Relaxing Floor Area Ratio: Housing Supply & Affordability in India

Geetika Nagpal[*] Sahil Gandhi[†]

January 6, 2026

Abstract

Does relaxing zoning regulations increase affordable housing or simply trigger the building of new larger units? This paper exploits a relaxation of the regulatory cap on building height and floorspace, the Floor Area Ratio (FAR), to answer this question in Mumbai, India. Leveraging granular panel data and exploiting variation in time and space, we find that developers increased their FAR utilization by 17%. The reform increased supply of housing units in treated areas by 58%. Overall, the FAR relaxation resulted in no change in unit sizes. However, areas receiving a higher-intensity of FAR relaxation witnessed a significant decline in unit sizes, resulting in a larger increase in the supply of housing units. The increase in supply leads to a 24% decrease in house prices that allows lower-income households to access housing. Our results show that FAR relaxation improves housing affordability.

[*]World Bank; gnagpal@worldbank.org

[†]University of Manchester; sahil.gandhi@manchester.ac.uk

We thank Dan Björkegren, Andrew Foster, Edward Glaeser, Vernon Henderson, Abhay Pethe, Vidhadyar Phatak, Bryce Steinberg, Vaidehi Tandel, Nick Tsivanidis, Matthew Turner and seminar participants at Brown University, Indian School of Business, Indiana University Bloomington, World Bank DIME, LSE Geography, Carnegie India, and conference participants at the UEA Toronto for their helpful comments. We also thank our dedicated research assistants for their contributions to this project. We acknowledge support from Structural Transformation and Economic Growth (STEG), the Centre for Contemporary South Asia, the Orlando Bravo Centre for Economic Research and the S4 Program at Brown University, the University of Manchester and the International Growth Centre. We are grateful to the Population Studies and Training Center at Brown University, which receives funding from the NIH, for training support (T32 HD007338) and for general support (P2C HD041020). This paper is a product of the staff of the International Bank for Reconstruction and Development/the World Bank. The findings, interpretations, and conclusions expressed do not necessarily reflect the views of the World Bank, the Executive Directors of the World Bank, the governments they represent, or any funders. The World Bank does not guarantee the accuracy of the data included in this work. An earlier version was circulated as "Scaling heights: Affordability implications of zoning deregulation in India."

1 Introduction

With 1.4 billion people predicted to move into cities and towns by 2050, urban housing supply across the world continues to be constrained by stringent density regulations (United Nations, 2025). The predominant density regulation, Floor Area Ratio (FAR), limits the floorspace that can be supplied on a given unit of land.[1] Advocates of relaxing FAR constraints posit that these regulations impede affordable housing provision and, thus, a relaxation would lead to increased housing for lower-income households (Glaeser *et al.*, 2005a,b; Katz and Rosen, 1987; Quigley and Raphael, 2004, 2005). Opponents argue that a relaxation would only increase the supply of a few large, higher-quality luxury units and is unlikely to enhance housing affordability (Rodríguez-Pose and Storper, 2020, 2022).[2] This paper asks whether the relaxation of zoning regulation lead to a substantial increase in housing units and reduce prices, or if it triggers the construction of a few large units catering to high-income buyers?

Our paper overcomes two key challenges. First, there are few examples of large-scale deregulation policies in developing country cities, which face the largest need for new housing.[3] Second, while there is an existing literature showing zoning regulations affect housing supply, determining if the reform leads to lower-income households moving in requires project level data matched to income of home buyers. Reliable data of that form are scarce, especially in cities in developing countries. We match detailed housing market data before and after a 2018 deregulation in Mumbai to understand its impacts on housing supply, house prices, and home buyer incomes.[4] This enables us to discuss the impact of deregulation on housing affordability. The deregulation relaxed Mumbai's FAR, increasing the permitted floorspace on parcels by 10–50%, generating spatial and temporal variation in the degree of relaxation enabling us to use a difference-in-difference design.[5]

We exploit the 2018 FAR relaxation in Mumbai, which provides a natural experiment to quantify the effects of such a deregulation in a highly constrained city. Mumbai's stringent FAR limits, which are much lower than those of comparable mega-cities, are often criticized for making housing unaffordable (Annez *et al.*, 2010; Bertaud, 2004, 2018; Pethe, 2013).[6] The relaxation in 2018 linked a parcel's FAR to the width of its bordering road. Parcels on roads

[1]Bertaud and Brueckner (2005), Brueckner *et al.* (2017), and Brueckner and Singh (2020) document the presence and stringency of FARs in India, China and the US, respectively.

[2]Rodríguez-Pose and Storper (2020, p.223) argue that "*changes in zoning are unlikely to improve affordability for lower-income households ... [but] would, however, increase gentrification within metropolitan areas and would not appreciably decrease income inequality*."

[3]A notable exception is Anagol *et al.* (2025), which estimates the effects of deregulation on housing supply in Brazil.

[4]Mumbai is one of the largest cities in India, with more than 12 million residents and the highest population density in the world (United Nations, 2025).

[5]Floor Area Ratio is known as Floor Space Index (FSI) in India.

[6]In Mumbai, the context studied in this paper, the FAR was capped at 2.7 for all residential developments, while similarly populated cities have ratios at least three times as high.

wider than 12 meters received progressive increases in FAR, while those on narrower roads remained ineligible for the relaxation. Our reduced-form specification uses a DID design to compare developments built between 2014 and 2022 on wider roads which received an FAR relaxation with those on narrower roads where FAR remained unchanged.

We overcome the data challenge by combining three novel datasets. First, we compile administrative data on the universe of residential permit applications in Mumbai for the period 2014-2022. The building plans filed with these permits contain the FAR granted, the approved floorspace and the number of units to be built by the developer for each project. Further, we geo-referenced each permit application. Second, we obtained unit-level data on sales prices from two sources, official transaction records for these residential developments, and prices recorded with mortgage applications with the largest housing private bank in India. Third, we link our housing data to socioeconomic characteristics such as the age and income of home buyers using mortgage applications submitted to the private sector bank.

We document three results. First, we show evidence of a large supply increase. Developers fully utilize FAR relaxation, with treated multifamily developments increasing the average number of apartments by 58% compared to the pre-period average housing development. We find differential supply impact based on the intensity of FAR relaxation.[7] We find more than double the increase in units in high-intensity FAR projects. Second, we see that the intensity of FAR relaxation induces a decline in unit-sizes in multifamily developments. This was previously undocumented in the literature. Although, overall there is no statistically significant fall in unit sizes, as the scale of development increases with higher-intensity FAR deregulation, developers construct smaller units. Third, the increase in supply increases housing affordability. Apartment prices fall by 24%, showing an improvement in housing access for lower-income households. We show that treated projects experience a corresponding decline in average buyer income.

Our paper contributes to three strands of literature. First, we contribute to a body of work that examines the impact of land-use regulations on housing supply and affordability. This literature has primarily used cross-sectional variation in zoning regulations to quantify their impact on affordability and welfare (Brueckner and Sridhar, 2012; Quigley and Raphael, 2005; Turner *et al.*, 2014).[8,9] More recent work has used within-city deregulation policies to examine their impact on housing supply and prices (Anagol *et al.*, 2025; Peng, 2022).[10] However,

[7]Projects received differential FAR relaxation based on the road-width the project is located on. Projects on roads between 12-27 meters in the suburbs and 12-18 meters in the Island city received 10-20% relaxation in FAR. While projects on roads over 27 meters in the suburbs and over 18 meters in the Island city received 30-50% relaxation in FAR.

[8]For a literature review, see Gyourko and Molloy (2015).

[9]Research has shown that land use regulations affect housing supply elasticities in the US (Baum-Snow, 2023; Baum-Snow and Han, 2024; Saiz, 2010). Duranton and Puga (2023) show that cities that have stringent regulations have a large wedge between residential price and replacement cost at the periphery.

[10]Büchler and Lutz (2024); Greenaway-McGrevy and Phillips (2023) also study zoning deregulation in Zurich

the literature on land-use deregulation and housing market outcomes has been sparse for cities in developing countries, where housing needs are most acute and rapid urbanization has placed enormous pressure on existing housing stock. Our paper complements and extends Anagol *et al.* (2025), who study a large zoning reform in Sao Paulo using block-level variation in allowable FAR (Built Area Ratio in Sao Paolo) to quantify developers' supply responses. We extend Anagol *et al.* in two ways. First, while their analysis documents supply and price effects, they cannot directly measure affordability or who moves into new housing. We link project-level development data to transaction prices and household income, allowing us to identify the distributional consequences of deregulation and to show whether lower-income households benefit. Second, we observe detailed project-level microdata—including approved floorspace, FAR granted, and the number of units built—which enables us to distinguish whether developers respond by increasing unit size or by increasing the number of units.

Second, our study contributes to a small but growing literature that highlights how land use regulations can limit income convergence across different geographical areas, a phenomenon largely studied in the US (Ganong and Shoag, 2017; Hsieh and Moretti, 2019; Kulka, 2019; Trounstine, 2020). We link housing developments to data on buyer characteristics and document that deregulation increases affordability in a developing country setting. Increasing FAR limits increases the number of units which draws in more lower-income households.

