Accountable Developers, Accessible Homes: Regulatory Pathways to Expanding Home Ownership

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Abstract

Home ownership builds wealth yet remains inaccessible for many. Developers constitute critical but understudied intermediaries controlling housing supply and affordability. Using India as our setting, we examine how regulatory intervention mandating developer accountability transforms home ownership. These reforms restructure the market—some exit under compliance burdens while others enter as standards replace reputation signals. The intervention benefits first-time buyers and marginalized groups while expanding affordable housing beyond metropolitan centers. Post-intervention mortgages show lower delinquency rates, revealing borrowers were deterred by developer's default risk rather than creditworthiness concerns. Our findings show how developer-focused policies can reshape housing markets for previously excluded populations.

Keywords: home ownership, real estate developers, mortgage, affordability

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1 Introduction

Home ownership plays a crucial role in wealth creation and economic mobility, serving as a cornerstone for financial security and intergenerational wealth transfer across societies (Chetty and Szeidl (2007), Chetty, Sándor and Szeidl (2017), Sodini et al. (2023) among others). While governments worldwide implement policies to promote home ownership, they have paid limited attention to a critical gatekeeper in the housing market: the real estate developer. These influential actors control the housing supply pipeline, determine property types and locations, and set initial market conditions that influence who can access home ownership and at what cost (Glaeser, Gyourko and Saks (2005), Glaeser et al. (2017), Nathanson and Zwick (2018), Couture et al. (2024), Van Straelen (2024)). Despite their profound impact on housing outcomes—from neighborhood composition to wealth distribution patterns—developers remain surprisingly understudied in research examining barriers to home ownership access. In this paper, we examine how regulatory frameworks that enhance developer accountability and transparency affect housing market dynamics, with particular attention to their impact on mortgage availability and home ownership opportunities across diverse demographic groups.

Real estate developers significantly influence housing markets through their control over supply, pricing, and accessibility.[1] These developers primarily operate through presale contracts, where buyers finance construction through deposits and installment payments before project completion. This model dominates worldwide, representing 60% of sales in the U.S., 40% in the U.K., 70% in Hong Kong, and over 90% in China. However, presale contracts inherently expose buyers to significant risks when developers delay completion, redirect funds to new projects, or default entirely. For instance, Unitech, a prominent Indian real estate developer, encountered multiple delays in completing its housing projects, affecting over 20,000 home buyers who had already committed substantial funds.[2] In markets with

[1]Market concentration has intensified globally, with the top 10 U.S. builders' market share tripling from 10% in the early 1990s to nearly 33% by 2019.

[2]There has been incidence of stalled residential project in many other countries and regions, including China, Singapore,

minimal oversight, these failures become not merely occasional occurrences but structural features of the housing system, disproportionately affecting first-time buyers and those with limited financial resources. The asymmetry between developer incentives and buyer protections creates a market environment where developer default emerges as a predictable characteristic rather than an anomaly.

To address these issues, India introduced the Real Estate (Regulation and Development) Act (RERA), providing a unique opportunity to examine how reducing developer defaults and increasing market transparency affects home ownership patterns. RERA implements comprehensive reforms by mandating escrow accounts for project funds, enforcing timely completion deadlines, and requiring detailed disclosures about project specifications and approvals. These provisions create institutional safeguards that protect buyers and lenders against developer opportunism while simultaneously imposing new constraints and compliance costs on developers.

Using data on approximately 1.06 million individuals, we investigate both sides of this regulatory intervention—how RERA's guarantees affect mortgage origination and home ownership rates, and how developers adapt their business strategies in response to increased accountability. We particularly examine who benefits from these reforms—whether the impact extends to first-time home buyers, marginalized groups, and smaller markets—and how developers respond through market exits, product adjustments, or pricing strategies when faced with stricter oversight, providing insights into how regulatory frameworks reshape both supply and demand dynamics in housing markets.

From an economic perspective, RERA's introduction creates competing effects on housing markets. On the demand side, improved transparency and reduced default risk should increase buyer confidence and mortgage availability, potentially expanding home ownership. However, the distributional impact remains theoretically ambiguous. On one hand, marginalized groups and first-time buyers, previously excluded due to wealth constraints

Malaysia, Thailand and Hongkong, among which, the problem is the most severe in mainland China which caused massive mortgage boycott against the banks.

and higher vulnerability to developer defaults, might benefit disproportionately, as institutional safeguards reduce the catastrophic impact of project failures. For these buyers, developer defaults represent potentially devastating financial setbacks from which recovery is difficult or impossible given their limited financial reserves. On the other hand, wealthier individuals with greater financial capacity could leverage improved market conditions more effectively, potentially widening rather than narrowing home ownership gaps.

On the supply side, RERA imposes significant operational constraints on developers, likely driving exit among firms unable to meet compliance requirements or operate profitably under stricter oversight. Yet the regulation simultaneously transforms market signaling mechanisms—where previously, firm size and brand reputation served as costly signals of quality and reliability. With government-mandated guarantees now partially substituting for these signals, smaller developers may face lower barriers to entry, potentially increasing competition and affordability in previously concentrated markets.

This interplay between demand expansion, redistribution, developer exit, and new entry creates complex market dynamics that ultimately determine whether regulatory intervention democratizes or further stratifies home ownership. These theoretical ambiguities motivate our empirical investigation into RERA's actual impact on home purchases, which we study through comprehensive data on mortgage originations across diverse demographic groups and geographic areas.

Our empirical strategy leverages the staggered implementation of RERA across Indian states to identify its effects on home ownership through mortgage origination patterns. We address three potential challenges: First, to control for RERA's influence on overall credit supply, our specification compares mortgage origination within branches (branch $\times$ year-quarter) across treated and control areas. Second, we mitigate selection bias from systematic differences between early and late RERA adopters through pre-trend analyses, branch $\times$ location fixed effects, and balance tests across treatment groups. We further focus on areas along state borders and control for city-pair by year fixed effects to ensure the comparability

between control and treated groups. Finally, we address potential state-level confounding events by confirming key macroeconomic variables affect control and treated groups similarly, and by exploiting within-state variation in RERA's applicability to builders. This approach demonstrates that the impact is concentrated on RERA-covered properties while exempt properties show no significant effects. We further ensure robustness by addressing methodological concerns regarding staggered difference-in-differences designs (Baker, Larcker and Wang, 2022; Sun and Abraham, 2021; Callaway and Sant'Anna, 2021).

We have 4 primary results in this paper. First, our empirical analysis reveals that the implementation of RERA leads to a significant increase in home purchases measured through mortgage origination, with a more pronounced effect for new homes compared to resale properties. This growth in mortgage access reflects both increased homebuyer participation and greater willingness from banks to extend credit. Following RERA's introduction, potential home buyers show increased confidence in entering the housing market, as the regulatory safeguards reduce their exposure to developer defaults and project delays (Kurlat and Stroebel, 2015). Concurrently, lenders demonstrate greater readiness to provide mortgage financing as RERA's mandated disclosures and project registration requirements reduce information asymmetries in assessing collateral quality (Stroebel, 2016; Cerqueiro, Ongena and Roszbach, 2016). With standardized compliance mechanisms in place, banks can evaluate lending risk more accurately without relying heavily on developer reputation or size. The stronger effect for new properties compared to resale homes aligns with RERA's primary focus on regulating ongoing development projects, confirming that the regulation most effectively addresses uncertainties in new construction purchases.

