the choice of the location of firms and residents, thus contributing to the reshaping of the urban structure.

There is an increasing imperative to comprehend the impacts of large-scale transport infrastructure, particularly in mega-cities within emerging economies. The expansion of these cities has been necessitated by the increase in population, which has concomitantly given rise to a number of deleterious consequences, including congestion and soaring real estate prices. Rapid urbanization and motorization typically accompany economic development, yet when infrastructure investment lags, transport bottlenecks, and severe congestion emerge. Conversely, well-timed transport projects can ease these frictions, and market price mechanisms offer a natural lens for evaluation: improvements in local public goods should be capitalized into land values. However, Causal evidence from developing country settings remains limited. Estimating causal impacts of large-scale infrastructure is inherently challenging. This is due to the fact that experimental methods, such as randomized controlled trials (RCT), are not feasible (Sawada, 2015; Raitzer et al., 2019).

In this paper, our aim is to partly bridge this gap in the existing literature by assessing the impact of the MTHL, which opened in January 2024 and connects Mumbai City and the opposite shore. The MTHL is India’s longest sea bridge and is the 12th longest in the world. To evaluate its impact, we employ a difference-in-differences framework based on proximity to the bridge, examining changes in real estate prices between 2014 and 2025 in Mumbai City and Mumbai Suburban districts.

To preview our study, two main findings emerge. First, an analysis of real estate prices within the Mumbai City district reveals a notable increase in land values in areas close to the bridge after its inauguration. Second, when suburban areas are included in the analysis, a higher price growth is sometimes observed farther from the bridge. This outcome is indicative of structural differences: Compared to the saturated urban core, suburban markets have likely experienced faster price appreciation reinforced by infrastructure developments such as new metro lines. As these suburban areas are also located farther from the MTHL, the bridges benefits are relatively weaker there. Presumably, local infrastructure improvements and strong baseline dynamics dominate, which dampens the extent to which the MTHL influences suburban land prices and results in higher observed increases in areas farther from the bridge. Furthermore, network effects, which are derived from the integration of the MTHL into the existing road system, as well as associated congestion and rerouting, suggest that the impact does not show a simple monotonic decay with distance.

We believe that our present paper contributes to the existing body of evidence on the impact of enhanced connectivity by focusing on the development of large-scale urban transport infrastructure, an area where empirical studies remain relatively scarce ([Raitzer et al., 2019](#)). Given Mumbai’s status as one of the most congested cities in India and worldwide, a rigorous evaluation of a major transport investment can yield critical insights into infrastructure’s role in economic development. Specifically, it contributes novel evidence to the existing body of literature on the subject of long span bridges ([Lee et al., 2020](#); [Mahmud and Sawada, 2018](#); [Blankespoor et al., 2022](#); [Bütikofer et al., 2024](#); [Tompsett, 2025](#)). To our knowledge, this constitutes the first effort to analyze the impact of a large-scale bridge on the values of urban properties.

The present paper is divided into several sections. The next section provides a literature

review, followed by Section 3 that introduces the background of the MTHL. Section 4 delineates the data sources utilized in this analysis. In Section 5, the identification strategy and estimation model that were used are introduced. In Section 6, the results of the analysis are described and discussed. The seventh section of the text has reached its conclusion.

2 Literature Review

The impact of infrastructure has been surveyed in many antecedents, including [Munnell \(1992\)](#); [Gramlich \(1994\)](#); [Sawada \(2015\)](#); [Foster et al. \(2023a,b\)](#). In line with this trend, [Redding and Turner \(2015\)](#); [Raitzer et al. \(2019\)](#); [Roberts et al. \(2020\)](#); [Gonzalez-Navarro et al. \(2023\)](#); [Donaldson \(2025\)](#) have provided transport infrastructure surveys in recent years. [Raitzer et al. \(2019\)](#) reviews extant literature on the subject and reveals a conspicuous absence of coverage of the infrastructure. The study posits that the preponderance of impact evaluations is centered on road infrastructure, particularly in rural areas, leading to a dearth of evidence regarding rail, urban mass transit, and sea and air travel. [Gonzalez-Navarro et al. \(2023\)](#) provides a comprehensive review of land transport infrastructure and argues that the literature on this subject is expanding rapidly, mainly driven by the availability of new spatial data and the adoption of trade and gravity models. Furthermore, it posits that transport infrastructure has the potential to generate significant gains, yet not all locations benefit equally from these investments. [Donaldson \(2025\)](#) conducts a comprehensive review of the existing literature on transport infrastructure and policy evaluation focusing primarily on the literature on regional and urban economics. It suggests three directions for future research: dynamic analysis, the study of inequality, and the focus on lower-income economies.

In light of the conclusions drawn from these review articles, a comprehensive examination of recent journal articles and working papers has been carried out to determine the impact of large-scale transport infrastructure. The present study places particular emphasis on papers published in 2020 and subsequent years. Consequently, three prevailing trends are evident: an increase in the variety of infrastructure categories, a transition toward the utilization of alternative data sources, and a synthesis of reduced-form analysis with estimates derived from economic models. The subsequent subsections will provide a detailed exposition of

these concepts.

2.1 Expanded Scope of Infrastructure Evaluation

Recent literature has broadened the scope of transport infrastructure types examined. A notable development is the proliferation of literature on rail and urban mass transit, two infrastructure categories that [Raitzer et al. \(2019\)](#) identified as lacking research. The recent seminal literature includes [Banerjee et al. \(2020\)](#); [Heblich et al. \(2020\)](#); [Fenske et al. \(2023\)](#); [Américo \(2024\)](#); [Andersson et al. \(2023\)](#); [Berger and Prawitz \(2024\)](#); [Chen et al. \(2022\)](#); [Lindgren et al. \(2021\)](#); [Nagy \(2023\)](#); [Hornbeck and Rotemberg \(2024\)](#) for railway network and [Zárate \(2022\)](#); [Khanna et al. \(2022\)](#); [Koh et al. \(2025\)](#); [Gendron-Carrier et al. \(2022\)](#); [Lee and Tan \(2024\)](#); [Gu et al. \(2021\)](#) for urban mass transit. A substantial body of research has been amassed on the impact of high-speed rail ([Tian and Yu, 2024](#); [Barwick et al., 2024](#); [Gao and Zheng, 2020](#); [Qin et al., 2025](#); [Hayakawa et al., 2021](#)). These include evidence on diverse outcomes such as crime, air pollution, job formalization, inequality, technology adoption and innovation. In regard to the methodological approach, in addition to reduced-form analyses that utilize causal inference tools such as instrumental variables and difference-in-differences methods, there has been an escalating number of studies that employ structural estimation models.

As [Raitzer et al. \(2019\)](#) have noted, the extant literature on the impact of road infrastructure is extensive. This body of literature has continued to expand. The following sources were consulted: [Bird et al. \(2020\)](#); [Lall and Lebrand \(2020\)](#); [Sotelo \(2019\)](#); [Fan et al. \(2023\)](#); [Balboni \(2025\)](#); [Alder \(2025\)](#); [Morten and Oliveira \(2024\)](#); [Pellegrina and Sotelo \(2023\)](#); [Baldomero-Quintana \(2025\)](#); [Ahmed et al. \(2024\)](#); [Allen and Atkin \(2022\)](#); [Abeberese and Chen \(2022\)](#); [Araujo et al. \(2025\)](#); [Chen et al. \(2023\)](#); [Brooks et al. \(2021\)](#); [Frye \(2024\)](#); [Gollin and Wolfersberger \(2024\)](#); [Herzog et al. \(2024\)](#); [Milsom \(2023\)](#); [Kaboski et al. \(2024\)](#); [Mahajan \(2024\)](#); [Jedwab and Storeygard \(2022\)](#) for highway or intercity road network; and [Alder et al. \(2023a\)](#); [Shamdasani \(2021\)](#); [Gebresilasse \(2023\)](#); [Asher and Novosad \(2020\)](#); [Brooks and Donovan \(2020\)](#); [Adamopoulos \(2025\)](#) for rural road. The recently discovered evidence offers a multifaceted interpretation of the impact of road infrastructure. [Gonzalez-Navarro et al. \(2023\)](#) summarize the existing literature on the subject, concluding that intercity trans-

portation tends to benefit relatively more developed or industrial areas than rural or less developed ones. The authors also note that there is no clear evidence that rural roads have a transformative effect on rural villages.