Finally, we contribute to a small but growing body of work that examines housing markets in India. The existing literature has examined the impact of FAR regulations in India (Bertaud and Brueckner, 2005; Duranton *et al.*, 2015; Harari, 2020) and other policy levers (Gandhi *et al.*, 2022, 2021; Gechter and Tsivanidis, 2025; Kumar, 2021; Tandel *et al.*, 2025) to reduce the housing demand–supply gap that they induce. We add to this literature by using a natural experiment to analyze the impacts of the deregulation on the housing market in Mumbai and quantify its effects on affordability. However, our results also have implications for other highly constrained cities in India and across the world.

The rest of the paper proceeds as follows. Section 2 describes the regulatory framework in Mumbai and the policy reform. Section 3 outlines the data sources, and section 4 discusses the empirical strategy and section 5 presents the results. Section 6 provides robustness checks. Section 7 concludes.

2 Background and Policy Reform

Mumbai has one of the most stringent density regulations in the world, with the Floor Area Ratio (FAR) governing how much housing floorspace can be supplied on a parcel. Prior to

and Auckland, respectively, documenting supply increases but a limited price response.

2018, Mumbai's FAR was capped at 2.7 for all residential developments, while similarly populated cities have FARs some three times as high.[11] In 2018, the city relaxed its FAR, intending to spur new supply of residential floorspace and housing to accommodate its growing population. We utilize this FAR relaxation to study the implications for housing supply and affordability in a developing-country city.

2.1 Origins of Zoning Regulations in Mumbai

Density regulations in Mumbai were established during the late 18th and early 19th centuries to address public health concerns related to overcrowding, inadequate light and air circulation, and poor drainage (Beverley, 2011; Dossal *et al.*, 1991; Kidambi, 2004). Mumbai's stringent density regulations can be traced to the Bombay Improvement Trust (1898), which implemented a regulatory regime that proved too expensive for the city's residents and exacerbated overcrowding (Issar, 2017).[12] The introduction of new building technologies marked by a need for more flexible regulation, and the FAR was introduced in the city's first development plan in 1964.[13]

The 1991 development plan altered the FAR regulations to allow the municipal government to incentivize developers to create infrastructure and redevelop slums. The plan stipulated FARs of 1.33 and 1 as the free "basic" FAR allowances in the city and its suburbs, respectively. While the allowance for the suburb remained unchanged, the FAR in the city declined. This created a scarcity of building rights, which was exploited by the state to provide infrastructure. The local government also introduced the use of transferable development rights (TDRs) in 1991, which provided developers an incremental FAR for rehabilitating slums and providing land to the state for construction of new roads, schools, hospitals, etc. Using TDRs, developers could attain an FAR of up to 2 in the city and suburbs. In 2008, the local government introduced a higher FAR limit and a new instrument that would allow it to monetize FAR (Gandhi and Phatak, 2016). Developers could directly purchase an FAR allowance from the state at 50% of the circle rate for housing. This "premium" FAR could be used to extend the limit by 35% over the FAR limit with TDRs. This implied that the FAR limit could be extended to 2.7 for the city and the suburbs using both the premium FAR and the TDR.

[11]The FARs for cities with similar population density areas, such as midtown Manhattan and Chicago, are 10 and 12, respectively. Singapore and Hong Kong, island cities facing similar geographic constraints, have FARs of 8 and 10.

[12]The Trust had been created following the bubonic plague outbreak in 1896 to improve conditions and dedensify the city. However, its stringent regulations on ground coverage, height and light angle limited housing development in the city.

[13]New building technologies included reinforced concrete and high-speed lifts.

2.2 The 2018 Development Plan and FAR Deregulation

The new development plan implemented in 2018 relaxed the FAR limit. While the relaxation aimed to reduce housing prices in the market, drafts of the plan were met with extensive public criticism.[14] The plan in its current form was released in May 2016.[15]

The development plan linked the FAR on each parcel to the width of the road it abuts, leading to progressive FAR relaxation. This change responded to the rationale that wider roads allow infrastructure that is necessary for higher density: access for fire brigades, water, sewage and sunlight.[16] Wider roads are also less likely to face traffic congestion as density increases. Developments along roads wider than 12 meters received up to 10–50% relaxation in their FARs, while those along roads narrower than 9 meters saw a slight FAR decrease and those along roads with widths between 9 and 12 meters were unaffected.[17] Our final sample consists of developments that received either an increase or no change in their FAR, i.e. developments on roads wider than 9 meters. Projects under construction on roads wider than 12 meters were allowed to revise their plans and make use of the higher allowable FAR. Details of the relaxation for each road width category are in Table 1.[18]

Table 1: DCPR 2034: FAR regime change

Road Width (in m)	**Pre-2018 FAR Cap**	**Post-2018 FAR Cap**	
		City	Suburb
<9	2.7	1.8	1.35
$\geq$ 9 and <12	2.7	2.7	2.7
$\geq$ 12 and <18	2.7	3.24	2.97
$\geq$ 18 and <27	2.7	3.65	3.24
$\geq$ 27	2.7	4.05	3.38

Note: The numbers are taken from Table 17 of the DCPR 2034. The pre-2018 and post-2018 FAR caps represent the maximum FARs that developments can obtain from all potential sources, including both the free FAR allowance and the allowance that can be acquired through payment to the MCGM and/or through purchasing transferrable development rights.

The initial draft of the plan, made public in 2015, had proposed a minimum FAR of 2.5 and a maximum of 8 in crowded transit corridors. The public criticism of this substantial increase was two-fold: that the FAR relaxation would put an excessive burden on the city's overwhelmed infrastructure and that it would not promote affordable housing.[19] Recent experi-

[14]What Went Wrong with the Mumbai Development Plan? I," *Moneylife*, accessed May 8, 2023.

[15]"Mumbai Development Plan 2034: Govt Makes 2,300 Changes in Draft," *The Indian Express*, April 21, 2018, accessed May 8, 2023.

[16]The linking of building heights to road-width to ensure that buildings received enough light and ventilation can be traced to the by-laws of the Bombay Improvement Trust (Issar, 2017).

[17]For our empirical analysis we do not consider construction on plots less than 9 meters in our control group as there was a fall in allowable FAR in the post deregulation period.

[18]The FAR relaxation was operationalized through increased TDRs and premium FAR allowances, not through higher "free" FARs. The "free" FAR allowances remained constant at 1 and 1.33 for the city and suburbs. However, as shown in Figure 2, developers used all sources of FAR allowances before and after the reform.

[19]The plan was particularly heavily criticized by civil society and nongovernmental organizations (Baitsch

ence with the redevelopment of the Mumbai mills had fostered a belief that FAR relaxation would lead to construction of luxury developments and would raise prices (Gechter and Tsivanidis, 2025).[20] The final plan in its current form was made public in 2016 and implemented in 2018.

3 Data

To assess whether developers utilized the higher FAR limits and how this altered the city's housing supply and prices, we construct three unique datasets. We combine administrative data on the universe of permit applications in Mumbai with detailed unit-level data on sales prices from transaction records and mortgage applications.

3.1 Housing Supply and Permit Applications

First, we compile the universe of permit applications filed with the Municipal Corporation of Greater Mumbai (MCGM) from 2014 to 2022. This allows us to measure whether developers make use of the relaxed FAR limits and how this translates into the number of new housing units supplied.

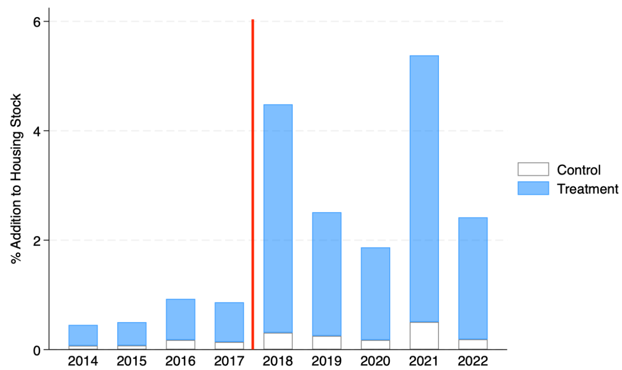
The permit applications allow us to track the construction of residential developments in Mumbai at a granular level. Each housing project is required to file for a permit with the MCGM, laying out the floor plan and details about the project, before construction can commence. Each permit application contains the project location, identified by a Chain and Triangulation Survey (CTS) number, and the width of the road that the parcel abuts. Each application is also required to file a layout plan that outlines the built FAR of the project, the area of the plot being developed, total residential floorspace, and the number of units in the project. We digitize each of these permit applications and geolocate them using the CTS number.[21]

and Bhide, 2022).

[20]"DP 2034: Architect Reacts to Backlash, Says Not Designed to Contain Densities," *The Indian Express*, April 27, 2018, accessed May 8, 2023.

[21]CTS numbers identify land parcels in a specific neighborhood and are the most granular geolocation identifiers within the administrative data. There are over 150,000 CTS numbers in the Mumbai region.

Figure 1: Supply of treatment and control apartments relative to housing stock



Note: This figure plots the aggregate number of apartments added to the housing stock each year in treatment and control projects as a proportion of the housing stock in 2012. The data are sourced from permit applications and from supplementary property tax data from 2012 with details of the housing stock. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. The vertical red line demarcates the pre-period from the post-period, indicating the FAR relaxation in 2018.