Uncertainty about collateral quality in mortgage markets creates a cycle of exclusion in housing access. Banks manage this uncertainty through vertical integration with developers (Agarwal et al. (2014), Stroebel (2016) among others) or by concentrating lending among established clients with proven relationships (Petersen and Rajan (2002), Berger and Udell (1995), Degryse and Ongena (2005), Agarwal and Hauswald (2010) among others). These

strategies systematically disadvantage first-time buyers and marginalized groups who lack banking connections. Simultaneously, these vulnerable populations often self-select out of mortgage applications, anticipating discrimination or unfavorable terms. The use of neighborhood characteristics as risk proxies further exacerbates this problem, as banks preferentially lend in affluent areas. This creates a dual barrier: banks restrict lending to perceived low-risk segments, while vulnerable groups withdraw from the market altogether. The resulting dynamic reinforces spatial concentration of mortgage availability and perpetuates socioeconomic disparities in home ownership access.

Our second set of results examines the heterogeneous effects of RERA implementation across demographic and geographic dimensions. We find that RERA's introduction is associated with increased mortgage originations for first-time borrowers, improved terms for women and marginalized castes, enhanced availability for properties in emerging neighborhoods, and a spatial redistribution from metropolitan and Tier 1 cities to Tier 2 and Tier 3 cities. These findings suggest that RERA's impact extends beyond aggregate market effects, potentially reducing barriers to entry and mitigating pre-existing disparities in mortgage access. The observed patterns are consistent with a democratization of home ownership and mortgage financing, indicating that regulatory interventions can have significant distributional consequences in credit markets.

The third set of results examines RERA's impact on housing project completion and subsequent mortgage performance. Utilizing project completion data, we document a statistically significant reduction in project delays following RERA implementation. Additionally, we observe lower delinquency and default rates in mortgage loans post-RERA. These findings suggest that RERA's regulatory framework has had substantial effects on the housing market by enhancing project transparency and increasing the potential costs of delays for property developers. The resulting improvement in project completion rates appears to have facilitated greater mortgage origination while simultaneously reducing default risk.

Our final set of results examines RERA's real effects on developers and the housing

market. We document both exit of established developers and a higher rate of new developer entry following RERA implementation. This market restructuring reflects RERA's dual impact: while project-specific escrow requirements and inter-project transfer prohibitions increase compliance costs driving some exits, the regulation simultaneously reduces signaling costs by substituting government standards for reputation-based quality signals, lowering barriers to entry for smaller developers. The resulting transformation increases competition particularly in the affordable housing segment, with new entrants focusing on smaller projects in emerging areas.

We find developers increasingly providing more affordable, smaller houses while reducing luxury housing availability. Concurrently, affordable home prices decrease while luxury home prices increase. These shifts in housing supply composition align with a democratization of home ownership, complementing our mortgage market findings and demonstrating how regulatory frameworks can reshape both financing access and physical housing stock distribution.

Our baseline results are robust to various robustness checks. First, there could be potential issues surrounding the approach of staggered DiD as highlighted in Baker, Larcker and Wang (2022), we address the concerns by following Sun and Abraham (2021) and Callaway and Sant'Anna (2021). Next, since many of the primary variables of interest are count-like variables we show that the results are robust to alternate specifications of using Poisson regression (Cohn, Liu and Wardlaw, 2022). We also exploit a regulatory guideline that allows some properties that are relatively smaller in plot size to be exempt from RERA. We find there is no tangible effect of the implementation of RERA in the non-RERA properties in the same state that implemented RERA highlighting that the effect is not driven by some state-specific unobservables that are correlated with the passage of RERA. We also show that the impact is larger on the presale housing than on the resale housing, because RERA affect the resale market indirectly. We further restrict our sample to cities located along the state borders to improve the comparability between areas exposed to RERA and those that are

not. In this specifcation, we control for state-pair-by-year-fixed effects. The variation thus comes from differences in outcomes between comparable areas within the same year.

This paper most directly contributes to the literature studying the impact of government intervention in the housing market. Floetotto, Kirker and Stroebel (2016) lays down a general equilibrium model to study the effect of government policies like taxes on property and/or rent on home prices, quantities, and allocations, and welfare. Various other works have empirically investigated different government policies on home prices and home ownership such as tax policies (Gervais, 2002; Sommer and Sullivan, 2018), and subsidies (Berger, Turner and Zwick, 2020). However, limited attention is given to the impact of real estate developers on the housing market. In this paper we contribute to this literature by showing government policies targeted toward real estate developers mandating them to be more transparent and increasing their cost to delay on projects (RERA) can impact allocative outcomes in the housing market and consequently in the mortgage market. We find that the passage of RERA leads to greater access of housing by first-time borrowers, and borrowers from smaller regions. More importantly, although RERA's higher costs may drive some developers out, its improved transparency attracts new entrants and ultimately promotes increased home ownership.

Our paper also contributes to the literature studying the role of collateral and the uncertainty surrounding collateral quality in affecting household debt. There is a large literature that highlights the importance of information asymmetry in credit disbursement (Petersen and Rajan (1994), Karlan et al. (2009) among others). Relationship between banks and borrowers have been highlighted to reduce information asymmetry and affect household debt like mortgage, credit card debt and also impacts default (Agarwal et al. (2018), Puri, Rocholl and Steffen (2017), Guiso, Sapienza and Zingales (2013) among others). In the context of the mortgage market, Stroebel (2016) highlights that lenders with superior information about collateral quality can reduce foreclosure in mortgages. It builds on works of Agarwal et al. (2014) that highlight the role of vertical integration of real estate developers and banks as

a tool to mitigate information uncertainty in the collateral quality. We add to this literature by showing that regulating real estate developers can create a scenario that improves transparency of the underlying collateral and facilitate higher mortgage origination.

Finally, we contribute to the literature that studies the factors that can expand or hinder access to owning homes across various groups. Barriers to mortgage access often stem from political/electoral factors (Akey et al. (2018), McCartney (2021) among others), discrimination based on race, gender, and religion in both the mortgage and housing market (Munnell et al. (1996), Bhutta and Hizmo (2021) among others), and self-selection out of these markets due to fear of discrimination (Charles and Hurst (2002), Park, Sarkar and Vats (2021) among others).[3] Other factors that can impact the dispersion of ownership could be segmented nature of search in the housing market leading to excess demand in a small neighborhood (Piazzesi, Schneider and Stroebel, 2020), the potential difference in historical mortgage-market reforms (Andersen, 2011) and differential appeal of the American dream of owning a home (Agarwal, Hu and Huang, 2016). We contribute to this literature by showing that making real estate builders more transparent and reducing the potential cost of default could have asymmetric impact on groups that were previously excluded from the housing market and can lead to democratization of the home ownership landscape.

The remainder of the paper is organized as follows: Section 2 details the institutional background of the housing market in India and the changes brought about by RERA. Section 3 describes the conceptual framework. Section 4 introduces the data. Section 5 outlines the empirical strategy used in the paper and section 6 presents the results. Finally, section 7 concludes.

[3]Several studies have highlighted supply-side bottlenecks that prevent access to mortgages across various groups like race, gender. See Holmes and Horvitz (1994), Tootell (1996), Ross et al. (2008), Ghent, Hernandez-Murillo and Owyang (2014), Cheng, Lin and Liu (2015), Hanson et al. (2016), Giacoletti, Heimer and Yu (2021), Bartlett et al. (2022), Ambrose, Conklin and Lopez (2021), Begley and Purnanandam (2021), Bhutta, Hizmo and Ringo (2021), Fuster et al. (2022), Howell et al. (2022), Butler, Mayer and Weston (2023), among others.