In the context of our study, it is important to note that the analysis of bridges, a type of road infrastructure, is relatively limited. The construction of long span bridges requires substantial investment, yet these bridges hold the potential to profoundly impact regional connectivity by bridging expanses of water that traditionally separate economic regions. Among the long span bridges previously studied are the Nanpu Bridge in Shanghai (Lee et al., 2020), Bangladesh’s Jamuna Bridge (Mahmud and Sawada, 2018; Blankespoor et al., 2022), and the Öresund Bridge between Denmark and Sweden (Bütikofer et al., 2024). Among these, Bütikofer et al. (2024) examines the impact of access to larger labor markets on wages and employment by employing a difference-in-differences method, controlling for proximity to the bridge. The bridge is found to lead to a significant increase in cross-country commuting of the Swedes and a 13.5% increase in the average wage of workers in the region. Tompsett (2025) estimates the impact of bridges between the Mississippi and Ohio rivers by exploiting variations in the location and timing of bridge construction. The enhanced connectivity exhibited a predominantly positive impact on per capita economic activity over large spatial scales, but adverse effects are manifested over smaller spatial scales (less than 5 km). These adverse effects can be explained by the presence of local sorting processes within cities that emerge along early transport routes.

2.2 Use of Alternative Data

Recent advances in accessing innovative big data, characterized by high volume, velocity, and variety, have begun to enable researchers and policy makers to overcome drawbacks in existing studies by conducting granular assessments of infrastructure in a timely manner. Go et al. (2023) summarizes the limitations associated with using government statistics as a primary source for infrastructure impact analysis. These limitations encompass three primary aspects: first, a deficiency in the timeliness of data compilation from surveys for analytical purposes; second, an absence of the optimal frequency for evaluating analyses; and third, a paucity of spatial granularity that hinders the analysis of heterogeneous effects

across administrative units. The recent advent of alternative data, including satellite imagery and global positioning system (GPS) location data, has precipitated a paradigm shift in the evaluation of the impact of transport infrastructure. This shift is based on the ability of these alternative data sources to circumvent the limitations discussed above.

The first strand of literature that uses alternative data for transport infrastructure impact analysis uses satellite imagery, both during the day and at night (Lee et al., 2020; Go et al., 2023; Baragwanath et al., 2024; Alder et al., 2023a; Bluhm et al., 2025). Nighttime luminosity serves as a reliable indicator of the intensity of economic activities (Asher et al., 2021; Gibson et al., 2020; Donaldson and Storeygard, 2016), while daytime imagery is found to be a valuable source of information on specific outcomes, such as household welfare (Huang et al., 2021; Marx et al., 2019), the use of land (Lee et al., 2020; Alder et al., 2023a) and the intensity of economic activity (Sturm et al., 2023; Go et al., 2023). Among these, Go et al. (2023) developed novel vehicle density data obtained from daytime satellite images to quantify local economic activity involving human and goods traffic flow, and evaluated the impact of the opening of a new international airport terminal in the Philippines.

The second group of literature uses substantial and frequent GPS location data to estimate the impact of transport infrastructure (Gupta et al., 2022; Kreindler et al., 2023; Alder et al., 2023b). GPS location data is provided by smartphones and used to analyze mobility patterns of people and location choices of households and firms (Testoni et al., 2022; Blanchard et al., 2023; Couture et al., 2022, 2025; Athey et al., 2021; Atkin et al., 2022; Miyauchi et al., 2025; Sheng et al., 2022). The data can also be collected from the GPS tracker device installed in trucks or buses (Allen et al., 2024; Alder et al., 2023b; Barnwal et al., 2024; Kreindler et al., 2023). As with smartphone GPS, call details records (CDRs) are demonstrated to be a useful tool for identifying the locations of individuals' residences and their mobility destinations (Büchel et al., 2020; Kreindler and Miyauchi, 2023; Sturm et al., 2023).

Finally, the literature on the impact of transport infrastructure that uses real-time and super-frequent travel time data, such as Google Map routing data, also emerges. The literature assesses the impact of urban mass transit on traffic congestion (Widita et al., 2023; Widita, 2024; Gu et al., 2021; Yamada and Jiang, 2025). The reliability of Google Map

routing data is verified using a number of alternative data sources, including data on actual trips (Akbar et al., 2023). Yamada and Jiang (2025) collected the data using the algorithm developed by Akbar et al. (2023) and used it to analyze the impact of the first rail-based urban mass transit system in Dhaka, Bangladesh. It finds a substantially large impact of increasing vehicle speed along the treatment corridor that hosts the viaduct of the mass transit.

2.3 Use of Structural Models

Redding and Turner (2015) underscore the significance of employing structural models to assess the impact of transport infrastructure. While significant efforts have been made to address the issue of nonrandom assignment of infrastructure, comparatively less attention has been directed toward differentiating between growth (in terms of its effect on the amount of economic activity) and reorganization (of preexisting economic activity). Despite the implementation of causal identification strategies to address the initial issue of endogeneity, such as instrumental variables and difference in differences methods, the subsequent problem persists. The generation of counterfactual scenarios by these models enables the assessment of the impact of reduced transportation costs on the spatial organization of economic activity under general equilibrium. Redding (2025) demonstrates the capability of quantitative urban models to predict the reorganization of economic activity within cities in response to transport improvements by comparing evaluations using conventional cost-benefit analysis, sufficient statistics approaches based on changes in market access, and model-based counterfactuals.

The literature employing these models can be divided into two broad categories: inter-city and intracity. The literature of the former group involves economic geography models that focus on the role of inter-regional transportation, such as railroads and highways, especially in the trade of goods between cities (Donaldson and Hornbeck, 2016; Donaldson, 2018; Alder, 2025; Baldomero-Quintana, 2025; Baragwanath et al., 2024; Bird et al., 2020; Lall and Lebrand, 2020; Fan et al., 2023; Morten and Oliveira, 2024; Pellegrina and Sotelo, 2023; Sotelo, 2019; Hornbeck and Rotemberg, 2024; Kaboski et al., 2024; Nagy, 2023; Adamopoulos, 2025; Allen and Atkin, 2022). Among these, Donaldson and Hornbeck (2016) developed

a quantitative model grounded in general equilibrium trade theory. Their findings suggest that, in the absence of the railway network in 1890, agricultural land values in the United States would have been reduced by approximately 60%. Building upon this framework, [Alder \(2025\)](#) proceeded to compare the effect of the Golden Quadrilateral highway network in India to a counterfactual network that connects India's intermediate cities. Their findings revealed that the counterfactual network would imply further aggregate gains and would benefit the lagging regions of the country.

The literature of the other group utilizes urban models that focus on the role of intra-regional transportation, such as road transit and subway, especially in the movement of people within a city ([Heblich et al., 2020](#); [Khanna et al., 2022](#); [Tsivanidis, 2023](#); [Zárate, 2022](#); [Sturm et al., 2023](#)). [Heblich et al. \(2020\)](#) developed a quantitative urban model and estimated the impact of railway network expansion in London during the 19th century. Their counterfactual analysis revealed that the population and the value of land and buildings in London would decrease by more than 50% if the network is removed. [Tsivanidis \(2023\)](#) also analyzes the impact of the bus rapid transit system in Bogotá. To this end, he develops a quantitative urban model with multiple groups of workers and transit modes. The results of the analysis indicate a considerable welfare gain from the system, but little impact on inequality after accounting for reallocation and general equilibrium effects.

Extended quantitative spatial models have also emerged. [Allen and Arkolakis \(2022\)](#) incorporated traffic congestion into both the intracity and intercity models and subsequently quantified the impact of congestion on these models. Their welfare analysis in the United States revealed the highly variable returns to road investment across different links, with the greatest gains occurring in the densest areas of economic activity and at choke points in the network. [Alder et al. \(2023b\)](#) extend the model of [Allen and Arkolakis \(2022\)](#) to incorporate the heterogeneity in the congestion elasticity and structurally estimate the extended model to match the real driving speed and traffic on each road link. [Fajgelbaum and Schaal \(2020\)](#) also incorporates traffic congestion into their model and focuses on allocating an optimal transport network in a general equilibrium framework.

3 Bridging the Mumbai Bay

The Mumbai Trans Harbour Link (MTHL) was first conceived approximately three decades ago with the objective of enhancing connectivity between Mumbai City and the opposite side of the Mumbai bay (Navi-Mumbai), promoting the development of the Navi-Mumbai region, and alleviating traffic congestion in Mumbai City. In February 2009, the Maharashtra State Government decided to have the Mumbai Metropolitan Region Development Authority (MMRDA) own and implement this project.

The project encompasses the construction of a six-lane (3+3 lanes) road with an approximate length of 21.8 km. The sea bridge is estimated to span approximately 16.5 kilometers, with the total length of the contiguous land bridge measuring approximately 5.5 kilometers. This bridge is noteworthy for its distinction as the longest sea bridge in India and its placement as the 12th longest bridge of its kind worldwide. According to official information from the MMRDA, the approved total project cost is 178.43 billion Indian rupees. Construction commenced in March 2018, and the bridge was opened to traffic on January 13, 2024. Concessional financing from Japan was used for the construction. A loan agreement was signed with the Japan International Cooperation Agency (JICA) in March 2017.