The permit applications measure housing supply and characteristics of the housing constructed. Our measure of housing supply is the number of units or apartments in each housing development. We calculate average unit sizes as the ratio of the total residential floorspace to the number of units in each project. Our sample consists of developments on roads wider than 9 meters from 2014 to 2022.[22] We obtain 4850 permit applications during this period, of which 98% are multifamily residential developments and 2% are single-family developments.

Treatment status is determined by the road width from the approved MCGM permit application, supplemented by AInsight's road width data when the permit lacks this information.[23,24] Using MCGM permit data, we measure annual additions to the housing stock as a percentage of the 2012 baseline. As shown in Figure 1, aggregate units added to the housing market — expressed as a percentage of the 2012 housing stock — remained below 1% per year before 2018, then increased to an average of 3.35% per year from 2018 — 2022, driven largely by units in projects on the treatment roads.[25]

3.2 Transaction Prices and Mortgage Data

We obtain unit-level sales prices from PropEquity and mortgage applications to one of India's largest private mortgage lenders, to measure how changes in housing supply affect prices. To match these data to the permit applications, we use unique government identifiers and the

[22] We exclude developments on plots adjoining a road less than 9 meter, since these would see a decline in their permitted FAR.

[23] Approximately 3% of the permit applications filed with the municipal corporation are missing a road width.

[24] AInsight is a Mumbai-based GIS software firm that maps and maintains data on physical infrastructure in Mumbai.

[25] Figure II.2 plots the share of new building permits by treatment status.

project location.

We use transaction records digitized by PropEquity as our primary data source for unit-level sale prices. PropEquity, a real estate analytics firm, maintains a subscription real estate information portal for the Indian market.[26] PropEquity aims to provide data on all new real estate projects in India with potential revenues over 10 million rupees (approximately US$200,000). For each multifamily development, we observe the developer, number of apartment units, unit size and the number of bedrooms. Since 2008, the firm has digitized transaction deeds for each apartment in the projects in its database. The prices in its database therefore correspond to those registered with the government, which are subject to governmental levies.

We use the CTS numbers and a unique government identifier to match projects from PropEquity to our permit application data. In 2017, the government of Maharashtra made it mandatory for real estate developers to register their projects with a newly created regulatory agency, the Real Estate Regulatory Authority (RERA). Each project is assigned a unique RERA number, which can be mapped back to the CTS number and permit applications. We leverage both the CTS and the RERA number to match developments from PropEquity to our permit applications and obtain over 64,296 unit-level transactions for 959 housing developments in our sample. We drop transactions after 2018 for projects launched prior to the reform. Retaining these observations would contaminate the post period with prices that reflect market-wide price movements but not the causal impact of increased allowable FAR, thereby biasing estimated treatment effects. Our final sample consists of 59,843 obs in 929 projects.

We complement the PropEquity data on unit-level transaction prices with a proprietary database of mortgage applications from one of India's largest private mortgage lenders. The data contain details of mortgage applications approved by the lender in Mumbai from 2014 to 2020. Each approved application contains information on the property for which the mortgage is taken out and the characteristics of the applicant. Each mortgage applicant reports her age, occupation, gender, and income in the process. The application contains the price and area of the apartment to which the mortgage application corresponds, the loan amount requested, the unit location, and the RERA number of the development. We use the RERA numbers to match the data to our permit application data and match 5,617 applications made for the new residential constructions in our sample. Our final sample drop applications after 2018 for projects launched prior to the reform, and consists of 5,325 mortgage applications.

We use two sources of data on unit-level transaction prices. The property price data from PropEquity come from registry deeds; as these are used by the government to collect stamp

[26]PropEquity is a for-profit analytics firm whose subscribers are real estate investors, banks and real estate developers, which primarily use the data to understand trends in local prices and quantities of new residential projects being developed.

duty and registration charges on the property as a proportion of the property price, it is likely that the prices are underreported.[27] Anagol *et al.* (2022) find that properties in Mumbai with mortgages from private banks are least subject to underreporting, and consequently, we supplement our transactions data with mortgage data from a private bank.[28]

4 Empirical Methods

We use a difference-in-difference (DID) strategy and the variation generated by the 2018 policy reform to compare the evolution of housing supply and prices on parcels with different treatment status. The granularity of our data allows us to compare projects that received differential FAR relaxation within a given administrative unit (ward) and year. A potential threat to our identification is that developments on wider roads had differential trends in housing supply and prices prior to the reform. This section elaborates the scope of these potential violations of our identification assumptions and documents the reduced-form impacts of FAR relaxation on housing supply, characteristics and prices and the implications of these changes for buyers of different income levels.

The core variation in treatment is derived from the linking of FARs to road widths. Parcels on roads wider than 12 meters witnessed a 10–50% FAR relaxation and form our treatment group. Parcels that abut a road between 9 and 12 meters were unaffected by the reform and form our control group. To motivate our DID identification strategy, we show evidence of parallel pretrends in our outcome variables.

The construction of the treatment and control groups is similar to that used in other papers in this literature, with one key difference. Anagol *et al.* (2025) and Peng (2022) use block-level variation to identify the effects of an FAR deregulation to estimate a spatial regression discontinuity. Similarly to these authors, we compare groups that witnessed a FAR increase with those whose FARs were unchanged. However, given the nature of the policy experiment, parcels on treated and control roads are within the same block or neighborhood (as seen in Figure I.1). This has the advantage of allowing us to compare developments with similar location fundamentals and amenities. We leverage the variation in road widths and rely on a DID framework for our reduced-form analysis. An alternate empirical strategy would leverage discontinuities in road width and compare plots on roads on either side of a narrow band around 12 meters. However, road widths are discontinuous in nature, with bunching around

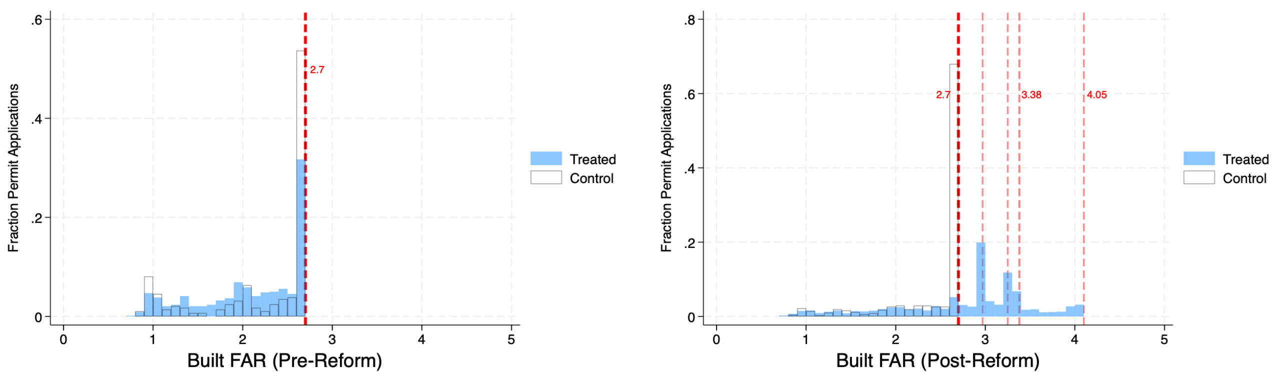
[27] The city of Mumbai collects a duty of 5% of the property price when a transaction is registered, with 80% of this fee collected as stamp duty and the remainder corresponding to the Metro cess. A further registration charge of INR 30,000 is levied for properties worth above INR 3,000,000. Properties worth less than INR 3,000,000 are charged 1% of the property value.

[28] Anagol *et al.* (2022) find that transactions in Mumbai with no associated mortgage exhibit the greatest extent of underreporting. Transactions with mortgages from public-sector or cooperative banks have a higher degree of underreporting than those with mortgages from private-sector banks.

multiples of 10 or 15 feet (3 or 4.5m).[29] Appendix Figure IV.1 plots the distribution of the road width along which FARs are claimed, i.e., the widest road width abutting the plot, and shows evidence of this bunching.

Our DID strategy compares the evolution of housing supply and prices in response to the change in FARs on treated and control parcels. Panel A of Figure 2 shows the distribution of the prereform FARs claimed on building permits for plots by the treatment status of the road to which they are adjacent. The FAR constraint of 2.7 is binding, as approximately 40% of the applications are approved at this limit value in Mumbai. Even after the reform, the FAR cap of 2.7 still binds for the applications corresponding to control parcels; however, applicants for building permits on treated plots can now apply for the higher FAR permitted under the new policy regime, as shown in panel B of Figure 2. The bunching observed in the FAR distribution in the treated group (panel B, Figure 2) after the reform coincides with the caps of 2.97, 3.25 and 3.38, as seen in Table 1, which reflect a 10–30% increase from the FAR cap of 2.7.

Figure 2: Built FAR



(a) Pre-2018 FAR

(b) Post-2018 FAR

Note: The vertical red line marks the prereform maximum FAR that projects could apply for, i.e., FAR = 2.7. The dashed lines show the differential postreform FAR caps of 2.97, 3.25, 3.38, and 4.05, which reflect a 10, 20, 30 and 50% increase in the FAR allowance from the prereform cap of 2.7. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group.

Our key identification assumption is that, in the absence of this reform, outcomes in the treated and control units would have evolved similarly. Figures 3a and 3c assess the validity if this assumption by showing the evolution of the built FAR and housing supply prior to the reform in 2018. We find no evidence of differential trends in these outcomes.