2 Institutional Details

This section presents the institutional design of home ownership in India – the way the housing market worked before the implementation of RERA, and the necessary changes that RERA brought in the housing market.

2.1 Pre-RERA Landscape of Housing Sector in India

Before the advent of the Real Estate (Regulation and Development) Act (RERA), the Indian housing sector faced a host of intricate challenges that impeded its functionality and credibility. Prior to the enactment of RERA, there was no national-level regulation concerning the pre-sale market, leading to a lack of oversight and transparency. Despite the mandatory requirement for developers to initiate projects solely after obtaining required approvals from the authorities, due to the lack of monitoring, it was common for the developers to violate these rules and launch pre-sales preemptively, sometimes before the land title was even settled.

Regarding the payment mode, it varies significantly depending on the discretion of individual developers and typically includes three options: the construction-linked plan, the downpayment plan and the flexi plan. Under the construction linked-plan, buyers initially pay a minimal proportion of the total price at the time of booking, with subsequent payments tied to the agreed-upon milestones in the construction progress. Conversely, in the downpayment plan, a small proportion, typically 10% of the total cost, is paid upfront as a downpayment, followed by a substantial portion of the remaining amount one month after the booking time, leaving only a negligible balance (around 5%) to be settled upon possession. The flexi plan, as its name suggests, offers a flexible blend of the aforementioned approaches. It incorporates an initial downpayment at the time of booking, accompanied by a smaller amount paid 30 days later, distinct from the downpayment plan's structure. The remaining sum is then tied to the construction milestones, akin to the construction-linked

plan. Notably, developers often incentivize buyers by offering substantial discounts for opting for the downpayment plan, aiming to expedite the receipt of sales proceeds. Because of inadequate oversight on how the developers use the sales proceeds, it was common that they use the fund for purpose unrelated to the ongoing project, leading to construction delays to a lack of liquidity.

Under such scheme, transparency was notably lacking, leaving prospective home buyers grappling with a shortage of comprehensive and accurate information concerning various housing projects. This lack of transparency created an atmosphere filled with uncertainties, exposing home buyers to misleading representations and financial risks. Moreover, persistent project delays left many home buyers in a state of uncertainty, despite significant financial commitments. Deceptive advertising, promising amenities that often failed to materialize, compounded the sector's problems. The absence of robust grievance redressal mechanisms further exacerbated home buyers' plight, amplifying financial vulnerabilities and discontent within the housing sector. RERA's implementation not only seeks to protect home buyers but also affects banks and financial institutions. The Act's focus on ensuring project completion within stipulated timelines and enhancing transparency can reduce default risks associated with delayed or incomplete projects, thereby positively impacting banks by mitigating non-performing assets (NPAs) and potential loan defaults related to the real estate sector. Additionally, RERA's stringent regulations and mechanisms for dispute resolution can potentially foster a more secure lending environment for banks, contributing to increased confidence in financing real estate projects.

2.2 RERA's Intervention and Key Provisions

The advent of the Real Estate (Regulation and Development) Act in March 2016 marked an epochal shift in the Indian housing sector, ushering in a paradigm of reforms aimed at rectifying long-standing industry maladies. RERA's core mandate revolved around enhancing transparency, instilling accountability, and fortifying consumer protection. Mandating the

registration of real estate projects above stipulated thresholds, RERA engineered a seismic shift towards transparency, mandating developers to provide comprehensive disclosures. These encompassed detailed project timelines, layouts, approvals, and periodic progress updates, empowering buyers with crucial information for informed decision-making. Notably, the Act underscored the imperative of fair practices, imposing stringent regulations to curtail misleading advertisements and ensuring strict adherence to disclosed project plans and stipulated timelines.

The introduction of escrow accounts emerged as a pivotal measure, aiming to prevent fund diversion and safeguard home buyers' financial interests. Developers were compelled to deposit 70% of collected funds into dedicated accounts and get paid to cover the cost of the project based on the progress of the project which will be certified by the authority, thereby mitigating the risks associated with fund diversion and ensuring their judicious utilization for project completion. The account number of the escrow account is made public to ensure the public awareness of this account, and the developers should regularly update the status of the account. RERA also requires regular auditing to monitor the financial statements submitted by the developers and to ensure that the withdrawal from the escrow account has been in compliance with the progress of the projects.

Crucially, RERA heralded the establishment of state-level regulatory bodies tasked with the onerous responsibility of enforcement, compliance monitoring, dispute resolution, and efficient grievance redressal, thus infusing an element of accountability and oversight within the sector. State RERAs operate online platforms where home buyers and contractors can directly file complaints over the developers. RERA also introduce rigorous punishment mechanism. Any violation of the law will incur upto 10% of estimated cost of the project and/or imprisonment upto 3 years. For any delay in the delivery of the project, the developers have to refund the buyers along with the due interest. If the buyer decides not to withdraw the property possession, the developers will compensate the buyers for the delay in the form of monthly interest till the delivery of the property.

RERA's implementation epitomized a transformative juncture, catalyzing a seismic shift towards a more transparent, accountable, and consumer-centric housing sector in India. The Act's stringent regulations and emphasis on transparency significantly bolstered buyer confidence by instilling trust in the sector's integrity. Timely project deliveries, adherence to quality standards, and the assurance of comprehensive disclosures augmented the sector's reliability, mitigating uncertainties associated with project delays and unfair practices. Additionally, RERA's pivotal focus on establishing efficient mechanisms for dispute resolution and robust grievance redressal engendered a more consumer-friendly housing market, fostering a harmonious ecosystem conducive to sustainable growth and heightened investor confidence. In essence, RERA's legacy transcends mere regulatory reforms; it has been instrumental in transforming the erstwhile opaque and uncertain housing domain into a transparent, accountable, and consumer-centric industry, envisaging a future characterized by resilience, fairness, and sustained growth. By the end of 2023, over 100,000 cases had been solved by State RERA, according to the Ministry of Housing and Urban Affairs, and over 100,000 projects were registered under RERA. [4]

2.3 Home Loan Application & Repayment in India

Application and Sanction of Loan - The home loan application process in India involves several key steps. Initially, borrowers submit applications, including personal information such as age, years until retirement, proof of salary, or proof of business address for non-salaried individuals, along with assets, liabilities, and credit scores. Lenders meticulously review these materials to assess creditworthiness and conduct property valuations, a process typically spanning 3-4 weeks. Decisions regarding loan approval, amount, and interest rate are then made by lenders. According to Reserve Bank of India (RBI) guidelines, the Loan-to-value (LTV) ratio is capped at different percentages based on loan amounts. It is capped at 90% for loans up to ₹300,000, 80% for loans between ₹300,001 to ₹750,000, and 75% for loans

[4] https://www.business-standard.com/finance/personal-finance/record-rally-realty-project-registrations-under-rera-touch-1-16-lakh-in-2-years-123122200750_1.html

above ₹750,000. The interest rate is calculated by adding a risk premium to the base rate [5], with factors such as home loan scheme, credit score, collateral quality, loan tenure, LTV, occupation and gender influencing the risk premium. Female and salaried borrowers may receive interest rate concessions. The tenure of home loans are up to 30 years. Borrowers aged between 18 to 70 years old are eligible.

If a loan application is rejected, the borrower must seek alternative lenders. Conversely, if the loan is approved, borrowers proceed to sign the loan agreement, and lenders disburse the loan amount to the seller or developer. A processing fee, typically 0.35% of the loan amount, subject to a minimum of ₹2,000 and a maximum of ₹10,000, is deducted from the total loan amount. However, certain categories of home loans may qualify for a waiver of this fee. The borrower commits to paying an equivalent monthly installment (EMI) as per the agreement, with charges applicable for prepayments.