The location of the MTHL is indicated by the red line in [Figure 1](#). The MTHL is a toll road, with Sewri on the Mumbai side and Chirle on the opposite Navi-Mumbai side serving as the main entrance ramp, respectively. The ramps in question connect to existing or planned expressways. The entrance and exit ramps on the Mumbai city side (Sewri) are located on the eastern side of the Mumbai peninsula, an area that has historically developed as a commercial center where aging structures stand alongside modern business districts. Upon completion of the ongoing construction of the Sewri-Worli Connector, it is expected to offer direct access to the western side of the peninsula and the existing international airport. On the Navi-Mumbai side, a new international airport is under construction, and multiple economic zones are in the planning stages. Until recently, traversing the expanse to reach the opposite shore of Mumbai Bay necessitated traversing either the Thane Creek Bridge, situated north of the MTHL, or circumventing the northern periphery of the bay.

This project is of importance for the regional development of the entire Mumbai metropoli-



Figure 1: Location of the Mumbai Trans Harbour Link (MTHL)

Source: Mumbai Metropolitan Region Development Authority

Note: The map is based on data as of 2017.

tan area. The project’s initial conception was as a transportation initiative. However, the Maharashtra State Government classified it as a regional development project through a government order in June 2011. The project’s primary objective is to enhance the existing network of transportation infrastructure by establishing new connections between the city of Mumbai and the opposite side of the bay. This initiative is expected to expedite access to the recently initiated construction of the new international airport, which is situated on the Navi-Mumbai side. Moreover, the promotion of regional development in the Navi-Mumbai area is expected to facilitate growth across the entire metropolitan area and contribute to alleviation of congestion in Mumbai City. In the following sections, we analyze the impact of the MTHL on real estate prices in neighboring areas.

4 Data

We have collected real estate data from the database of the Annual Statement of Rates (ASR) of the Department of Registration and Stamps, Government of Maharashtra, via the eASR portal. This is an unbalanced panel data concerning specific land parcels from 2014 to 2025 for each zone and subzone in Mumbai City and Mumbai Suburban Districts. The raw data obtained lack coordinate information. However, leveraging textual data related to the zone, subzone, and street to which each land parcel is assigned, in conjunction with the Google Maps Geocoding API, enabled the approximation of the latitude and longitude for each land parcel. During the scraping and geocoding process, however, a small portion of the data could not be retrieved. We believe that this limitation does not critically affect the results of our analysis.

The ASR is a valuation tool used by the state government to assess the value of real estate, including land and buildings, within the state. It serves as the foundation for calculating Stamp Duty and Registration Fees levied during real estate transactions. For each land parcel, prices are established for five distinct property types: open land, residential flats, office, shops, and industrial facilities. While the ASR does not necessarily represent actual market transaction prices, it is a government-determined reference informed by transaction data from previous years, thereby reflecting market values to a certain extent. Moreover,

reliable data covering diverse property types and large geographic areas is notably scarce. Given this limitation, the ASR is identified as the most suitable dataset for the objectives of this analysis.

Within the Mumbai Metropolitan Region, we focus on the two districts on the western side of Mumbai Bay, Mumbai City and Mumbai Suburban Districts. [Figure 2](#) maps each land parcel and its distance from the entrance ramp of the MTHL on the Mumbai City side. In this figure, the parcels in the Mumbai City District are represented by blue dots and those in the Mumbai Suburban District are represented by green dots. Concentric rings at 1-km intervals indicate the distance from the ramps. The Mumbai City District is located at the tip of the peninsula and encompasses the regions most concentrated central business district (CBD). It includes 341 land parcels in our sample, with an average distance of 4.8 km from the ramps. In contrast, the Mumbai Suburban District occupies the northern portion of the peninsula and corresponds to the suburbs of central Mumbai; it comprises 832 land parcels with an average distance of 15.8 km from the ramps.

It is imperative to acknowledge that the year of application for the ASR and the base year for the underlying land transaction are not congruent. The ASR is determined and published by the end of March each year, based on aggregated data of actual real estate transaction prices up to the previous year, and is applied to the following fiscal year (1 April 1 to 31 March of the following year). The 2025 ASR was determined based on land transaction records up to 2024, reflecting the short-term impact of the MTHL opening in January 2024. Furthermore, ASR revisions were not performed in certain years. The rates for 2018, 2019, 2021, 2023, and 2024 were maintained at the previous year's levels. Consequently, observations from these years have been excluded from the dataset for analysis.

[Table 1](#) reports descriptive statistics for the panel data used in our analysis. The data encompasses the years 2014, 2015, 2016, 2017, 2020, 2022, and 2025. For some land parcels and years, not all five categories of property prices are available. With the exception of open land, average prices are roughly 200,000 rupees per square meter. However, there are large differences between the Mumbai City District and the Mumbai Suburban District. For the Shop, Office, and Residential categories, mean prices in the former are more than twice those in the latter. In contrast, [Table 2](#) shows that price growth rates are substantially

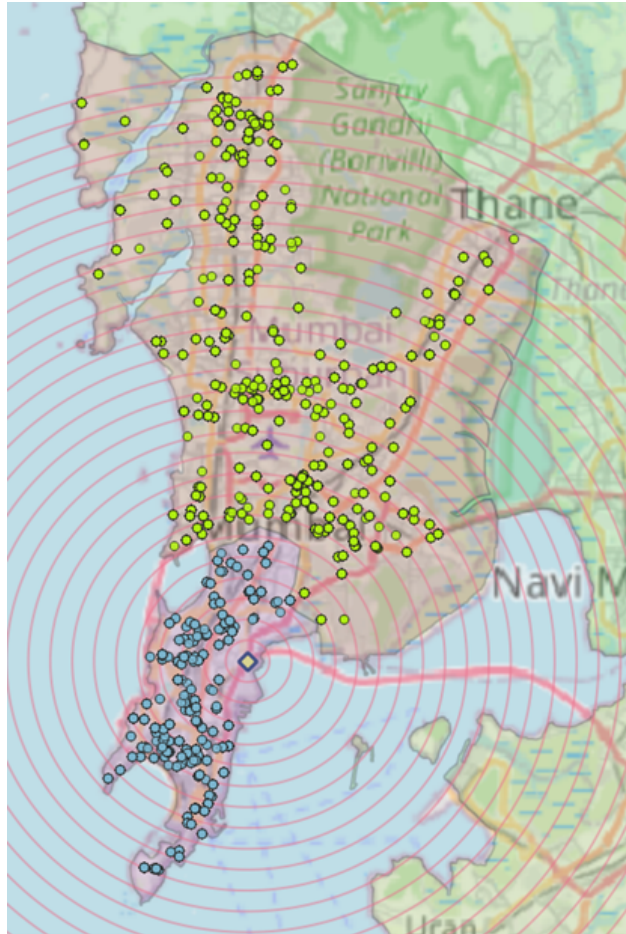


Figure 2: Land parcels and distance from the MTHL entrance ramp

higher in the Mumbai Suburban District, where increases in Shop, Office, and Residential prices exceed those of the Mumbai City District by a factor of three or more.

Table 1: Summary statistics of property prices

District	Type	Obs	Mean	Std. Dev.	Min	Max
All Districts	Open land	2,469	85,095.3	54,793.7	11,000	340,100
	Residential	5,178	176,775.4	112,050.3	28,200	871,080
	Shop	4,802	260,145.6	156,349.7	31,700	1,088,850
	Office	5,080	214,857.9	133,118.8	32,100	1,001,740
	Industrial	3,335	181,425.5	114,272.7	30,500	871,080
MumbaiCity District	Open land	639	118,901.5	68,006.0	19,700	340,100
	Residential	1,368	270,708.3	147,607.6	54,000	871,080
	Shop	1,209	406,857.4	202,308.2	87,200	1,088,850
	Office	1,322	337,494.0	171,133.3	67,700	1,001,740
	Industrial	879	288,074.3	144,472.5	66,700	871,080
Mumbai Suburban District	Open land	1,830	73,290.8	43,581.3	11,000	299,900
	Residential	3,810	143,048.3	70,273.2	28,200	538,530
	Shop	3,593	210,778.9	96,053.1	31,700	673,160
	Office	3,758	171,716.6	80,454.8	32,100	619,310
	Industrial	2,456	143,256.1	68,840.9	30,500	538,530

Table 2: Property price growth (%) between 2022 and 2025

District	Open land	Residential	Office	Shop	Industrial
Mumbai City District	5.5	5.6	3.5	1.0	2.8
Mumbai Suburban District	7.3	11.9	11.2	6.9	12.6

This structural difference in the property price growth rates between the two districts may be related to major infrastructure development and redevelopment projects other than the MTHL. [Figure 3](#) shows the locations of these projects and [Figure 4](#) shows the distance from the MTHL entrance ramp. In particular, the recent development of multiple metro lines (Line 1, Line 2A, and Line 3) has significantly improved connectivity within the Mumbai Suburban District and its connection to the City District.