To formally estimate the effect of the relaxation in the FAR cap on housing supply, we estimate the following DID model:

$$Y_{iwt} = \alpha + \beta_1 \cdot Treatment_i + \beta_2 \cdot Treatment_i \times Post_t + \gamma_w \times Post_t + \gamma_w + \delta_t + \varepsilon_{iwt} \quad (1)$$

[29] One lane is approximately 3m.

where Y_{iwt} is the outcome for project i in ward w in year t. $Treatment_i = 1$ if the maximum width of the road adjacent to the plot is greater than 12 meters, and $Treatment_i = 0$ if the maximum road width adjacent to the plot is between 9 and 12 meters in width. Project level outcomes of interest are FAR, total residential built-up space, number of units and average unit sizes. $Post_t$ is an indicator variable that takes value 1 if the application was filed in or after 2018 and 0 otherwise. We control for unobservable ward-level characteristics and aggregate-time shocks through ward × post fixed effects ($\gamma_w \times Post_t$) and ward and year fixed effects (γ_w and δ_t). The coefficient β_2 identifies the effect of relaxing the FAR constraint on our outcomes of interest. Standard errors are clustered at the ward level.

We estimate the impact of the relaxation of the FAR cap on housing prices and income following eq. (1) with two modifications to improve identification. First, we restrict the sample to transactions and mortgage applications that can be unambiguously classified into the post-deregulation period, i.e. we drop post deregulation transactions from developments initiated before 2018. This sample restriction avoids contaminating the post period with prices that reflect market-wide price movements but not the causal impact of increased allowable FAR, thereby biasing estimated treatment effects.[30] Second, since housing developments often take several years to sell, we use the year of the transaction instead of the year of permit application to define $Post_t$ in eq. (1) for the estimation of effects on housing prices and household incomes.

A potential endogeneity concern with our estimation is that plots located on wider roads may systematically differ from other plots within the same ward in ways that are correlated with both treatment status and housing market outcomes. For example, schools and green spaces might be on wider roads. In particular, within-ward spatial heterogeneity – such as variation in local amenities, affecting neighborhood desirability – could lead to differential demand for housing across areas that ward fixed effects would not control, potentially biasing our estimates. To address this concern, we implement two checks. We use a nearest-neighbor matching strategy that pairs each treated housing development with the nearest control development in the same ward and permitting year, ensuring that treatment and control developments are comparable along these location-specific dimensions. Second, we use fixed effects at a smaller administrative unit, i.e. the pincode level. We estimate specifications with pincode fixed effects, which provide a finer geographical control than wards and absorb much of the within-ward spatial variation in amenities and local demand conditions. We discuss these robustness checks in section 6.

[30] We show treatment effects without this sample restriction in Appendix Table III.2.

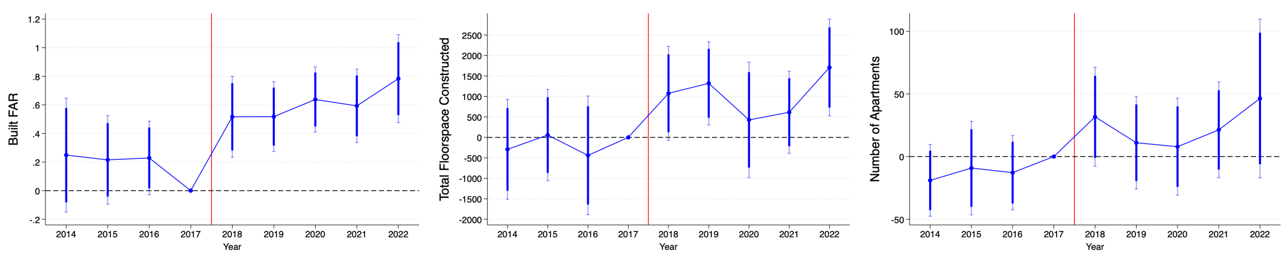
5 Results

In this section we look at the impact of deregulation on housing supply and unit sizes, house prices, and income of home buyers by estimating eq. (1).

5.1 Housing Supply

Whether a relaxation increases housing supply depends on the restrictiveness of the FAR cap. As shown in Figure 2, FAR caps were binding for approximately 40% of the permit applications prior to 2018. We use data from permit applications to measure changes in the FARs of projects being built by developers and how these changes translate into floorspace and changes in the number of apartments, which are our measure of housing supply. Relaxation of FAR on treated roads led to increased utilization of FAR by the developer and therefore residential floorspace (Table 2). The 10–50% FAR relaxation induced by this policy reform leads to a statistically significant 0.37 or 17.3% increase in built FAR relative to an average pre-period housing development and a statistically significant increase of 1027 square meters developed floorspace (or 30.1% of the pre-period average).

Figure 3: Impact of Deregulation on Housing Supply



(a) Floor Area Ratio (FAR) (b) Total Floorspace (c) Apartments

Note: The data are sourced from permit applications. Total floorspace is denoted in square meters. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. We plot the difference in the outcome variable between treatment and control normalized by 2017, the year before the implementation of the policy. The vertical red line demarcates the preperiod from the postperiod, indicating the FAR relaxation in 2018.

How does this increase in built FAR translate into changes in housing supply? The number of apartments in treated developments increases by 33 units relative to that in the control (Column 3, Table 2). This corresponds to a 58.1% increase in housing supply relative to an average pre-period housing development. Consequently, the aggregate supply response from the FAR relaxation translates into a 2 p.p increase in the housing stock, which is larger than recent estimates in the literature on other cities (e.g., Peng, 2022, for New York).[31] The

[31] Figure 1 shows that the total housing added to the stock every year increases from approximately 1% prior to the reform to 3.35% after the reform.

magnitude of this effect is driven by the heterogeneity in the intensity of FAR relaxations, as discussed below.

Table 2: Effects of Deregulation on Housing Supply

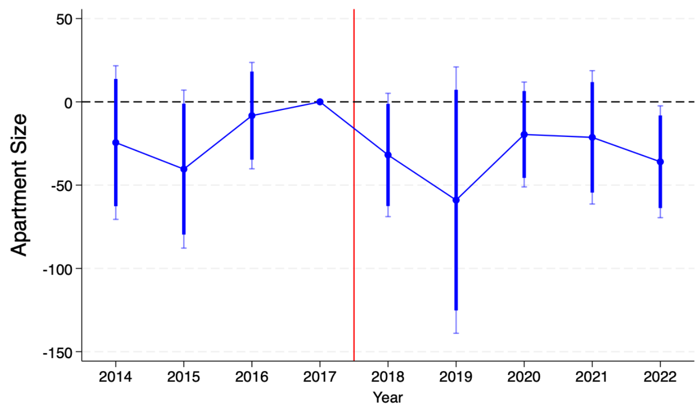
Dependent Variable:	FAR	Total Floorspace	Units
Treat * Post	0.37***	1027.23**	33.69**
	(0.04)	(371.03)	(13.28)
Treat	-0.11**	1485.18***	30.57***
	(0.05)	(340.68)	(7.32)
Pre-period Mean	2.14	3408.48	57.98
Number of Applications	4816	4537	4243
Ward X Post FE	X	X	X
Ward FE	X	X	X
Year FE	X	X	X

Notes: The table shows the difference-in-difference results, capturing the impact of the FAR relaxation as described in eq. (1). The observations are residential projects in the period 2014–2022, and the data are sourced from permit applications. Columns (1)–(3) show effects of the deregulation on the FAR, total floorspace area, and number of apartments, respectively. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. Post takes the value 1 if a project files building plans following the FAR deregulation in 2018. Total floorspace is measured in square meters. The data have missing values for total floorspace and number of units. Standard errors are clustered at the ward level. *** p<0.01, ** p<0.05, * p<0.1.

Measuring housing supply only by changes in floorspace and number of units can mask the types of units that are built. A concern raised by Rodríguez-Pose and Storper (2020) is that zoning deregulation will lead to the construction of larger apartments, resulting in an inadequate supply response. Our permit data enable us to create apartment size metrics for each project, addressing these concerns directly. Figure 4 displays the trends in unit sizes. Following the relaxation, unit sizes fell, but this decline is not statistically significant (Appendix Table II.1).

Examining heterogeneity in the intensity of FAR deregulation across developments reveals important differences in both supply and unit size responses. We find that the effects are substantially larger for projects exposed to higher FAR relaxations (see Appendix Table III.1). Developments that receive a lower FAR relaxation (10–20%) exhibit modest increases in floorspace and units, whereas those receiving higher relaxations (30–50%) experience more than twice the increase in number of units. Consistent with this supply response, the high-intensity group shows a statistically significant 37 sq. mts reduction in unit sizes, substantially larger than the decline in the low-intensity group. This suggests that developers adjust both the scale and unit sizes when the FAR relaxation is higher (Table 3).

Figure 4: Impact of Deregulation on Apartment Size



Note: The data are sourced from permit applications. Apartment sizes are measured in square meters. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. We plot the difference in the outcome variable between treatment and control normalized by 2017, the year before the implementation of the policy. The vertical red line demarcates the preperiod from the postperiod, indicating the FAR relaxation in 2018.