Delinquent and Default - If a borrower misses fewer than three EMIs, the bank typically issues a warning; after three consecutive missed payments, the borrower is classified as being in default, and the bank issues a formal notice. Borrowers may approach the lenders to explain their situation, in which case the bank might grant a grace period. If the issue remains unresolved, the bank may issue a final 60-day notice. Failure to settle the outstanding dues within this period leads to a follow-up notice indicating the auction date of the collateral property. Under the Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest (SARFESI) Act, banks are authorized to directly seize and auction the collateral. If the auction proceeds are insufficient to recover the loan amount, banks may pursue recovery from the borrowers' other assets. Missing EMI payment or default are reported to credit bureaus, which can negatively affect the borrowers' credit score.

[5] From 1 April, 2016, the base rate is replaced by Marginal Cost of Funds based Lending Rate (MCLR).

2.4 Real Estate Sector and Housing Market in India

As in many other developing countries, the real estate sector in India is closely linked with various industries and contributes significantly to the economic output. According to data from the Ministry of Statistics and Programme Implementation, the GVA by the real estate sector reached ₹25.87 trillion in FY 2018-19, accounting for 15.3% of the national GVA. From FY 2014-15 to FY 2018-19, the sector's GVA grew at an average annual rate of 13% .

Urban housing development expanded rapidly during our sample period, driven by a steadily rising urbanization rate. The urban housing market in India comprises of a primary market where home buyers purchase directly or with the assistance of real estate brokers from the developers, and a secondary market where properties are transacted between individuals. Figure A2 shows the quarterly housing price index, published by the Federal Reserve Bank of St. Louis. Prior to 2012, housing prices in India experienced a steady increase driven by rapid economic growth. However, from 2013 to 2014, prices declined slightly due to oversupply and economic slowdown. Form 2015 and 2018, growth of housing demand is lower due to weaker real GDP growth and policy interventions such as demonetization, the implementation of RERA and Goods and Service Tax Act. As a result, the housing price saw only modest appreciation during this period. In 2019, housing price decreased marginally, reflecting liquidity constraints faced by developers and an increased supply of affordable housing.

3 Conceptual Framework

We now provide a conceptual structure to understand the economic mechanisms through which RERA affects both home buyers and developers. Our model serves two primary purposes: first, to identify which buyer segments are most likely to benefit from increased developer accountability, and second, to analyze how regulatory changes reshape developer market structure and behavior.

The framework consists of two interconnected components. We begin by modeling home buyers' expected utility when purchasing presale properties, focusing on how default risk affects different buyer segments. This allows us to derive predictions about which demographic groups should experience the largest gains in home ownership access following RERA implementation. We then model the developer market, comparing equilibrium outcomes before and after regulatory intervention to understand how RERA's dual impacts—increasing compliance costs while reducing signaling costs—affect market structure, pricing, and housing supply.

Through this theoretical exercise, we establish testable predictions that guide our empirical analysis and help interpret our findings on home ownership democratization and market transformation.

3.1 The Decision of home buyers

Let $U(W)$ denote the utility function of home buyers. The expected utility from home purchasing is:

$$E(U) = \theta \times U(W_0 - C + V) + (1 - \theta) \times U(W_0 - C - L)$$

where θ is the probability that the presale housing is delivered. W_0 represents the buyer's wealth excluding the house, C is consumption of numeraire goods, and V is the value of the housing. $W_0 - C + V$ represents household wealth if the house is delivered as promised.

In the case of developer default, the homebuyer loses the house and may incur extra costs, such as temporary housing expenses, search costs for a new property if the home buyers decides to withdraw, opportunity cost of capital and legal fees if litigation is required. These extra costs are denoted as L. $W_0 - C - L$ represents the wealth if the developer defaults.

Buyers' sensitivity to default is:

$$\frac{\partial E(U)}{\partial \theta} = U(W_0 - C + V) - U(W_0 - C - L) \tag{1}$$

It can be shown that buyers' sensitivity to default (θ) is negatively related to wealth (W_0), and positively related to both the value of the house (V) and the losses incurred from developer default (L). The proof is provided in Appendix B.

The model implies that disadvantage groups, those with lower wealth and face higher losses upon default, are more sensitive to default risk and thus benefit more from RERA. One example of such buyers is the new home buyers.

According to the model, new home buyers benefit more from RERA than existing home buyers (upgraders) who already owns a house. First-time buyers typically have lower wealth and are therefore more sensitive to developer default. Thus, they will increase purchase more than other buyers. As a result, the reduction in default risk caused by RERA has a larger impact on purchasing decisions compared to other buyers.

3.2 The Operation of Developers

This section compares the developer behavior before and after RERA. Detailed steps and proofs can be found in Appendix C.

We model the cost function as linear-quadratic with decreasing return to scale, consistent with standard formulations in the literature.

$$C(q) = c_0 q + \frac{1}{2} c_1 q^2 + F + 1_{Before} \times \frac{\alpha}{S} q + 1_{after} \times \left[\gamma(1-\theta) q + \frac{\beta}{S} q * 1_{q>\bar{q}} \right] \tag{2}$$

where q represents the number of units supplied, and $c_0 q + \frac{1}{2} c_1 q^2 + F$ represents the normal development costs, where F represents the fixed costs. S is the size of the firm and $\frac{\alpha}{S}$ represents the signaling cost required to establish buyer trust. Since firm size may act as a positive signal

for credibility (see Bafera and Kleinert (2023) for a comprehensive review), signaling costs are assumed to decline with firm size. θ captures the developers' creditworthiness. 1_{Before} indicates that the signaling costs are only incurred before the introduction of RERA, which enhances market transparency and thereby reduces the need for costly signaling. $\gamma(1-\theta)$ represents the expected default penalty under RERA. As RERA mandates compensation for homes not delivered on time, developers with higher creditworthiness (θ) face lower expected penalties. Here, γ represents the penalty per unit of housing defaulted.

$\frac{\beta}{S} \times 1_{q>\bar{q}}$ represents the additional financing cost arising when a developer supplies beyond a threshold $\bar{q}$, reflecting the reliance on external financing due to RERA's escrow account requirements. Abundant empirical evidence shows that the financial costs of small firms are higher than those of the large firms (Hall and Weiss (1967) and Beck, Demirgüç-Kunt and Maksimovic (2005), among others), so we assumes that the extra financing cost incurred by RERA is a decreasing function of firm size S. 1_{After} indicates that both the delay penalty and the additional financing costs are only relevant after the implementation of RERA.

For tractability, we define the following linear demand function:

$$Q^D = q_0 - \frac{P}{\theta}$$

We assume that higher developer creditworthiness, reflected in a larger θ, increases market demand. P denotes the housing price. q_0 denotes the demand when price is zero.

3.2.1 Equilibrium before RERA

For simplicity, we assume that the firm size (S) follows a binary distribution: half of the firms are large with size $\bar{S}$, and the other half are small with size $\underline{S}$.

Under the assumption of free-entry, which drives economic profits to zero, we can derive the price of housing supply for developers of difference sizes:

$$P^*_{small} = \sqrt{2Fc_1} + c_0 + \frac{\alpha}{\underline{S}}$$

$$P^*_{large} = \sqrt{2Fc_1} + c_0 + \frac{\alpha}{\bar{S}} \tag{3}$$

Because $P^*_{large} < P^*_{small}$, small firms will exit the market, so that the equilibrium price $P^* = P^*_{large}$.