Although the present paper uses publicly available price data, our companion papers use alternative data as introduced in Section 2. Specifically, we have collected satellite imagery, GPS location data, and real-time travel time data. The results of the analysis using these

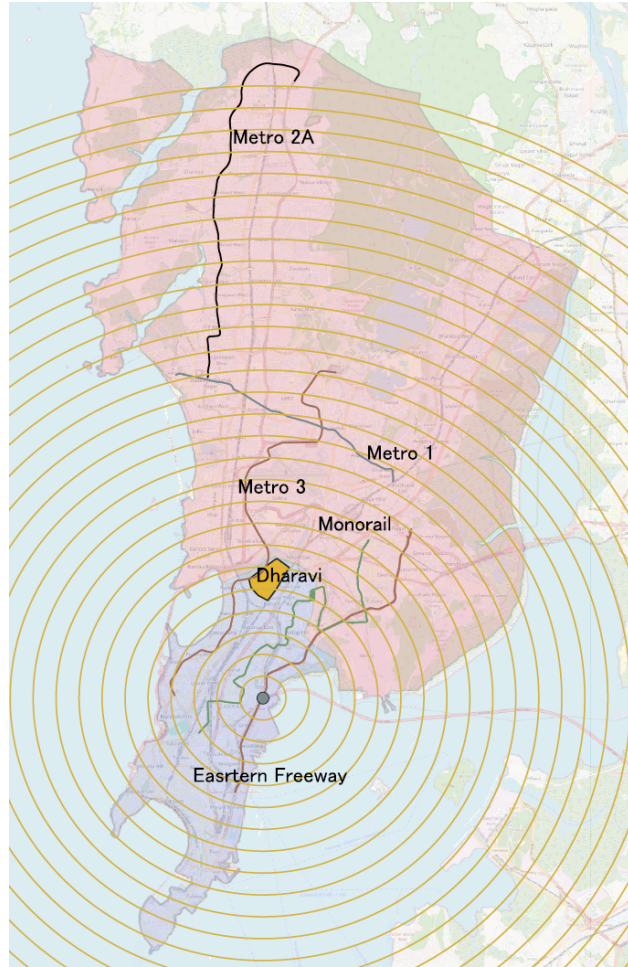


Figure 3: Location of other main infrastructure and redevelopment projects

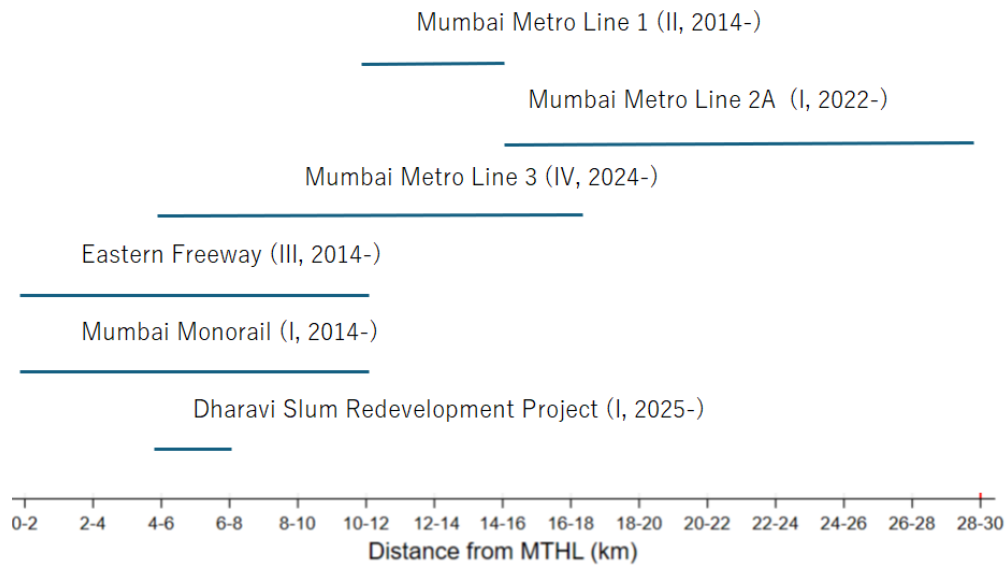


Figure 4: Other main infrastructure and redevelopment projects and their distances from the MTHL

data are expected to further clarify how the MTHL affected the local economy and the mobility of people.

5 Empirical Model and Identification Strategy

To assess the impact of the MTHL on nearby real estate prices, we adopt a difference-in-differences design based on the physical distance from the bridge and employ the following three different specifications. First, we use the distance from the MTHL entrance ramp on the Mumbai City side as a continuous measure of treatment intensity and estimate the coefficient of its interaction with a post-opening dummy variable. We estimate this specification using the full sample of land parcels and the subsample restricted to the Mumbai City District. The estimation equation is specified as follows:

$$\ln p_{it} = \alpha_i + \lambda_t + \gamma \text{After}_t + \delta \text{Dist}_i + \beta(\text{After}_t \times \text{Dist}_i) + \varepsilon_{it}, \quad (1)$$

where i indexes land parcels and t indexes years; p_{it} denotes the outcome of each land type (i.e., open land, residential, office, shop, and industrial); After_t is an indicator variable which equals to one for years $t \geq 2025$ and zero otherwise. Note that although the MTHL opened in January 2024, the land prices after the opening in 2024 are reflected only in the ASR data from 2025 and onwards. Accordingly, the post-opening dummy is defined for 2025 and onwards; Dist_i is the time-invariant distance from location i to the entrance ramp of the MTHL; α_i and λ_t are land parcel and year fixed effects, respectively; and ε_{it} is the error term. Standard errors are clustered at the land parcel level. Our coefficient of interest is β .

Second, in order to assess the potential for non-linear effects beyond a single linear specification, we partition the study area into 2-kilometer bands according to the distance from the bridge entrance ramp. We then estimate a piecewise linear function in which the key parameters are the coefficients on the interaction terms between the distance-band dummies and the post-opening dummy for the bridge. Our estimation is performed on two alternative samples: the full set of land parcels and a restricted sample comprising only parcels located within the Mumbai City District. The estimation equation is specified as follows:

$$\ln p_{it} = \alpha_i + \lambda_t + \gamma \text{After}_t + \sum_{b \neq b_0} \delta_b D_{ib} + \sum_{b \neq b_0} \beta_b (D_{ib} \times \text{After}_t) + \varepsilon_{it}, \quad (2)$$

where i indexes land parcels and t indexes years; p_{it} is the outcome of each land type; After_t equals one for years $t \geq 2025$ and zero otherwise; D_{ib} denotes distance-band dummy equal to one if land parcel i lies within distance band b (e.g., 0–2 km, . . . , 28–30 km) with $b_0 = 28$ –30 as the omitted reference band, and zero otherwise; α_i and λ_t are land parcel and year fixed effects; and ε_{it} is the error term, with standard errors clustered at the location level. Our coefficient of interest is β_b .

Third, under the assumption that the impact of the bridge opening is confined to areas within 4 km of the entrance ramp, we conduct an estimation that treats parcels located within a 4-kilometer concentric boundary as the treatment group and those located beyond 4 kilometers as the control group. The 4-kilometer cutoff approximates the average distance of land parcels from the entrance ramp of the MTHL in the Mumbai City District (4.8 km). This estimation is performed using only the sample from Mumbai City District, where the estimation results of Equations 4 and 5 described later are stable. The estimation equation is specified as follows:

$$\ln p_{it} = \alpha_i + \lambda_t + \gamma \text{After}_t + \delta \text{Within4km}_i + \beta (\text{After}_t \times \text{Within4km}_i) + \varepsilon_{it}, \quad (3)$$

where i indexes land parcels and t indexes years; p_{it} denotes the outcome of each land type; After_t is an indicator variable which equals to one for years $t \geq 2025$ and zero otherwise; Within4km_i denotes a dummy equal to 1 if land parcel i lies within 4km from the entrance ramp of the MTHL, and zero otherwise; α_i and λ_t are land parcel and year fixed effects; and ε_{it} is the error term. Standard errors are clustered at the land parcel level. Our coefficient of interest is β .

6 Estimation Results

6.1 Linear Specification with Continuous Treatment

The results of the estimation using the distance from the bridge as a continuous variable are reported in [Table 3](#) and [Table 4](#). For the full sample of all land parcels, the estimated coefficients on the interaction terms between the bridge opening dummy and the distance from the bridge are statistically significant across all property types ([Table 3](#)). This indicates that land prices tend to increase in areas farther from the bridge. In contrast, when the analysis is restricted to the subsample of Mumbai City District, the signs of the coefficients are reversed, suggesting that land prices tend to increase in areas closer to the bridge in all property types ([Table 4](#)).

Table 3: Results of the linear function models: continuous treatment with all land parcels

	(1)	(2)	(3)	(4)	(5)
Variables	ln_openland	ln_residential	ln_office	ln_shop	ln_industrial
After2025					
× Distance to the bridge	0.003*** (0.000)	0.004*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.004*** (0.001)
Observations	2,345	4,897	4,800	4,549	3,139
R-squared	0.991	0.988	0.989	0.993	0.989

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors clustered at the land parcel level in parentheses. All regressions include land parcel and year fixed effects.