Table 3: Heterogeneity in Effects on Unit Sizes by Treatment Intensity

Dependent Variable:	Unit Size	
	Low Intensity (10-20%)	High Intensity(30-50%)
Treat * Post	-11.38	-37.66**
	(12.26)	(16.99)
Treat	20.64	44.06**
	(15.06)	(16.47)
Pre-period Mean	102.00	103.94
Number of Applications	3392	1831
Ward X Post FE	X	X
Ward FE	X	X
Year FE	X	X

Notes: The table presents difference-in-difference results of the impact of the treatment as described in eq. (1). The observations are residential projects in the period 2014–2022, and the data are sourced from permit applications. The treatment group in columns (1)-(3) comprises of applications on roads that received 10-20% relaxation in FAR. This includes roads between 12-27 meters in the suburbs and 12-18 meters in the Island city. The treatment group in columns (3)-(6) comprises of applications on roads that received 30-50% relaxation in FAR. This includes roads over 27 meters in the suburbs and over 18 meters in the Island city. Projects on roads between 9 and 12 meters in width form the control group in both specifications. Post takes the value 1 following the FAR deregulation in 2018. The data has missing values for total floorspace and number of units. Standard errors are clustered at the ward level. *** p<0.01, ** p<0.05, * p<0.1.

5.2 Impact on House Prices

To understand the price response generated by the increase in housing supply, we bring together two new sources of unit-level transaction price data. Obtaining reliable price data on property prices in India is a challenge, as property values are often underreported. We combine data from transactions registered with the government and digitized by PropEquity, and mortgage applications made to one of the largest private lenders in India. We find that prices fall post deregulation using our two data sources, which is reassuring as they are subject to differential underreporting (see Anagol *et al.*, 2022).

Table 4 shows that the deregulation leads to a decline in the price per square foot.[32] The data from PropEquity (column 1, Table 4) shows a 24% decrease and from private sector mortgage data (column 2, Table 4) shows a 14% decline in price per square feet.[33]. Anagol *et al.* (2022) studies under reporting in the real estate market in Mumbai and find a higher under reporting in transactions recorded with mortgages given by public sector banks than private sector banks. This would explain the differential impact in prices based on data sources in Table 4. Figure 5 illustrates the trends in prices from PropEquity and mortgage data before and after the reform and shows that there is a sustained fall in prices after deregulation.

The decline in prices is in contrast to the small and often insignificant effects on prices observed in other contexts. Anagol *et al.* (2025) find a small price decline of 0.5% in response to a supply increase of 1.9% in the aggregate housing stock over 10 years. On the other hand, Peng (2022) finds insignificant effects of a zoning reform on floorspace values in New York in the short term, with prices responding only after 10 years. These differences in effects on prices between zoning reforms in Mumbai, and Sao Paolo and New York, are a result of differential impacts on supply. In Mumbai, where FAR was binding (see fig. 2), as seen in the previous section, the deregulation led to a larger short-run increase in housing supply.

Table 4: Effects of Deregulation on Prices

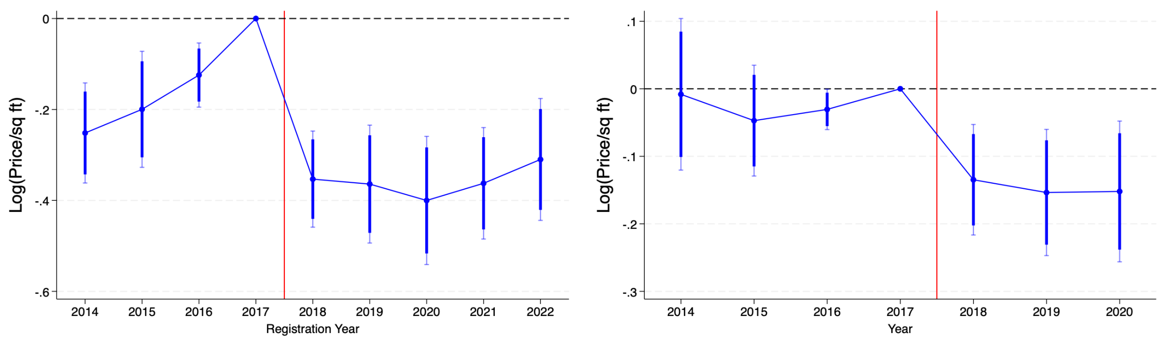
Dependent Variable:	Log(Price/sq ft)	
	PropEquity	Mortgage Data
Treat * Post	-0.24**	-0.14***
	(0.06)	(0.05)
Treat	0.45***	0.22***
	(0.06)	(0.03)
Pre-period Mean	17630.24	22428.56
Number of Applications	57281	5269
Ward X Post FE	X	X
Ward FE	X	X
Year FE	X	X

Notes: The table shows the difference-in-difference results, capturing the impact of the FAR relaxation as described in eq. (1). Column (1) uses transactions for projects in the period 2014–2022 and are sourced from PropEquity. Column (2) uses data from mortgage application from 2014 – 2020 and are sourced from one of the largest private lenders in India. Columns (1)–(2) show effects of the deregulation on price per unit area of the apartment. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. Post takes value 1 if a project files building plans following the FAR deregulation in 2018. Means are reported in INR. Standard errors are clustered at the ward level. *** p<0.01, ** p<0.05, * p<0.1

[32]In November 2016, the government of India announced demonetization of all ₹500 and ₹1,000 banknotes to curb "black" money and the use of undocumented cash. This could potentially lead to a decline in the reported transaction price for new units. However, Anagol *et al.* (2022) show that demonization did not impact prices when units were sold by developers as compared to when they were sold in the secondary market.

[33]Appendix Table III.2 shows the results on prices without restricting our sample of transactions as previously mentioned in Section 3.2. We include transactions post-2018 for projects that began in the pre-2018 period. We find that our results are very similar (column 1, Table III.2) to those shown in Tables 4 and 7.

Figure 5: Impact of Deregulation on Prices per square foot



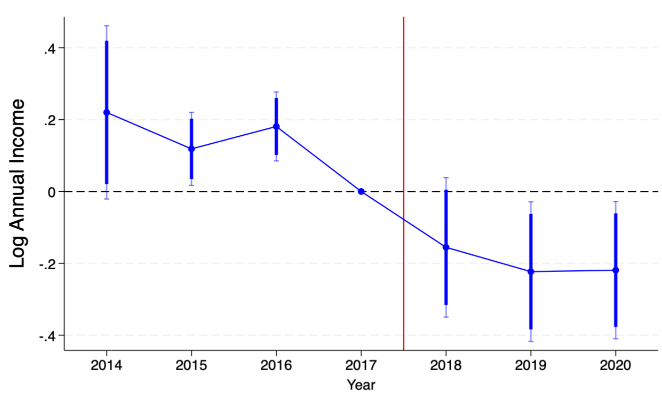
(a) PropEquity (b) Mortgage Data

Note: Apartment prices are sourced from PropEquity data in panel (a) and mortgage applications in panel (b).The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. We plot the difference in the outcome variable between treatment and control normalized by 2017, the year before the implementation of the policy. The vertical red line demarcates the preperiod from the postperiod, indicating the FAR relaxation in 2018.

5.3 Implications for Households

Whether the supply response to the FAR relaxation allows households with lower incomes to access housing is unclear. One argument against zoning deregulation is that the new housing generated might only be accessible for the rich (Baitsch and Bhide, 2022, pp. 94–95). However, tracking the characteristics of the households moving into developments in developing countries is challenging. We utilize unique data from mortgage applications to overcome this challenge. We find that the reduction in prices allows lower-income households to access

Figure 6: Effects of Deregulation on Buyer Income



Note: Data are sourced from mortgage applications. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. We plot the difference in the outcome variable between treatment and control normalized by 2017, the year before the implementation of the policy. The vertical red line demarcates the preperiod from the postperiod, indicating the FAR relaxation in 2018.

housing following the deregulation, as shown in Table 5. Figure 6 shows evidence of this decline in the relative income of the households moving into treated and control developments.

Second, although younger households in particular struggle to access affordable housing in urban settings, we find no effects of the deregulation on their ability to access housing.

Table 5: Effects of Deregulation on Household Characteristics

Dependent Variable:	Log(Income)	Age
Treat * Post	-0.29***	-0.78
	(0.07)	(1.13)
Treat	0.47***	0.99
	(0.09)	(0.85)
Pre-period Mean	37.99	39.81
Number of Transactions	5321	5321
Controls	X	X
Ward FE	X	X
Year of Transaction FE	X	X
Ward X Post FE	X	X

Notes: The table shows the difference-in-difference results, capturing the impact of the FAR relaxation as described in eq. (1). The observations are mortgage applications for projects launched in the period 2014–2020 and are sourced from a large private bank in India. Columns (1)–(2) show effects of the deregulation on annual income of buyers and their age, respectively. Annual income is reported in lakhs (= 10^5 INR). The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. Post takes value 1 if a project files building plans following the FAR deregulation in 2018. Controls include applicant age and gender in column (1) and only gender in column (2). Standard errors are clustered at the the ward level. *** p<0.01, ** p<0.05, * p<0.1.

6 Robustness Checks

In this section, we run robustness tests that address our endogeneity concerns discussed in section 4 and check whether our results are sensitive to missing data in the permit application data.