Let P^* equals to the marginal cost of supply which is the derivative of equation (2), we can derive supply for each developer before the implementation of RERA:

$$q^* = \sqrt{\frac{2F}{c_1}} \tag{4}$$

Define N as the number of developers. The total supply can be expressed as $Q^S = N_{\times} q^*$. Let $Q^S = Q^D$, we can drive the number of developers in equilibrium:

$$N^* = N^*_{large} = \frac{c_1[q_0 - \frac{1}{\theta}(\sqrt{2Fc_1} + c_0 + \frac{\alpha}{S})]}{\sqrt{2Fc_1}} \tag{5}$$

3.2.2 Equilibrium after RERA

(1) Case 1: $q < \bar{q}$

Under the assumption of free entry, the price of housing is:

$$P^* = \sqrt{2Fc_1} + c_0 + \gamma(1-\theta) \tag{6}$$

Let P^* equal to the marginal cost of supply, we can derive the equilibrium supply for each developer after RERA:

$$q^* = \sqrt{\frac{2F}{c_1}} \tag{7}$$

With market clearing condition, we can drive the number of developers in equilibrium:

$$N^* = \frac{c_1\left\{q_0 - \frac{1}{\theta}\left[\sqrt{2Fc_1} + c_0 + \gamma(1-\theta)\right]\right\}}{\sqrt{2Fc_1}} \tag{8}$$

(2) Case 2: $q > \bar{q}$

The financial cost $\frac{\beta}{S}$ is assumed to be higher for small firms than for large firms. Consequently, if a small firm develops more than $\bar{q}$, its equilibrium price would exceed that of a large firm. As a result, small firms will exit the market if they attempt to supply beyond $\bar{q}$. Therefore, each small firm will optimally develop exactly $\bar{q}$ units.

$$q^*_{small} = \bar{q}$$

Under the assumption of free entry, the optimal supply of large firms is given by:

$$q^*_{large} = \sqrt{\frac{2F - \bar{q}\frac{\beta}{S}}{c_1}} \tag{9}$$

Let P equal to the marginal cost of production, the equiliubrium price is:

$$P^* = \sqrt{2c_1(F - \bar{q})\frac{\beta}{\underline{S}}} + c_0 + \gamma(1-\theta) + \frac{\beta}{\underline{S}} \tag{10}$$

With market clearing condition, the equilibrium number of firms is:

$$N^* = \frac{2c_1\left[q_0 - \frac{1}{\theta}\sqrt{2c_1(F - \bar{q}\frac{\beta}{S})} + c_0 + \gamma(1-\theta) + \frac{\beta}{S}\right]}{\sqrt{2c_1(F - \bar{q}\frac{\beta}{S})} + c_1\bar{q}} \tag{11}$$

3.3 Model Implications

Regarding the total number of developers, it can be shown that if the costs incurred by RERA are sufficiently low, the equilibrium number of firms will increase. Specifically, by comparing equation (8) with (5), we find that there are more firms after RERA if $\gamma(1-\theta) < \frac{\alpha}{\underline{S}}$. Similarly, comparing equation (11) with (5), the number of firms increases if the conditions specified in Appendix equations (C17) and (C20) hold.

Likewise, it can be shown that if the costs incurred by RERA are sufficiently low, the equilibrium price will be lower. Specifically, comparing equations (3) and (6), the price

decreases after RERA if $\gamma(1-\theta) < \frac{\alpha}{\underline{S}}$. Comparing equations (3) and (10), the price is lower after RERA if the condition in equation (C17) holds.

In summary, after RERA, as developers become more trustworthy (i.e., θ increases), equilibrium price (P^*) falls, the number of firms (N^*) rises and total transactions (Q^*) increase. Consequently, both total supply and total demand expand following the implementation of RERA.

4 Data and Summary Statistics

The primary analysis of the paper hinges two different sources of data – mortgage transactions data, and data on real estate purchases. We augment these data with the information on the passage and implementation of RERA from the Ministry of Housing Affairs in India. In this section we provide an overview of the data:

Mortgage transactions data The data includes the mortgage originated by all branches of a state-owned commercial bank in India from the 1990s to 2023. This bank is one of the largest in India, with over 20,000 branches across all states and union territories. The distribution of branches across the country is presented in Panel (a) of Figure 1. The original sample includes 4 million loans. The data includes loan information, collateral attributes, borrower information, and branch information. Loan information includes the date of disbursement, loan amount, interest rate, loan term, whether the interest rate is fixed, monthly repayments, and loan performance. Attributes of the collateral include the address and the PIN code of the home, the purchase price, the appraised value, and the square footage of the home. Borrower information includes each borrower's unique identifier, gender, age, occupation, income, caste, and religion. Branch information includes PIN code where the branch is located and a unique identifier for each branch.

We keep the mortgages originated from April 2015 to December 2019 and remove the four years from 2020 to 2023 to avoid the confounding effect of the COVID-19 pandemic.

We only keep the branches that issued the first mortgage before October 2016 which is the month when the first few states announced the state-level RERA policy and delete branches that started home loan business after RERA. We exclude mortgages that rank in the top and bottom 1% of all mortgages in terms of the loan amount, purchase cost, or square footage. We also removed mortgages that were missing the collateral PIN code. After the screening, we have above 1 million mortgages.

Table 1 presents summary statistics of key variables. In Panel A, we construct a panel of branch and collateral PIN code by calendar quarters. Every quarter, ₹713,000 or 0.36 mortgage loans are originated per branch per PIN. These mortgages are obtained by 0.35 borrowers, of which 0.26 are first-time borrowers. The average size of each mortgage (=*Loan Amount/Loan Number*) is ₹2.11 million. "*Prob. of Getting Loan*" is a dummy variable equal to one if "Loan Amount" is greater than zero.

In Panel B, we construct a panel of branch and state of collateral by calendar quarters. We focus on the number of unique PIN codes that received loans with this data structure. "*No. of New PIN*" represents the number of PIN codes that received mortgages for the first time this quarter, while "*No. of Existing PIN*" represents the number of PIN codes that obtained loans previously. Each quarter, on average 1.07 PIN codes within a state obtain a mortgage from each branch, with nearly no PIN codes obtaining a loan for the first time.

In Panel C, we examine the loan-level data. The average interest rate is 8.69%, and the average loan amount is ₹2 million. The average property cost is ₹3.24 million, with a mean build-up area of 885.80 square feet. The average loan-to-value ratio is 56.26%. Among borrowers, 27% are female, 82% are first-time borrowers, and 5% belong to the backward caste.

Real Estate data The data includes residential real estate development projects across 12 cities[6] in 9 Indian states between 2010 and 2020. It contains detailed project characteristics such as location, developer information, property segment, project score, RERA status,

[6]The 12 cities are Ahmedabad, Bengaluru, Chennai, Faridabad, Ghaziabad, Greater Noida, Gurugram, Hyderabad, Kolkata, New Delhi, Noida, and Pune.

delays, number of units, unit size, and transacted prices. We restrict the sample to projects launched within five years before and after the RERA enactment in the respective states. This results in a total of 13,357 development projects.

Panel D provides the summary statistics of project-level variables. The average project size is 297.97 units. Among all projects, 21% of the units are affordable apartments with another 21% as luxury apartments. The mean project score is 6.64 with an average delay of 14.41 months. The average unit size is 1,378.14 square feet and the average per square feet price is ₹4,183.88.

Company financial statements The data includes key financial indicators of all companies in India, both listed and unlisted, at an annual frequency. It also contains information on the company registration dates and locations, as well as the time of firm closures.