6.2 Piecewise Linear Function Specification

[Figure 5](#) and [Figure 6](#) plot, respectively, the estimated coefficients of the interaction terms between the band dummies (defined in 2-km intervals by distance from the entrance ramp of the MTHL) and the post-opening dummy, with the horizontal axis representing the distance from the bridge. For the full sample of all land parcels, most bands yield statistically insignificant results. Within 10 km, the coefficients are statistically significant for open land, residential, and industrial parcels. However, for residential and industrial parcels, the slope

Table 4: Results of the linear function models: continuous treatment with the land parcels in Mumbai City District

	(1)	(2)	(3)	(4)	(5)
Variables	ln_openland	ln_residential	ln_office	ln_shop	ln_industrial
After2025					
× Distance to the bridge	-0.005* (0.003)	-0.008*** (0.002)	-0.006*** (0.002)	-0.003** (0.002)	-0.006** (0.003)
Observations	597	1,277	1,232	1,131	823
R-squared	0.993	0.991	0.994	0.997	0.992

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors clustered at the land parcel level in parentheses. All regressions include land parcel and year fixed effects.

of the coefficients has been reversed around the 4 to 6 km band, indicating instability in the results. Furthermore, in bands that extend beyond 10 km where samples from the Mumbai Suburban District prevail the influence of distance variations on land prices is comparatively negligible (Figure 5). In contrast, when samples are restricted to the Mumbai City District, all property types exhibit a tendency for land prices to increase as proximity to the bridge increases. Among these, residential and office parcels show statistically significant effects in the bands closest to the bridge (0 to 2 km and 2 to 4 km) (Figure 6).

The apparent inconsistency between Figure 5 and Figure 6 stems from the definition of the control group. The Mumbai City subsample offers a cleaner counterfactual, whereas the full-sample estimates are attenuated because the control group includes the subsample in the Mumbai Suburban District that is benefiting from faster baseline appreciation and the recent development of multiple metro lines (Line 1, Line 2A, and Line 3) as described in Section 3. The similar profiles of the distance plots for the 0 to 2 km, 2 to 4 km, and 4 to 6 km bands between the two figures support this interpretation. Further explanations on this point are provided in Section 6.4.

6.3 Linear Specification with Binary Treatment

Table 5 presents the estimation results using a 4-km concentric boundary around the bridge entrance ramp, where parcels located beyond 4 kilometers serve as the control group and those within 4 kilometers are treated as the intervention group. As described in the previous

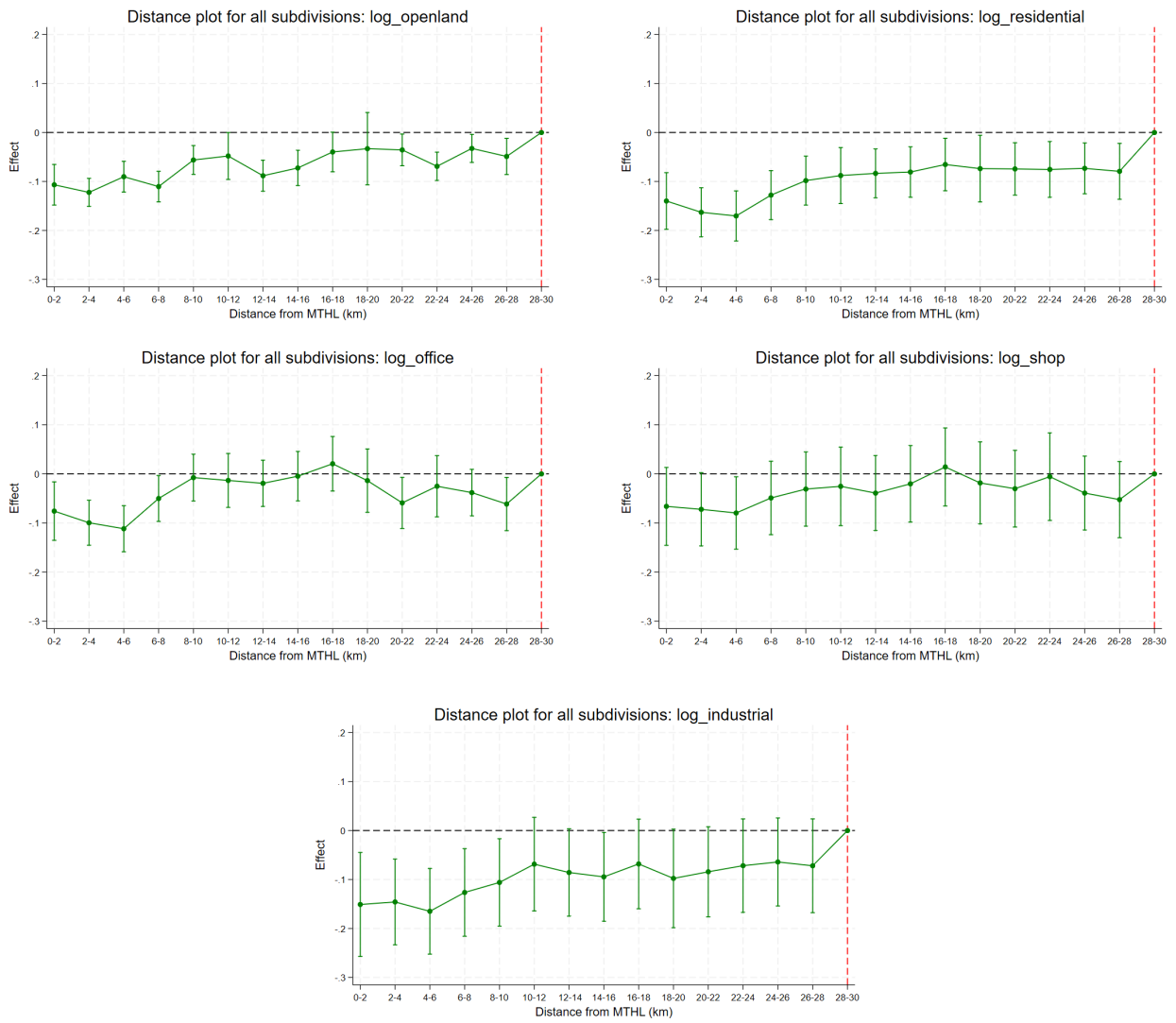


Figure 5: Distance plots of the analysis with all land parcels

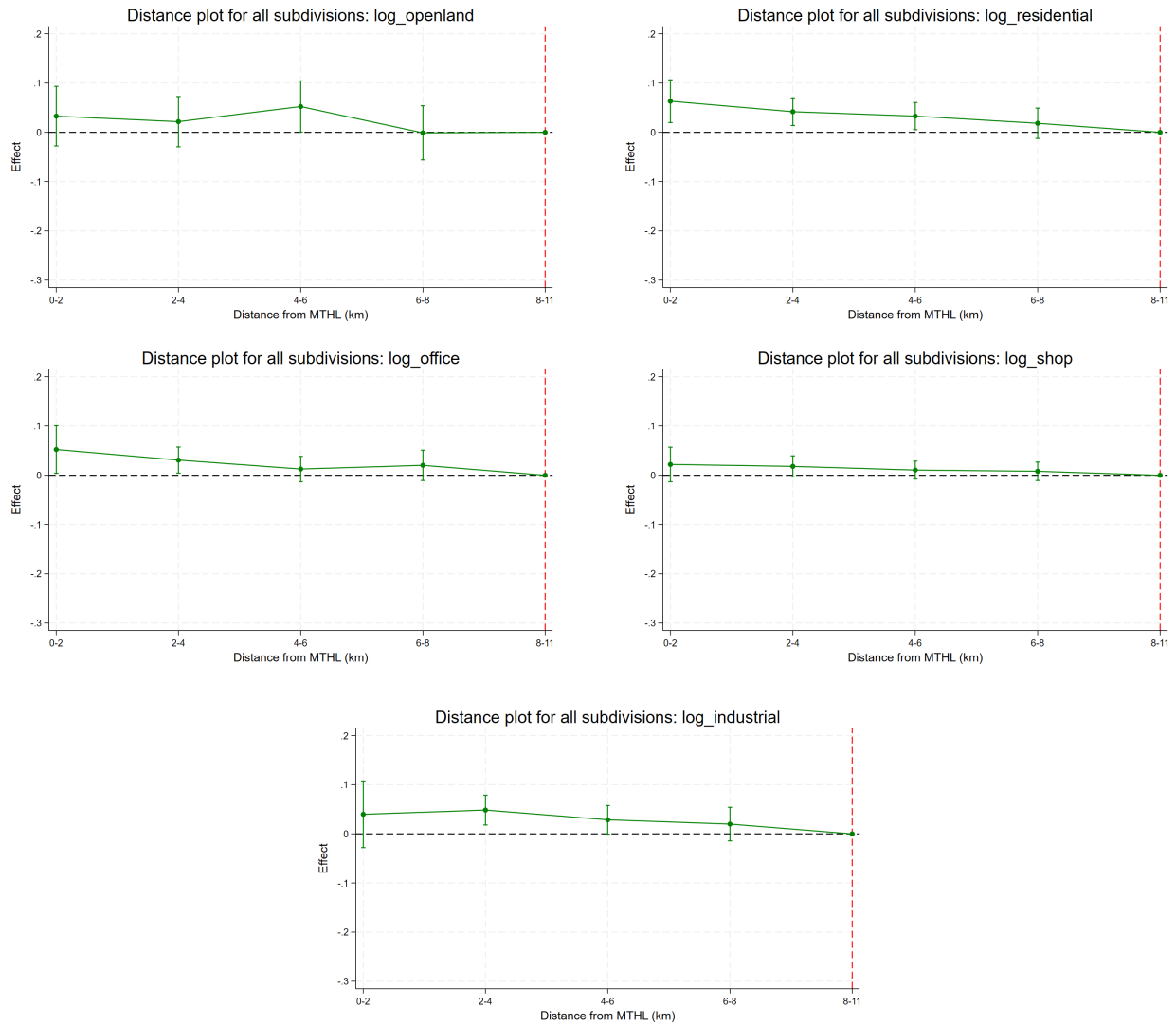


Figure 6: Distance plots of the analysis with the land parcels in Mumbai City District