6.1 Matching

In our main specification, we compare treated and control developments within a given ward–year. However, wards, while small in area, may still contain treatment and control developments that are not in close proximity to each other.[34] To address these potential differences within wards, we match each control project to the nearest treated project within 500 meters that started development in the same year. The results from this comparison, presented in Table 6, confirm that our main estimates are not driven by projects located in isolated

[34] On average, each ward covers an area of approximately 20 square kilometers. Some of the larger wards in Mumbai, such as the K-West Ward, cover an area of approximately 30 square kilometers, while some of the smaller wards, such as D-Ward, cover an area of approximately 10 square kilometers.

or distant locations. The point estimate on price remains negative but statistically insignificant, likely because the 500m matching sharply reduces the effective number of comparable treated–control pairs.

Table 6: Nearest Neighbor Matching

Dependent Variable:	FAR	Total Floorspace	# Units	Log(Price/sq ft)
Treat * Post	0.34***	1249.50**	34.32**	-0.17
	(0.06)	(420.95)	(15.00)	(0.13)
Treat	-0.04	998.79**	20.62**	0.34***
	(0.06)	(339.33)	(8.00)	(0.09)
Pre-period Mean	2.21	2934.07	47.26	13058.05
Number of Applications	2742	2639	2507	16297
Ward X Post FE	X	X	X	X
Ward FE	X	X	X	X
Year FE	X	X	X	X

Notes: The table shows the difference-in-difference results, capturing the impact of the FAR relaxation as described in eq. (1). The observations are residential projects in the period 2014–2022, and the data are sourced from permit applications. Columns (1)–(3) show effects of the deregulation on the FAR, total floorspace area, and number of apartments, respectively. We match treated developments to their nearest control development. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. Post takes the value 1 if a project files building plans following the FAR deregulation in 2018. Total floorspace is measured in square meters. The data have missing values for total floorspace and number of units. Standard errors are clustered at the ward level. *** p<0.01, ** p<0.05, * p<0.1.

6.2 Alternate spatial fixed effects

We re-estimate our specification using pincode fixed effects and pincode-by-post fixed effects, which provide a much finer geographic control than wards and absorb virtually all time-varying heterogeneity at the neighborhood level. As shown in Table 7, the magnitude and significance of the treatment effects remain highly consistent with our baseline results. The price effect remains negative and similar in magnitude to our baseline but is estimated less precisely.

Table 7: Alternate Spatial Fixed Effects

Dependent Variable:	FAR	Total Floorspace	# Units	Log(Price/sq ft)
Treat * Post	0.33***	1271.16**	42.23**	-0.20
	(0.05)	(419.33)	(13.37)	(0.12)
Treat	-0.08*	1282.54**	21.54**	0.35***
	(0.04)	(393.97)	(6.77)	(0.10)
Pre-period Mean	2.15	3425.87	59.98	17732.82
Number of Applications	3970	3724	3464	54810
Year FE	X	X	X	X
Pincode FE	X	X	X	X
Pincode x Post FE	X	X	X	X

Notes: The table shows the difference-in-difference results, capturing the impact of the FAR relaxation similar to eq. (1), with pincode fixed effects instead of ward level fixed effects. Of the 104 pincodes in Mumbai, 76 are in our sample. Columns (1)–(3) show results of the deregulation on FAR, total floorspace area, and number of apartments respectively. The observations are residential projects in the period 2014-2022 and the data is sourced from permit applications. Column (4) hows effects of the deregulation on price per unit area of the apartment. The observations are transactions for projects in the period 2014–2022 and are sourced from PropEquity. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. Post takes the value 1 if a project files building plans following the FAR deregulation in 2018. Means are reported in INR. Standard errors are clustered at the ward level. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Robustness to Missing Data

Dependent Variable:	FAR	Total Floorspace	# Units
Treat * Post	0.40***	810.05*	15.43**
	(0.04)	(393.93)	(5.65)
Treat	-0.09*	1551.70***	12.66**
	(0.05)	(373.85)	(5.22)
Pre-period Mean	2.21	3336.91	41.23
Number of Applications	4030	4030	4030
Ward X Post FE	X	X	X
Ward FE	X	X	X
Year FE	X	X	X

Notes: The table shows the difference-in-difference results, capturing the impact of the FAR relaxation as described in eq. (1). The observations are residential projects in the period 2014-2022, and the data is sourced from permit applications. Columns (1)-(3) show results of the deregulation on FAR, total floorspace area, and number of apartments respectively. Only applications containing all three of these variables are included in the sample. The treatment group consists of developments on parcels on roads wider than 12 meters, while developments on roads between 9 and 12 meters form our control group. Post takes the value 1 if a project files building plans following the FAR deregulation in 2018. Total floorspace is measured in square meters. Standard errors are clustered at the ward level. *** p<0.01, ** p<0.05, * p<0.1.

6.3 Sensitivity to Missing Data

Our data on permit applications are obtained through digitizing information made public by the municipal government. As a result, the information released may not contain the full set of information on the number of units proposed and the size of the unit, leading to data missingness. Table 8 presents results from the sample with non-missing information for each of our three outcome variables: FAR, total floorspace and number of apartments. The results are quantitatively and qualitatively similar to those from our main specification in Table 2.

7 Conclusion

We study whether relaxing land use regulations increases housing affordability or merely induces the construction of larger, higher-end units. Exploiting a rule-based relaxation of Floor Area Ratio (FAR) in Mumbai in 2018, we provide causal evidence on how developers and housing markets respond to zoning deregulation in one of the most supply-constrained cities in the world.

FAR relaxation leads to a substantial supply response. Developers increase FAR utilization and increase the number of housing units in treated areas. This increase in supply does not occur through the construction of larger units. Although average unit sizes do not decline overall, higher-intensity FAR relaxations generate meaningful scale effects: as projects become larger, developers respond by building smaller units, leading to disproportionately larger increases in the number of apartments supplied. An increase in housing supply leads to a reduction in prices. We find that apartment prices decline in treated areas, improving access to formal housing for lower-income households. Linking housing transactions to buyer income data, we show that deregulation draws in households with lower average incomes, providing direct evidence that FAR relaxation improves housing affordability.

Our findings have several broader implications. First, they demonstrate that relaxation of binding constraints can be an effective tool for increasing housing affordability in cities in developing-countries, where regulatory restrictions are often severe and housing shortages acute. Second, the results highlight that the design of deregulation policies matters: larger relaxations in cities where these regulations are binding, generate qualitatively different development responses than marginal changes. Third, using buyer-level data, we provide evidence on who benefits from zoning reforms, an aspect missing from the literature in developing country contexts.

We provide clear evidence that relaxing FAR constraints in highly regulated cities can increase housing supply and improve affordability for lower-income households.

References

Anagol, S., Balasubramaniam, V., Ramadorai, T. and Uettwiller, A. (2022) A Bad Bunch: Asset Value Under-Reporting in the Mumbai Real Estate Market, *Available at SSRN*.

Anagol, S., Ferreira, F. V. and Rexer, J. M. (2025) Estimating the Economic Value of Zoning Reform, *American Economic Journal: Economic Policy*, forthcoming.

Annez, P., Bertaud, A., Patel, B. and Phatak, V. K. (2010) Working with the market: a new approach to reducing urban slums in India, *World Bank Policy Research Working Paper*.

Baitsch, T. and Bhide, A. (2022) Politics of land use regulations, in *Politics of Urban Planning: The Making and Unmaking of the Mumbai Development Plan 2014–2034*, Springer, pp. 83–105.

Baum-Snow, N. (2023) Constraints on city and neighborhood growth: The central role of housing supply, *Journal of Economic Perspectives*, **37**, 53–74.

Baum-Snow, N. and Han, L. (2024) The microgeography of housing supply, *Journal of Political Economy*, **132**, 1897–1946.

Bertaud, A. (2004) Mumbai FSI conundrum: The perfect storm: The four factors restricting the construction of new floor space in Mumbai, *Presentation available on www. alain-bertaud. com*.

Bertaud, A. (2018) *Order without Design: How Markets Shape Cities*, MIT Press.

Bertaud, A. and Brueckner, J. K. (2005) Analyzing building-height restrictions: predicted impacts and welfare costs, *Regional Science and Urban Economics*, **35**, 109–125.

Beverley, E. L. (2011) Colonial Urbanism and South Asian cities, *Social History*, **36**, 482–497.

Brueckner, J. K., Fu, S., Gu, Y. and Zhang, J. (2017) Measuring the stringency of land use regulation: The case of China's building height limits, *Review of Economics and Statistics*, **99**, 663–677.

Brueckner, J. K. and Singh, R. (2020) Stringency of land-use regulation: Building heights in US cities, *Journal of Urban Economics*, **116**, 103239.

Brueckner, J. K. and Sridhar, K. S. (2012) Measuring welfare gains from relaxation of land-use restrictions: The case of India's building-height limits, *Regional Science and Urban Economics*, **42**, 1061–1067.

Büchler, S. and Lutz, E. (2024) Making housing affordable? the local effects of relaxing land-use regulation, *Journal of Urban Economics*, **143**, 103689.

Dossal, M. *et al.* (1991) *Imperial designs and Indian realities: the Planning of Bombay City, 1845-1875*, Oxford University Press, USA.

Duranton, G., Ghani, S. E., Goswami, A. G., Kerr, W. and Kerr, W. R. (2015) The misallocation of land and other factors of production in india, *World Bank Policy Research Working Paper*.