Implementation of RERA The dates of RERA implementation are collected from the official RERA website for each state. For states where official notifications are unavailable, we supplement this with dates manually collected from news articles. The quarterly implementation of RERA across various states is presented graphically in Figure 1 Panel B. We observe significant variations in the timing of implementation across the country.

State Macroeconomic variables We obtain state-specific macroeconomic variables like GDP per capita, gross value added for the construction sector, the CPI of housing, and credit issued by scheduled commercial banks from the Handbook of Indian Statistics maintained by the Reserve Bank of India.

5 Empirical Strategy

In this section, we describe the primary empirical strategy used to examine the effect of RERA on mortgage outcomes, leveraging the proprietary data from a large bank in India. We then use real estate data to study the impact of RERA on the housing market.

5.1 Effect on Mortgage

We adopt a staggered difference-in-differences approach that compares states that have implemented RERA with those that have yet to implement it. As introduced in Section 2, RERA was announced at the national level by the central government in 2016, while the state governments retained discretion over the timing of its implementation.

In our baseline regression, we examine the impact of RERA on mortgage loans originated to the borrowers whose collateral is located in the treated states. Our empirical specification is presented below:

$$Y_{bpq} = \beta \cdot Post_{pq} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq} \tag{12}$$

Where Y_{bpq} denotes the following outcomes: (1) the probability of receiving a loan from branch b in a PIN code p during quarter q; (2) the amount of loan originated by branch b to borrowers whose collateral is located in PIN code p during quarter q; (3) the number of borrowers receiving a loan from branch b with collateral located in a PIN code p in quarter q; (4) the average loan size from branch b in PIN code p in quarter q; (5) the total number of first-time borrowers receiving a loan from branch b with collateral located in PIN code p in quarter q; (6) the total number of existing borrowers receiving a loan from branch b with collateral located in PIN code p in quarter q. "Post" is a binary variable that takes 1 if a PIN code p belongs to a state that has implemented RERA at time q. The regression specification includes branch×PIN fixed effects (α_{bp}) and branch×year-quarter fixed effects (α_{bq}). Branch×PIN code fixed effects control for time-invariant factors influencing a branch's propensity to originate mortgage to a specific PIN code, such as distance, home bias, etc. This allows the estimation to rely on time-series variation in RERA implementation status in a state. Branch×year-quarter fixed effects control for unobserved, time varying factors affecting a branch in a given quarter. This ensures that identification comes from within-branch variation across PIN codes, one located in a state that has implemented RERA and

another in a state that has not.

We also investigate the changes in mortgage attributes including the loan amount, LTV, and interest rate using the data at loan-level with the regression specified in equation (12).

To capture the dynamic effects over time, we define a series of binary variables, *"Event$_{pq}$"*, indicating each event quarter from 4 quarters before to 8 quarters after the implementation of RERA in each state. Additionally, we define two binary variables: "$Event_{pq(<=-5)}$", which captures all quarters leading up to the fourth quarter preceding the implementation, and "$Event_{pq(>=9)}$", which captures all quarters following the ninth quarter post-implementation. To show the aggregated effect of the policy in each event quarter t, we visualize the cumulative effect $b_t = \sum_{q=-4}^{t} \beta_q$.

$$Y_{bpq} = \beta_{q(<=-5)} \cdot Event_{pq(<=-5)} + \sum_{q=-4, q\neq -1}^{8} \beta_q \cdot Event_{pq} + \beta_{q(>=9)} \cdot Event_{pq(>=9)} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq} \quad (13)$$

We then conduct heterogeneity analysis to examine whether the effect of RERA varies across collaterals located in different cities. Specifically, we estimate the following regression with data at the branch × PIN code level:

$$Y_{bpq} = \beta_1 \cdot Post_{pq} + \beta_2 \cdot Post_{pq} \times Tier2 + \beta_3 \cdot Post_{pq} \times Tier1 + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq} \quad (14)$$

where the binary variables *"Tier 1"* and *"Tier 2"* equal 1 if the collateral is located in a Tier 1 or Tier 2 city, respectively, and 0 otherwise. Tier 3 cities are the omitted reference group.

We use the following specification to examine the effects of RERA on borrowers with different socio-economic status:

$$Y_{bpq} = \beta_1 \cdot Post_{pq} \times Group + \beta_2 \cdot Post_{pq} + \beta_3 \cdot Group + \alpha_{bp} + \alpha_{bq} + \alpha_{sq} + \alpha_{s,g} + \varepsilon_{bpq} \quad (15)$$

where *"Group"* is a binary variable indicating the borrower's gender, income, and new borrower status. This specification also includes state×quarter fixed effects (α_{sq}), which

control for state-specific macroeconomic confounders. We also include state×Group fixed effects (α_{sg}) to account for time-invariant characteristics of each group within states.

5.2 Effect on Housing Projects

To evaluate the effect of RERA on housing project characteristics, we estimate a project level regression with the following specification:

$$Y_{ijq} = \beta \cdot Post_{ijq} + \alpha_j + \gamma_q + \varepsilon_{ijq} \tag{16}$$

where Y_{ijq} includes project segment, score, delay, average unit size, and launch price per per square feet for project i in city j during quarter q. The regression specifications include city fixed effect α_j and quarter fixed effects γ_q. The city fixed effects control for time-invariant heterogeneity across city, allowing identification to come from the time-varying implementation of RERA within a city. Meanwhile, year-quarter fixed effects absorb common shocks over time.

We evaluate the effect of RERA enactment on RERA-registered projects and its spillover effects on non-registered projects through the following specifications:

$$Y_{ijq} = \beta_1 \cdot Post_{ijq} \times R + \beta_2 \cdot Post_{ijq} \times NR + \alpha_j + \gamma_q + \varepsilon_{ijq} \tag{17}$$

where the binary variables R and NR take 1 if the project is RERA-registered or not registered respectively, and 0 otherwise.

The dynamic effects of RERA on housing project characteristics are estimated using the following specifications:

$$Y_{ijq} = \sum_{q=-5}^{-2} \beta_q \cdot Event_{jq} + \sum_{q=0}^{9} \beta_q \cdot Event_{jq} + \alpha_j + \gamma_q + \varepsilon_{ijq} \tag{18}$$

while the dynamic effects by RERA-registration status are evaluated using:

$$Y_{ijq} = \sum_{q=-5}^{-2} \beta_q \cdot Event_{jq} + \sum_{q=0}^{9} \beta_{1q} \cdot Event_{jq} \times R + \sum_{q=0}^{9} \beta_{2q} \cdot Event_{jq} \times NR + \alpha_j + \gamma_q + \varepsilon_{ijq} \quad (19)$$

We further investigate the effect of of RERA by property segment using the following specification:

$$Y_{ijq} = \beta_1 \cdot Post_{ijq} \times Seg1 + \beta_2 \cdot Post_{ijq} \times Seg2 + \beta_3 \cdot Post_{ijq} \times Seg3 + \alpha_j + \gamma_q + \varepsilon_{ijq} \quad (20)$$

where the binary variables *"Seg 1"*, *"Seg 2"*, and *"Seg 3"* take 1 if the development project belongs to affordable, mid, and luxury segment, respectively, and 0 otherwise.

6 Result

This section presents the results from the empirical analysis described in Section 5. First, using the detailed data on mortgages, we study the impact of RERA on mortgage origination, and exploit various geographic and demographic cross-sections. Next, we use data on real estate projects to study the impact of RERA on the various aspects of housing market. Lastly, we examine the operation of real estate developers to understand the post-RERA organization of the industry.