Note: Land parcels exist within the 10 to 11 km range, but due to their small number, they were combined with the 8 to 10 km band for regression.

section, this estimation is performed using the Mumbai City District subsample. The results show that for residential, office, and industrial properties, the coefficient of interest, β , is positive and statistically significant. In other words, when assuming the area within 4 km to be the treatment region of the bridge opening, the intervention is found to increase prices for these three types of properties.

Table 5: Results of the linear function models: 4km dummy treatment

Variables	(1) ln_openland	(2) ln_residential	(3) ln_office	(4) ln_shop	(5) ln_industrial
after2025 \times within4km	-0.014 (0.014)	0.020* (0.012)	0.022** (0.011)	0.010 (0.008)	0.024* (0.012)
Observations	597	1,277	1,232	1,131	823
R-squared	0.993	0.991	0.994	0.997	0.992

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors clustered at the land parcel level in parentheses. All regressions include land parcel and year fixed effects.

To assess the robustness of these results, [Figure 7](#) plots the coefficients of the interaction terms between the year dummies and the dummy for parcels located within 4 km, with the horizontal axis indicating years relative to the baseline year and the vertical axis showing the estimated coefficients. The bridge opened in January 2024, and the immediately preceding year is 2023; however, because data for 2023 are unavailable, 2022 is taken as the baseline year. For all three property types that were found to be statistically significant in [Table 6](#) (residential, office, and industrial), the confidence intervals of the estimated coefficients overlap with zero for all or part of the pre-opening years. This indicates that no clear pretrend can be established, thereby confirming the validity of our results based on the difference-in-differences framework.

Nevertheless, [Figure 7](#) exhibits a subtle (statistically insignificant) pre-trend, implying a mild departure from the parallel-trends assumption. The pattern is consistent with the projects staged rollout. As noted above, the MTHL was approved in February 2009, following a JICA loan in March 2017 construction began in March 2018, and the bridge was inaugurated in January 2024. Positive estimates for open land in 2014-2015 likely reflect prolonged announcement effects; the 2020 effects for open and residential land are consis-

tent with anticipation effects from project implementation; and the 2025 effects align with post-opening impacts.

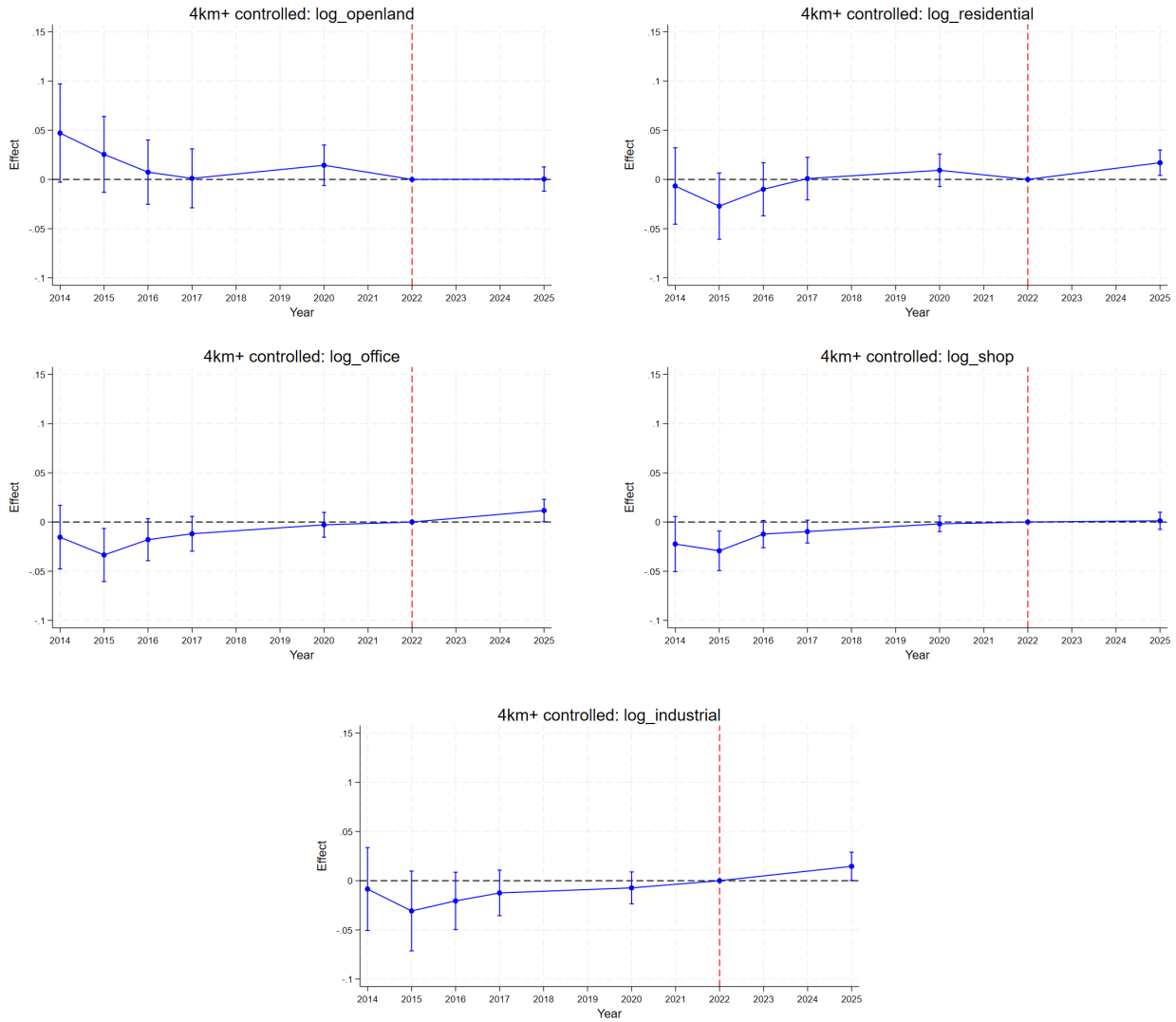


Figure 7: Results of the linear function models: 4km dummy treatment

6.4 Discussion

Based on the estimation results reported above, we may be able to make two interpretations. First, in the subsample restricted to the Mumbai City District, the evidence robustly demonstrates that areas closer to the MTHL experienced greater increases in land prices after the opening of the bridge. This finding indicates that the magnitude of the benefit is

higher in areas physically closer to the MTHL.

Second, when land parcels in Mumbai Suburban District are included in the analysis, there are cases where areas farther from the MTHL experienced relatively higher increases in land prices compared to those closer to the bridge. This pattern, which at first may appear counterintuitive, can be explained by two distinct mechanisms. The initial factor is the structural differences between the two districts. The stronger appreciation of suburban land values arises from the fact that suburban markets, being less saturated than central areas, had greater room for appreciation in the first place, and this dynamic has been further reinforced by concurrent infrastructure projects such as new metro lines. The second mechanism pertains to network effects or externalities. The MTHL's integration into the existing road network introduces a series of mediating factors that influence its efficacy. These factors include congestion, route substitution, and other network effects. Consequently, the spatial distribution of effects does not conform to a simple monotonic decay with distance.

7 Conclusion

In this paper, we assessed the impact of the MTHL, which opened in January 2024 and connects Mumbai City to the opposite shore. To evaluate its impact, we employ a difference-in-differences framework based on proximity to the bridge, examining changes in real estate prices between 2014 and 2025 in Mumbai City and Mumbai Suburban districts.