Duranton, G. and Puga, D. (2023) Urban growth and its aggregate implications, *Econometrica*, **91**, 2219–2259.

Gandhi, S., Green, R. K. and Patranabis, S. (2022) Insecure property rights and the housing market: Explaining India's housing vacancy paradox, *Journal of Urban Economics*, **131**, 103490.

Gandhi, S. and Phatak, V. K. (2016) Land-based financing in metropolitan cities in India: The case of Hyderabad and Mumbai, *Urbanisation*, **1**, 31–52.

Gandhi, S., Tandel, V., Tabarrok, A. and Ravi, S. (2021) Too slow for the urban march: Litigations and the real estate market in Mumbai, India, *Journal of Urban Economics*, **123**, 103330.

Ganong, P. and Shoag, D. (2017) Why has regional income convergence in the us declined?, *Journal of Urban Economics*, **102**, 76–90.

Gechter, M. and Tsivanidis, N. (2025) Spatial Spillovers from High-Rise Developments: Evidence from the Mumbai Mills, Tech. rep., Working Paper.

Glaeser, E. L., Gyourko, J. and Saks, R. (2005a) Why is Manhattan so expensive? Regulation and the rise in housing prices, *The Journal of Law and Economics*, **48**, 331–369.

Glaeser, E. L., Gyourko, J. and Saks, R. E. (2005b) Why have housing prices gone up?, *American Economic Review*, **95**, 329–333.

Greenaway-McGrevy, R. and Phillips, P. C. (2023) The impact of upzoning on housing construction in Auckland, *Journal of Urban Economics*, **136**, 103555.

Gyourko, J. and Molloy, R. (2015) Regulation and housing supply, in *Handbook of regional and urban economics*, Elsevier, vol. 5, pp. 1289–1337.

Harari, M. (2020) Cities in bad shape: Urban geometry in India, *American Economic Review*, **110**, 2377–2421.

Hsieh, C.-T. and Moretti, E. (2019) Housing constraints and spatial misallocation, *American Economic Journal: Macroeconomics*, **11**, 1–39.

Issar, S. (2017) Codes of Contention: Building Regulations in Colonial Bombay, 1870-1912, *Journal of Historical Sociology*, **30**, 164–188.

Katz, L. and Rosen, K. T. (1987) The interjurisdictional effects of growth controls on housing prices, *The Journal of Law and Economics*, **30**, 149–160.

Kidambi, P. (2004) 'An infection of locality': Plague, Pythogenesis and the Poor in Bombay, c. 1896–1905, *Urban History*, **31**, 249–267.

Kulka, A. (2019) Sorting into neighborhoods: The role of minimum lot sizes, in *Conference paper, APPAM 41st Annual Fall Research Conference, Denver, CO*.

Kumar, T. (2021) The housing quality, income, and human capital effects of subsidized homes in urban India, *Journal of Development Economics*, **153**, 102738.

Peng, X. E. (2022) The Dynamics of Urban Development: Evidence From Zoning Reform in New York, *Unpublished Manuscript*.

Pethe, A. (2013) Metropolitan public finances: The case of mumbai, in *Financing Metropolitan Governments in Developing Countries* (Eds.) R. W. Bahl, J. F. Linn and D. L. Wetzel, Lincoln Institute of Land Policy, Cambridge, MA, pp. 243–272.

Quigley, J. M. and Raphael, S. (2004) Is housing unaffordable? why isn't it more affordable?, *Journal of Economic Perspectives*, **18**, 191–214.

Quigley, J. M. and Raphael, S. (2005) Regulation and the high cost of housing in California, *American Economic Review*, **95**, 323–328.

Rodríguez-Pose, A. and Storper, M. (2020) Housing, urban growth and inequalities: The limits to deregulation and upzoning in reducing economic and spatial inequality, *Urban Studies*, **57**, 223–248.

Rodríguez-Pose, A. and Storper, M. (2022) Dodging the burden of proof: A reply to Manville, Lens and Mönkkönen, *Urban Studies*, **59**, 59–74.

Saiz, A. (2010) The geographic determinants of housing supply, *The Quarterly Journal of Economics*, **125**, 1253–1296.

Tandel, V., Gandhi, S., Nanda, A. and Agnihotri, N. (2025) Do mandatory disclosures squeeze the lemons? The case of housing markets in India, *Journal of Public Economics*, **247**, 105395.

Trounstine, J. (2020) The geography of inequality: How land use regulation produces segregation, *American Political Science Review*, **114**, 443–455.

Turner, M. A., Haughwout, A. and Van Der Klaauw, W. (2014) Land use regulation and welfare, *Econometrica*, **82**, 1341–1403.

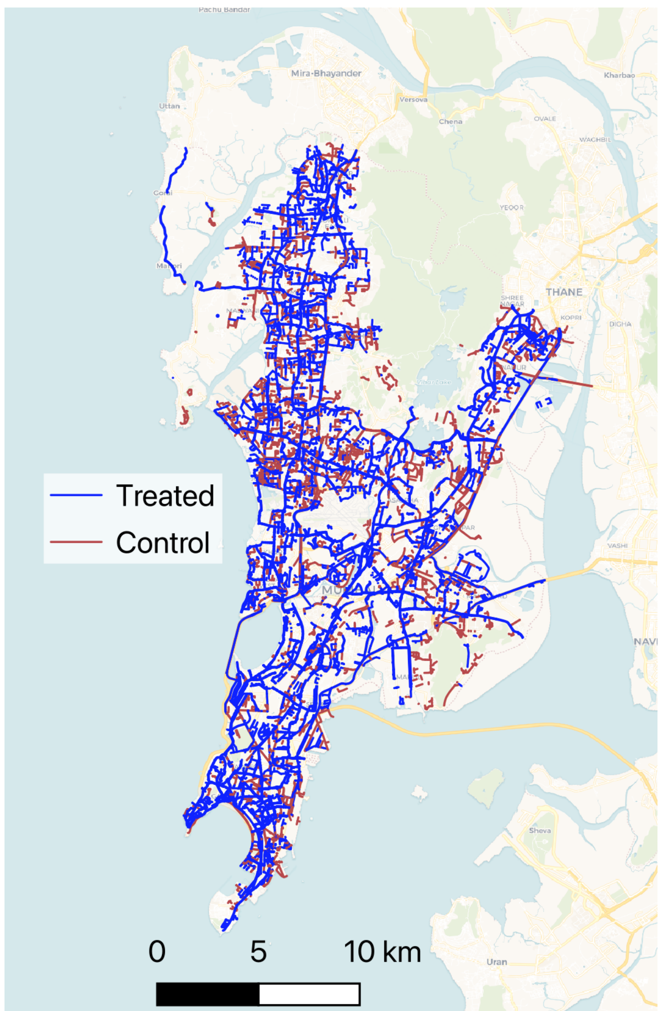
United Nations (2025) World urbanisation prospects 2025.

Appendix

Appendix Contents

I Mumbai – Location of Treatment and Control

Figure I.1: Treatment and Control Roads in Mumbai



Source: AInsight roads data layer. Treatment roads are those wider than 12 meters, while roads between 9 and 12 meters are depicted as control.

II Application Permit data

We obtain the application permit data by digitizing the permit applications filed with and approved by the Municipal Commission of Greater Mumbai (MCGM). Figures II.1a and II.1b show permit applications before and after the implementation of the reform.

II.1 Permit Example

Figure II.1: Permit applications before and after 2018

		PROFORMA – A	
A) AREA STATEMENT			SQ.MTS.
1.		AREA OF PLOT	492.40
2.		DEDUCTION FOR	
	A	ROAD SET BACK AREA	--
	B	PROPOSED ROAD	--
	C	ANY RESERVATION	--
		TOTAL (A + B + C)	--
3.		BALANCE AREA OF THE PLOT (1 – 2)	492.40
4.		DEDUCTION FOR R. G.	--
5.		NET AREA OF PLOT (3 – 4)	492.40
6.		ADD FOR F. S. I.	--
	2A	100%	--
	2B	100% PROPOSED ROAD SET BACK AREA	--
7.		TOTAL AREA (5 + 6)	492.40
8.		F.S.I. PERMISSIBLE	1.00
9.		F.S.I. CREDIT AVAILABLE BY DEVELOPMENT RIGHTS PROPOSE SLUM T.D.R. D.R.C. NO. SRA/1114/CONST.	250.00
		ADDITIONAL FOR FLOOR SPACE INDEX 0.50 FSI AS PER GOVT. NOTIFICATION (50% OF 492.40)	242.40
10.		PERMISSIBLE FLOOR AREA	984.80
11.		TOTAL PROPOSED BUILT UP AREA	984.80
12.		F. S. I. CONSUMED ON NET PLOT	2.00
B) DETAIL OF RESIDENTIAL NON RESIDENTIAL AREA			
1.		PURELY RESIDENTIAL BUILT UP AREA	984.80
2.		REMAING NON – RESIDENTIAL BUILT UP AREA	--
C) DETAIL OF FSI AVAILABLE AS PER DCR 35(4)			
1.		FUNGIBLE B.U.A. COMPONENT PERMISSIBLE VIDE DCR 35(4) FOR REHAB RESIDENTIAL (492.40 x 35%)	172.34
2.		FUNGIBLE B.U.A. COMPONENT PERMISSIBLE VIDE DCR 35(4) FOR SALE RESIDENTIAL (492.40 x 35%)	172.34
3.		FUNGIBLE B.U.A. PROPOSED FOR REHAB RESIDENTIAL	172.34
4.		FUNGIBLE B.U.A. PROPOSED FOR SALE RESIDENTIAL	172.34
5.		TOTAL FUNGIBLE AREA (3 + 4)	344.68
6.		TOTAL GROSS BUILT UP AREA PROPOSED [A(11)+C(5)]	1329.48
7.		TOTAL F. S. I. CONSUMED ON NET PLOT	2.70