6.1 Effect of RERA on Mortgage Origination

We start by investigating the effect of RERA on mortgage origination, which is one of the cornerstones of home ownership.[7] We exploit the staggered implementation of RERA and employ a difference-in-differences empirical strategy using the baseline regression specification in equation (12). The results are reported in Table 2. In columns (1) and (2), the

[7] A large number of homes are purchased through mortgage borrowing. The 2021 Statistics Research Department report - *"Number of new home sales in the U.S. 2000-2020, by financing type"* states that two in three home purchases between 2000 and 2020 were financed through a conventional mortgage.

dependent variable is a binary variable taking the value 1 if a home mortgage loan is extended by a branch to a PIN code in a given quarter. We find that RERA implementation increases the probability of a mortgage being issued to a PIN code in treated state by 0.8 percentage points, relative to untreated states. Given the unconditional mean of approximately 16 percent, this represents an increase of over 5% in the probability of receiving a mortgage. Column 1 includes branch×year-quarter and PIN code fixed effects while column 2 replaces the PIN code fixed effects with branch×PIN code fixed effects. Branch×year-quarter fixed effects control for unobserved shocks affecting each branch in a given quarter, allowing identification to come from within-branch variation across PIN codes—one in a state that has implemented RERA and one in a state that has not. The branch × PIN code fixed effects control for time-invariant characteristics of a branch's propensity to lend to specific PIN codes, such as distance or home bias, enabling identification from time-series variation in RERA implementation status within each branch–PIN code pair. In columns 3 and 4 of Table 2, the main variable is the amount of loans disbursed. We perform a log transformation of the variable using ln(0.01 + loan amount). We find that RERA imeplementation leads to an over 4% increase in the disbursal of home loans. Column 3 includes branch×year-quarter and PIN code fixed effects while column 4 includes branch×year-quarter and branch×PIN code fixed effects. Similarly, we observe an approximately 4% increase in the numbers of loans disbursed in the PIN codes located in states that implemented RERA. The effects are consistent in columns 5 and 6 of Table 2. Taken together, the results highlight that there is an increase in the aggregate mortgage loans disbursed after the implementation of RERA.

Next, we estimate the dynamic version of the regression specification (12) as presented in the empirical specification (13). Since the effect may persist over time, we focus on plotting the cumulative effect in each period, following the methodology in Agarwal and Qian (2014). The results are shown in Figure 2. Panel A shows the dynamic trend in the amount of loan disbursed. We observe no statistically significant difference between the treated and control group before the implementation of RERA, supporting the parallel trends assumption

critical to difference-in-differences analysis. Following RERA implementation, however, we find a sharp and sustained increase in lending toward PIN codes located in treated states. We observe similar dynamic patterns for the number of loans and the probability of loan disbursal, as presented in Panels B and C of Figure 2.

Robustness Checks: We conduct a series of robustness checsk to validate our baseline results. First, to address the recent criticisms of the staggered difference-in-differences design highlighted by Baker, Larcker and Wang (2022), we implement the estimation process proposed in Sun and Abraham (2021) and Callaway and Sant'Anna (2021). The results are presented in Appendix Tables A1 and A2.

We address concerns about the usage of log(1+.) transformation for count-like variables. We follow the recommendation of Cohn, Liu and Wardlaw (2022) and estimate a Poisson regression model. The results are shown in Table A3.

RERA is implemented primarily at the state level. However, to control for local unobservables, our main analysis is conducted at the PIN code level. A potential concern with this level of granularity is that the increase in the number of observations may artificially inflate the t-statistics. To address this, we re-estimate our baseline specification using data collapsed to the branch–state–quarter level, instead of the branch–PIN–quarter level. The results are presented in A4.

We also address concerns about the non-random timing of RERA implementation across states by examining whether observable state-level characteristics predict the timing of adoption. In Appendix Table A5, we present the relationship between state-specific macroeconomic factors and the probability of RERA implementation. We find no significant effect of lagged GDP, construction sector growth, aggregate credit flow, or the housing price index on the timing of implementation. Furthermore, we include these variables as controls in our baseline specification and find that the results remain qualitatively and quantitatively unchanged. These robustness results are reported in Appendix Table A6.

We conduct a placebo test by randomly assigning RERA implementation status across

states and plotting the distribution of estimated coefficients. The actual coefficient lies outside this distribution, suggesting that the observed effect is unlikely to be driven by chance. The placebo results are shown in Appendix Figure A1.

To address the concern that treated and control groups may be geographically distant—and thus differ along unobserved dimensions—we restrict the sample to PIN codes located in districts that straddle state borders, as illustrated in Figure A3. We estimate the baseline regression specification (12) on this restricted sample and present the results in the odd-numbered columns of Table A7. In the even-numbered columns, we additionally include state-pair×year fixed effects to control for time-varying bilateral trends. The results are consistent with our baseline findings.

6.2 Heterogeneity

In this section, we explore heterogeneity in the data to better understand the pathways through which RERA implementation can affect housing market dynamics. Specially, we examine variations in the following dimensions: whether the borrower had a prior relationship with the bank, the status of the collateral, and the borrower's location, gender, income level, and caste.

We begin by exploring variation across borrowers with an existing relationships with the lending branch. The motivation of this test stems from the role of relationship lending in mitigating informational frictions, particularly in the presence of asymmetric information (Boot and Thakor (2000), Sufi (2007) among others). As discussed in Section 2, before the implementation of RERA, uncertainty surrounding the quality of collateral may have limited lending to new borrowers, while favoring borrowers with established relationships. Following RERA, which enhanced transparency around project and collateral quality, we expect banks to rely less on prior borrower relationships—resulting in increased lending to first-time borrowers.

We present a cross-sectional analysis comparing new and existing borrowers in Table

3. In columns 1-2, we estimate the empirical specification in equation (12) separately for new and existing borrowers. The dependent variable is the natural logarithm of the number of borrowers of each type. We find a 2.4% increase in the number of new borrowers following the implementation of RERA, while there is no economically or statistically significant effect for the existing borrowers. Similarly, in columns 3 to 4, we find a significant increase in the amount of loan being issued to the new borrowers, but no statistically significant impact for existing borrowers. In Column 5, we examine the number of unique PIN codes a branch lends to in states that have implemented RERA. The idea is that, after RERA improves collateral transparency, branches may expand lending to new areas where they previously had no borrower relationships, consistent with (Agarwal and Hauswald, 2010). We report the result in column 5 of Table 3. We find that branches lend to 9.5% more PIN codes after the implementation of RERA.

We also present the dynamic effects of RERA on new and existing borrowers in Figure 3. Panel A shows the result on the total number of borrowers, we find an increase in the total number of borrowers after RERA with no significant pre-trends. Panel B focuses on new borrowers and similarly shows an increase after RERA. In contrast, Panel C presents results for existing borrowers, where we find no discernible effect of RERA implementation.

RERA primarily targets the presale housing market and is therefore expected to directly affect the mortgage loans used to purchase new apartments, with potential spillover effects on the resale market. To explore the heterogeneous effect on the loan outcomes based on collateral status, i.e., new versus resale housing, we repeat the regressions specified in equation (12), defining the dependent variable Y_{bpq} for loans originated against new and resale housing. Specifically, Y_{bpq} is measured at the branch (b) - PIN code (p) - quarter (q) level, and is defined as: (1) the probability of a loan being originated for new housing; (2) the probability of a loan being originated for resale housing; (3) the total loan amount originated for new housing; (4) the total loan amount originated for resale housing; (5) the number of borrowers receiving loans backed by new housing; (6) the number of borrowers receiving

loans backed by resale housing.