As a result, two main findings emerge. First, an analysis of real estate prices within the Mumbai City district reveals a notable increase in land values in areas close to the bridge after its inauguration. Second, when suburban areas are included in the analysis, a higher price growth is sometimes observed farther from the bridge. This outcome is indicative of structural differences: suburban markets have experienced faster baseline appreciation, reinforced by recent infrastructure developments, such as new metro lines, which enables them to absorb MTHL benefits more strongly in a catch-up dynamic. Furthermore, network effects, which are derived from the integration of the MTHL into the existing road system, as well as associated congestion and rerouting, suggest that the impact does not show a simple monotonic decay with distance.

Looking ahead, several avenues for future research remain. First, the instability of the estimates once the Mumbai Suburban District is included may plausibly be driven by the network structure of existing roads and externalities such as congestion. This issue could be further investigated by analyzing more granular and higher-frequency travel time data, as briefly discussed in Section 2. Second, one of the main objectives of the MTHL is to promote regional development in the broader Mumbai metropolitan area (see Section 3). Although data limitations prevent us from addressing this critical dimension in the present study, future work should extend the analysis to a wider region, including the opposite shore of Mumbai Bay.

References

- Abeberese, A. B. and Chen, M. (2022). Intranational trade costs, product scope and productivity: Evidence from india’s golden quadrilateral project. *Journal of Development Economics*, 156.
- Adamopoulos, T. (2025). Spatial integration and agricultural productivity: Quantifying the impact of new roads. *American Economic Journal: Macroeconomics*, 17(1):343–378.
- Ahmed, M. H., Tesfaye, W. M., Dietrich, S., and Gassmann, F. (2024). Rural roads, child labor, and schooling in rural ethiopia. *The Journal of Development Studies*, 60(11):1675–1690.
- Akbar, P., Couture, V., Duranton, G., and Storeygard, A. (2023). Mobility and congestion in urban india. *American Economic Review*, 113(4):1083–1111.
- Alder, S. (2025). Chinese roads in india: The effect of transport infrastructure on economic development. *Journal of International Economics*, Forthcoming.
- Alder, S., Croke, K., Duhaut, A., Marty, R., and Vaisey, A. (2023a). The impact of ethiopia’s road investment program on economic development and land use: Evidence from satellite data. *World Bank Policy Research Working Paper*, 10000.

- Alder, S., Song, Z. M., and Zhu, Z. (2023b). On (un)congested roads: A quantitative analysis of infrastructure investment efficiency using truck gps data. *Working Paper*.
- Allen, T. and Arkolakis, C. (2022). The welfare effects of transportation infrastructure improvements. *The Review of Economic Studies*, 89(6):2911–2957.
- Allen, T. and Atkin, D. (2022). Volatility and the gains from trade. *Econometrica*, 90(5):2053–2092.
- Allen, T., Atkin, D., Cleves, S. C., and Hernandez, C. E. (2024). The traveling trucker problem. *AEA Papers and Proceedings*, 114:334–339.
- Américo, P. (2024). The industrialization path: Railroads, technology adoption, and structural transformation in brazil. *Working Paper*.
- Andersson, D., Berger, T., and Prawitz, E. (2023). Making a market: Infrastructure, integration, and the rise of innovation. *The Review of Economics and Statistics*, 105(2):258–274.
- Araujo, R., Assunção, J., and Bragança, A. (2025). Transportation infrastructure and deforestation in the amazon. *Journal of Development Economics*, 177.
- Asher, S., Lunt, T., Matsuura, R., and Novosad, P. (2021). Development research at high geographic resolution: An analysis of night-lights, firms, and poverty in india using the shrug open data platform. *The World Bank Economic Review*, 35(4):845–871.
- Asher, S. and Novosad, P. (2020). Rural roads and local economic development. *American Economic Review*, 110(3):797–823.
- Athey, S., Ferguson, B., Gentzkow, M., and Schmidt, T. (2021). Estimating experienced racial segregation in us cities using large-scale gps data. *Proceedings of the National Academy of Sciences*, 118(46):e2026160118.
- Atkin, D., Chen, K., and Popov, A. (2022). The returns to face-to-face interactions: Knowledge spillovers in silicon valley. *NBER Working Paper Series*, 30147.
- Balboni, C. (2025). In harm’s way? infrastructure investments and the persistence of coastal cities. *American Economic Review*, 115(1):77–116.

- Baldomero-Quintana, L. (2025). How infrastructure shapes comparative advantage. *Journal of International Economics*, 155.
- Banerjee, A., Duflo, E., and Qian, N. (2020). On the road: Access to transportation infrastructure and economic growth in china. *Journal of Development Economics*, 145:102442.
- Baragwanath, K., Hanson, G. H., Khandelwal, A. K., Liu, C., and Park, H. (2024). Using satellite imagery to detect the impacts of new highways: An application to india. *Working Paper*.
- Barnwal, P., Dingel, J. I., Iurchenko, D., and Krishna, P. (2024). Internal trade barriers in india. *Working Paper*.
- Barwick, P. J., Donaldson, D., Li, S., Lin, Y., and Rao, D. (2024). Transportation networks, short-term mobility, and pollution exposure: Evidence from high-speed rail in china. *NBER Working Paper Series*, 30462.
- Berger, T. and Prawitz, E. (2024). Collaboration and connectivity: Historical evidence from patent records. *Journal of Urban Economics*, 139:103629.
- Bird, J., Lebrand, M., and Venables, A. J. (2020). The belt and road initiative: Reshaping economic geography in central asia? *Journal of Development Economics*, 144:102441.
- Blanchard, P., Gollin, D., and Kirchberger, M. (2023). Perpetual motion: High-frequency human mobility in three african countries. *TEP Working Paper*, 0823.
- Blankespoor, B., Emran, M. S., Shilpi, F., and Xu, L. (2022). Bridge to bigpush or backwash? market integration, reallocation and productivity effects of jamuna bridge in bangladesh. *Journal of Economic Geography*, 22(4):853–871.
- Bluhm, R., Dreher, A., Fuchs, A., Parks, B. C., Strange, A. M., and Tierney, M. J. (2025). Connective financing: Chinese infrastructure projects and the diffusion of economic activity in developing countries. *Journal of Urban Economics*, 145:103730.
- Brooks, W. and Donovan, K. (2020). Eliminating uncertainty in market access: The impact of new bridges in rural nicaragua. *Econometrica*, 88(5):1965–1997.

- Brooks, W. J., Kaboski, J. P., Kondo, I. O., Li, Y. A., and Qian, W. (2021). Infrastructure investment and labor monopsony power. *IMF Economic Review*, 69(3):470–504.
- Büchel, K., Ehrlich, M. V., Puga, D., and Viladecans-Marsal, E. (2020). Calling from the outside: The role of networks in residential mobility. *Journal of Urban Economics*, 119:103277.
- Bütikofer, A., Løken, K. V., and Willén, A. (2024). Building bridges and widening gaps. *Review of Economics and Statistics*, 106(3):681–697.
- Chen, J., Niu, Y., and Shum, M. (2023). Reassessing the firm selection hypothesis: New evidence from chinese highways. *Working Paper*.
- Chen, T., Qi, H., and Wang, J. (2022). Railways, telegraph and technology adoption: The introduction of american cotton in early 20th century china. *Working Paper*.
- Couture, V., Dingel, J. I., Green, A., and Handbury, J. (2025). Demographic preferences and income segregation. *NBER Working Paper Series*, 33386.
- Couture, V., Dingel, J. I., Green, A., Handbury, J., and Williams, K. R. (2022). Jue insight: Measuring movement and social contact with smartphone data: a real-time application to covid-19. *Journal of Urban Economics*, 127:103328.
- Donaldson, D. (2018). Railroads of the raj: Estimating the impact of transportation infrastructure. *American Economic Review*, 108(4-5):899–934.
- Donaldson, D. (2025). *Transport Infrastructure and Policy Evaluation*, volume 6. Elsevier.
- Donaldson, D. and Hornbeck, R. (2016). Railroads and american economic growth: A market access approach. *The Quarterly Journal of Economics*, 131(2):799–858.
- Donaldson, D. and Storeygard, A. (2016). The view from above: Applications of satellite data in economics. *Journal of Economic Perspectives*, 30(4):171–198.
- Fajgelbaum, P. D. and Schaal, E. (2020). Optimal transport networks in spatial equilibrium. *Econometrica*, 88(4):1411–1452.