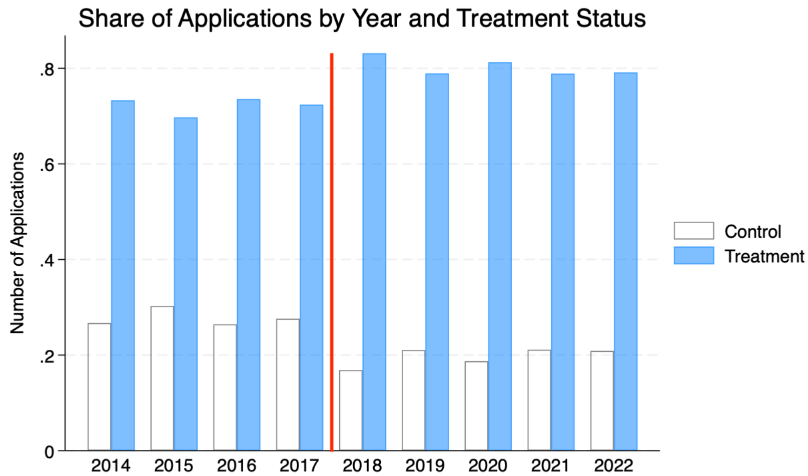
(a) Pre-2018 permit application

	PROFORMA-A	TOTAL AS PER DCPR 2034
I	AREA STATEMENT	
1.	AREA OF PLOT	666.20
a)	Area of Reservation in plot	
b)	Area of Road Set back	NIL
c)	Area of D.P. Road	9.00
2.	DEDUCTIONS FOR	NIL
A.	For Reservation/Road Area	NIL
	a) Road setback Area to be handed over (100%) Reg. No. 16	9.00
	b) Proposed D.P. Road to be handed over (100%) Reg. No. 16	NIL
	c) Reservation Area to be handed over (100%) Reg. No. 17(ii)	NIL
	d) Reservation Area to be handed over as per AR(100%) Reg. No.17	NIL
3.	TOTAL DEDUCTIONS [{2(A)+2(B)}+2(C) as and when applicable]	9.00
4.	BALANCE AREA OF PLOT (1-3)	657.20
5.	Plot area under Development after areas to be handed over to MCGM/ Appropriate Authority as per Sr. No. 4 above	657.20
6.	Zonal (basic) FSI 1.00	1.00
7.	Built up Area as per Zonal (basic) FSI (5X6)	657.20
8.	Additional Built up Area for land handed over as per Reg. 30(A)	18.00
9.	Built up Area in lieu of cost of construction of built up amenity to be handed overequal to area of land handed over as per Reg. 30(A)	NIL
10.	Built up Area due to "Additional FSI on payment of premium" as per Tab No. 12 of Reg. No. 30(A) on remaining/ balance plot.	328.60
11.	Built up Area due to admissible "TDR" as per Table No. 12 of Reg. 30(A and 32 on remaining/ balance plot. (0.90 X 657.20= 591.48 S.MTS.) 591.48-18= 573.48	573.48
12.	Permissible Built up Area	1577.28
13.	Proposed BUA	1577.28
14.	TOTAL PERMISSIBLE BUILT UP AREA	
a)	i. Permissible Fungible Compensatory Area for Rehab component without charging premium	142.97
	ii. Fungible Compensatory Area for Rehab component without charging premium	142.97
b)	i. Permissible Fungible Compensatory Area by charging premium	409.08
	ii. Fungible Compensatory Area availed on payment of premium	408.88
15.	Total Built up Area proposed including Fungible Compensatory Area [13 + 15(a)(ii) + 15 (b)(ii)]	2129.13
16.	FSI consumed on Net Plot (13/4)	3.24

(b) Post-2018 permit application

II.2 Residential Developments

Figure II.2: Impact of deregulation on applications



Note: The data are sourced from permit applications. The treatment group consists of developments on parcels on roads wider than 12 meters, while residential developments on parcels on roads between 9 and 12 meters form our control group. The vertical red line demarcates the pre-period from the post-period, indicating the FAR relaxation in 2018.

II.3 Tables

Table II.1: Effects of Deregulation on Housing Characteristics

Dependent Variable:	Unit Size (sq m)
Treat * Post	-14.38
	(11.00)
Treat	22.30*
	(11.88)
Pre-period Mean	107.41
Number of Applications	4222
Ward X Post FE	X
Ward FE	X
Year FE	X

Notes: The table shows the difference-in-difference results, capturing the impact of the FAR relaxation as described in eq. (1). The observations are residential projects in the period 2014–2022, and the data are sourced from permit applications. The table shows the effects of the deregulation on apartment size. The treatment group consists of developments on parcels on roads wider than 12 meters, while residential developments on parcels on roads between 9 and 12 meters form our control group. Post takes value 1 if a project files building plans following the FAR deregulation in 2018. Unit size is measured in square meters. The data have missing values for unit size. Standard errors are clustered at the ward level. *** p<0.01, ** p<0.05, * p<0.1.

III Heterogeneity

Table III.1: Heterogeneity Effects on Supply by Treatment Intensity

	Low Intensity (10-20%)			High Intensity(30-50%)		
Dependent Variable:	FAR	Total Floorspace	# Units	FAR	Total Floorspace	# Units
Treat * Post	0.35***	740.09*	25.47**	0.51***	1704.18*	60.14**
	(0.04)	(372.34)	(11.89)	(0.08)	(881.45)	(27.96)
Treat	-0.08	1347.46***	20.02**	-0.27***	2387.07**	76.48**
	(0.06)	(332.50)	(6.86)	(0.05)	(906.73)	(23.58)
Pre-period Mean	2.18	3114.97	45.58	2.13	3170.60	64.05
Number of Applications	3738	3621	3408	2140	1970	1838
Ward X Post FE	X	X	X	X	X	X
Ward FE	X	X	X	X	X	X
Year FE	X	X	X	X	X	X

Notes: The table presents difference-in-difference results of the impact of the treatment as described in eq. (1). The observations are residential projects in the period 2014-2022, and data are sourced from permit applications. The treatment group in columns (1)-(3) comprises of applications on roads that received 10-20% relaxation in FAR. This includes roads between 12-27 meters in the suburbs and 12-18 meters in the Island city. The treatment group in columns (3)-(6) comprises of applications on roads that received 30-50% relaxation in FAR. This includes roads over 27 meters in the suburbs and over 18 meters in the Island city. Projects on roads between 9 and 12 meters in width form the control group in both specifications. Post takes the value 1 following the FAR deregulation in 2018. The data has missing values for total floorspace and number of units. Standard errors are clustered at the ward level. *** p<0.01, ** p<0.05, * p<0.1.

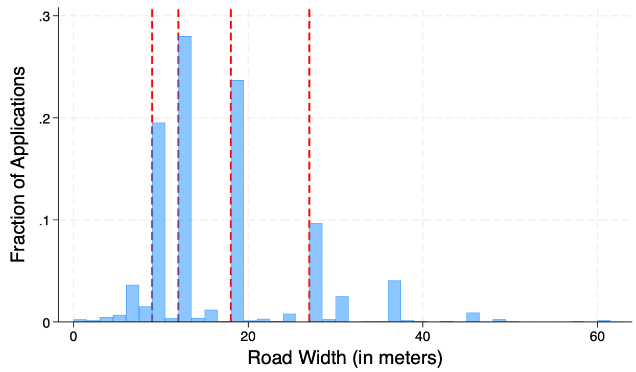
Table III.2: Effects of Deregulation on Prices (All Registrations)

Dependent Variable:	% Change in Price/sq ft PropEquity	
	Ward FE	Pincode FE
Treat * Post	-0.24***	-0.20*
	(0.06)	(0.12)
Treat	0.45***	0.34**
	(0.06)	(0.10)
Pre-period Mean	19890.10	20032.79
Number of Applications	61547	58935
Year FE	X	X
Ward X Post FE	X	
Ward FE	X	
Pincode X Post FE		X
Pincode FE		X

Notes: The table shows the difference-in-difference results, capturing the impact of the FAR relaxation as described in eq. (1). The observations are transactions for projects in the period 2014–2022 and are sourced from PropEquity. Columns (1)–(2) show effects of the deregulation on price per unit area of the apartment. The treatment group consists of developments on parcels on roads wider than 12 meters, while residential developments on parcels on roads between 9 and 12 meters form our control group. Post takes value 1 if a project files building plans following the FAR deregulation in 2018. Means are reported in INR. Standard errors are clustered at the ward level. *** p<0.01, ** p<0.05, * p<0.1

IV Road Width Data

Figure IV.1: Road widths against which FAR is claimed



Note: The vertical red lines indicate the road-widths at which FAR was increased progressively: 9, 12, 18 and 27 meters.