- Fan, J., Lu, Y., and Luo, W. (2023). Valuing domestic transport infrastructure: A view from the route choice of exporters. *The Review of Economics and Statistics*, 105(6):1562–1579.
- Fenske, J., Kala, N., and Wei, J. (2023). Railways and cities in india. *Journal of Development Economics*, 161:103038.
- Foster, V., Gorgulu, N., Jain, D., Straub, S., and Vagliasindi, M. (2023a). The impact of infrastructure on development outcomes: A meta-analysis. *World Bank Policy Research Working Paper*, 10350.
- Foster, V., Gorgulu, N., Straub, S., and Vagliasindi, M. (2023b). The impact of infrastructure on development outcomes: A qualitative review of four decades of literature. *World Bank Policy Research Working Paper*, 10343.
- Frye, D. (2024). Transportation networks and the geographic concentration of employment. *The Review of Economics and Statistics*, pages 1–34.
- Gao, Y. and Zheng, J. (2020). The impact of high-speed rail on innovation: An empirical test of the companion innovation hypothesis of transportation improvement with china manufacturing firms. *World Development*, 127:104838.
- Gebresilashe, M. (2023). Rural roads, agricultural extension, and productivity. *Journal of Development Economics*, 162:103048.
- Gendron-Carrier, N., Gonzalez-Navarro, M., Polloni, S., and Turner, M. A. (2022). Subways and urban air pollution. *American Economic Journal: Applied Economics*, 14(1):164–196.
- Gibson, J., Olivia, S., and Boe-Gibson, G. (2020). Night lights in economics: Sources and uses. *Journal of Economic Surveys*, 34(5):955–980.
- Go, E., Nakajima, K., Sawada, Y., and Taniguchi, K. (2023). Satellite-based vehicle flow data to assess local economic activities. *CIRJE Discussion Papers*, F-1209.
- Gollin, D. and Wolfersberger, J. (2024). Agricultural trade and deforestation: the role of new roads. *HAL*, 04171124v3.

- Gonzalez-Navarro, M., Zarate, R. D., Jedwab, R., and Tsivanidis, N. (2023). Land transport infrastructure. *VoxDevLit*, 9.
- Gramlich, E. M. (1994). Infrastructure investment: A review essay. *Journal of Economic Literature*, 32(3):1176–1196.
- Gu, Y., Jiang, C., Zhang, J., and Zou, B. (2021). Subways and road congestion. *American Economic Journal: Applied Economics*, 13(2):83115.
- Gupta, A., Van Nieuwerburgh, S., and Kontokosta, C. (2022). Take the q train: Value capture of public infrastructure projects. *Journal of Urban Economics*, 129:103422.
- Hayakawa, K., Koster, H. R. A., Tabuchi, T., and Thisse, J.-F. (2021). High-speed rail and the spatial distribution of economic activity: Evidence from japan’s shinkansen. *RIETI Discussion Paper Series*, 21-E-003.
- Heblich, S., Redding, S. J., and Sturm, D. M. (2020). The making of the modern metropolis: Evidence from london*. *The Quarterly Journal of Economics*, 135(4):2059–2133.
- Herzog, I., Liu, S., and Yu, Y. (2024). National road upgrading and structural transformation: Evidence from ugandan households. *Working Paper*.
- Hornbeck, R. and Rotemberg, M. (2024). Growth off the rails: Aggregate productivity growth in distorted economies. *Journal of Political Economy*, 132(11):3547–3602.
- Huang, L. Y., Hsiang, S., and Gonzalez-Navarro, M. (2021). Using satellite imagery and deep learning to evaluate the impact of anti-poverty programs. *NBER Working Paper Series*, 29105.
- Jedwab, R. and Storeygard, A. (2022). The average and heterogeneous effects of transportation investments: Evidence from sub-saharan africa 1960-2010. *Journal of the European Economic Association*, 20(1):1–38.
- Kaboski, J. P., Lu, J., Qian, W., and Ren, L. (2024). Melitz meets lewis: The impacts of roads on structural transformation and businesses. *NBER Working Paper Series*, 32448.

- Khanna, G., Medina, C., Nyshadham, A., Ramos-Menchelli, D., Tamayo, J., and Tiew, A. (2022). Spatial mobility, economic opportunity, and crime. *Working Paper*.
- Koh, Y., Li, J., and Xu, J. (2025). Subway, collaborative matching, and innovation. *The Review of Economics and Statistics*, 107(2):476–493.
- Kreindler, G., Gaduh, A., Graff, T., Hanna, R., and Olken, B. A. (2023). Optimal public transportation networks: Evidence from the world’s largest bus rapid transit system in jakarta. *Working Paper*.
- Kreindler, G. E. and Miyauchi, Y. (2023). Measuring commuting and economic activity inside cities with cell phone records. *Review of Economics and Statistics*, 105(4):899–909.
- Lall, S. V. and Lebrand, M. (2020). Who wins, who loses? understanding the spatially differentiated effects of the belt and road initiative. *Journal of Development Economics*, 146:102496.
- Lee, K. H. and Tan, B. J. (2024). Urban transit infrastructure and inequality. *The Review of Economics and Statistics*, pages 1–46.
- Lee, M.-j., Sawada, Y., and Terada-Hagiwara, A. (2020). Unleashing development potential by river crossings. *Working Paper*.
- Lindgren, E., Pettersson-Lidbom, P., and Tyrefors, B. (2021). The causal effect of transport infrastructure: Evidence from a new historical database. *IFN Working Paper*, 1407.
- Mahajan, A. (2024). Highways and segregation. *Journal of Urban Economics*, 141:103574.
- Mahmud, M. and Sawada, Y. (2018). Infrastructure and well-being: employment effects of jamuna bridge in bangladesh. *Journal of Development Effectiveness*, 10(3):327–340.
- Marx, B., Stoker, T. M., and Suri, T. (2019). There is no free house: Ethnic patronage in a kenyan slum. *American Economic Journal: Applied Economics*, 11(4):36–70.
- Milsom, L. H. (2023). Moving opportunity local connectivity and spatial inequality. *Working Paper*.

- Miyauchi, Y., Nakajima, K., and Redding, S. (2025). The economics of spatial mobility: Theory and evidence using smartphone data. *The Quarterly Journal of Economics*, Forthcoming.
- Morten, M. and Oliveira, J. (2024). The effects of roads on trade and migration: Evidence from a planned capital city. *American Economic Journal: Applied Economics*, 16(2):389–421.
- Munnell, A. H. (1992). Policy watch: Infrastructure investment and economic growth. *Journal of Economic Perspectives*, 6(4):189–198.
- Nagy, D. K. (2023). Hinterlands, city formation and growth: Evidence from the u.s. westward expansion. *Review of Economic Studies*, 90(6):3238–3281.
- Pellegrina, H. and Sotelo, S. (2023). Migration, specialization, and trade: Evidence from brazil’s march to the west. *Working Paper*.
- Qin, M., Vitorino, M. A., and John, G. (2025). Planes, trains, and co-opetition: Evidence from china. *Working Paper*.
- Raitzer, D. A., Blöndal, N., and Sibal, J. (2019). Impact evaluation of transport interventions: A review of the evidence. Report, Asian Development Bank.
- Redding, S. J. (2025). Evaluating transport improvements in spatial equilibrium. *NBER Working Paper Series*, 33532.
- Redding, S. J. and Turner, M. A. (2015). *Transportation Costs and the Spatial Organization of Economic Activity*, volume 5, pages 1339–1398. Elsevier.
- Roberts, M., Melecky, M., Bougna, T., and Xu, Y. (2020). Transport corridors and their wider economic benefits: A quantitative review of the literature. *Journal of Regional Science*, 60(2):207–248.
- Sawada, Y. (2015). The impacts of infrastructure in development: A selective survey. *ADB Working Paper Series*, 511.

- Shamdasani, Y. (2021). Rural road infrastructure & agricultural production: Evidence from india. *Journal of Development Economics*, 152:102686.
- Sheng, J., Malani, A., Goel, A., and Botla, P. (2022). Jue insights: Does mobility explain why slums were hit harder by covid-19 in mumbai, india? *Journal of Urban Economics*, 127:103357.
- Sotelo, S. (2019). Domestic trade frictions and agriculture. *Journal of Political Economy*, 128(7):2690–2738.
- Sturm, D. M., Takeda, K., and Venables, A. J. (2023). How useful are quantitative urban models for cities in developing countries? evidence from dhaka. *Working Paper*.
- Testoni, M., Sakakibara, M., and Chen, M. K. (2022). Face-to-face interactions and the returns to acquisitions: Evidence from smartphone geolocational data. *Strategic Management Journal*, 43(13):2669–2702.
- Tian, L. and Yu, Y. (2024). Geographic integration and firm exports: Evidence from china. *Working Paper*.
- Tompsett, A. (2025). Bridges. *Working Paper*.
- Tsivanidis, N. (2023). Evaluating the impact of urban transit infrastructure: Evidence from bogotá's transmilenio. *Working Paper*.
- Widita, A. (2024). Medium- and long-term impacts of transit on congestion: Jakarta's experience. *Findings*.
- Widita, A., Welch, T., Rukmana, D., and Diwangkari, A. (2023). Impact of the mrt jakarta on congestion: Evidence from a before-after, treatment-control evaluation. *Journal of Planning Education and Research*, page 0739456X231174136.
- Yamada, E. and Jiang, Y. (2025). The impact of dhaka mass rapid transit on road congestion. *JICA Ogata Research Institute Discussion Paper*, 35.
- Zárate, R. D. (2022). Spatial misallocation, informality, and transit improvements: Evidence from mexico city. *World Bank Policy Research Working Paper*, 9990.