The results in Table 4 suggest the increase in mortgage loan origination is primarily driven by loans backed by new housing. Columns 1 and 2 show that the probability of originating a loan for new housing increases by 0.6 percentage points following RERA implementation, while the corresponding increase for resale housing is a statistically insignificant 0.2 percentage points. Columns 3 and 4 show that the total loan amount originated for new housing increases by 3.3% per quarter, compring to an insignificant 0.8% increase for resale housing. Similarly, the number of loans originated for new housing increases by 2.9%, while the increase for resale housing is again 0.8%. While the coefficients on resale housing are not statistically significant, likely because any spillover effects are indirect, their magnitudes remain economically meaningful.

Next, we explore heterogeneity by the geographic location of the purchased home, specifically, whether it is purchased in a Tier 1, Tier 2, or Tier 3 city, using the classification in Table 5. Tier 1 cities are metropolitan areas with high commercial value and relatively better access to information on the business in general and housing quality. In contrast, Tier 3 cities tend to have greater uncertainty regarding project quality and market condition. Consistent with our hypothesis, the implementation of RERA would increase the propensity to lend more substantially in Tier 3 cities.

In Table 6, we examine the effect of RERA implementation on mortgage characteristics, including the Loan-to-value ratio (LTV) and interest rate. The results show that, although the implementation of RERA leads to an increase in loan origination, it does not significantly affect the LTV or interest rate, suggesting that borrowing cost and downpayment requirement are not higher. However, we observe significant heterogeneity across borrower groups. Mortgage loans originated to new borrowers, female borrowers, low income borrowers, and borrowers from backward castes are issued with relatively higher LTV and lower interest rates. For new borrowers, the LTV increases by 2.805 percentage points, and the interest rate declines by 4.1 basis points. For female borrowers, the LTV increases by an insigificant

0.406 percentage points, while the interest rate is 3.9 basis points lower. Among borrowers with annual income below ₹480,000, the LTV increases by 0.693 percentage points, and the interest rate drops by 10.5 basis points. For borrowers from backward castes, the LTV increases by 0.453 percentage points, while the interest rate decreases by an insignificant 17.4 basis points. These results suggest that the disadvantaged borrowers receive mortgage loans with relatively better terms after RERA implementation. In Table A8, we re-estimate these effects by controlling for borrower characteristics, including income, gender, age, and occupation. We also use interest spread as an alternative dependent variable in Table A9. The results are consistent with the baseline results reported in Table 6.

6.3 Effect on Housing Projects

In this section, we investigate the effect of RERA on the characteristics of housing projects, including unit size, per-square-foot price, and project quality, which may in turn affect housing affordability.

We start by presenting the overall trends in Figure 4 Panels (a) and (b). Prior to the implementation of RERA, we observe a steady increase in both the size of residential units and per-square-foot prices. Both factors could make homes less affordable for potential buyers. The implementation of RERA appears to interrupt these trends, slowing the growth in both dimensions. Empirical results from our staggered difference-in-differences regressions, presented in Table 7, supports these observations. As shown in Panel B columns 1 and 2, the implementation of RERA reduces the unit size by 13% for RERA-registered projects with no statically significant changes in per-square-foot prices; while for non-registered projects, both unit size and per-square-foot price reduces, by 6.1% and 8.6% respectively. These results suggest that housing becomes more affordable after RERA implementation, regardless of registration status, although the adjustment mechanism differs across project types.

We further examine RERA's impact on housing affordability by estimating its hetero-

geneous effects across different market segments, namely, affordable, mid-tier and luxury sectors. As shown in Table 7 Panel C columns 1 and 2, we find a decrease in both unit size and per-square-foot price for affordable and mid-tier housing sectors, with affordable sector experiencing a larger reduction. The unit size and per-square-foot price for luxury homes, on the other hand, increase. Additionally, without changes in the trend of total housing supply before and after the implementation of RERA, as shown in Panel (a) of Figure 5, the proportion of affordable apartments increases while the proportion of luxury apartments reduces (Panels (b) to (d) of Figure 5). Taken together, these results suggest that the implementation of RERA improves housing affordability by reducing prices and unit sizes in lower-market segments and shifting supply towards more affordable housing options.

Prior to RERA implementation, the quality of housing projects was declining, as indicated by a downward trend in project scores shown in Figure 4 Panel (c). Following RERA, this deterioration slowed for RERA-registered projects. Our empirical estimates show a 0.79 point increase in project score post-RERA implementation (column 3 of Panel B in Table 7). This improvement suggests an enhancement in collateral quality, which may facilitate greater access to credit for home purchases and consequently improve housing affordability.

We conduct event studies to understand the dynamic effects of RERA on housing project characteristics. The results are presented in Panel (a) of Figures 6 and 7. We observe statistically insignificant differences between the pre-RERA estimates to that of the baseline period, the quarter immediately preceding RERA implementation, validating the difference-in-differences research design.

6.4 Delay and Default

Figure 4 Panel (d) shows a trend of increasing delays in housing project completion, which slows significantly for RERA-registered project following RERA implementation, while delays for non-registered projects continue to increase more rapidly. Column 4 in Panel B of Table 7 shows that the estimated delays for RERA-register projects reduces by 5.088 months

on average whereas it increases by 3.667 months for non-registered projects. Column 4 in Panel (c) of Table 7 further shows that delays are reduced in the affordable housing segment, but increase in luxury segment. The dynamic effects of RERA on project completion delays by RERA-registration status are presented in Panel (b) of Figure 7.

Next, we investigate if the implementation of RERA affected the performance of the mortgage outstanding. The premise is that, by reducing project delays and increasing transparency, RERA improves loan outcomes, both by allowing the banks to better screen borrowers and by enabling borrowers to make more informed purchase decisions. The results are reported in Table 8. In column 1, we find that the probability of a loan becoming default within one year of the disbursal decreases by approximately 1.3%. Column 2 shows that a 7.4% reduction in the proportion of loans under default for those disbursed after the implementation of RERA. Column 3 indicates a reduction in the total number of months a loan remains in default. Column 4 shows a reduction in the proportion of loans that were categorized as under default. Overall, these results show a reduction in delinquency of mortgage loans disbursed after the implementation of RERA. Our results also highlight that the enhancement of market transparency enables the bank to expand credit accessibility to the marginalized groups without increasing the default risk.

6.5 Effect on Developers

The previous results suggest that the real estate industry is affected by the implementation of RERA. In this section, we examine the effect of RERA on real estate developers. RERA imposes stricter regulations and transparency requirements, which increase compliance costs and limit developers' ability to divert funds across projects. Specifically, RERA mandates that a significant part of project funds be held in escrow accounts, reducing financial flexibility and potentially increasing reliance on external financing hence borrowing costs. Additionally, RERA's provisions for timely project completion and penalties for delays may lead to higher operational costs and reduced profit margins. The increased transparency and accountability

also empower buyers, potentially limiting developers' ability to inflate prices or engage in unfair practices. These regulatory pressures, combined with the need for greater upfront capital and professional management, may force less efficient developers out of the market. At the same time, RERA enhances the market transparency so that potential home buyers are exposed to lower risk. This may attract previously marginalized home buyers and boost housing demand. Moreover, developers, especially the small ones may benefit from reduced signaling cost as in a more transparent market, as credibility becomes less reliant on reputation and more on verifiable compliance. Therefore, the overall effect of RERA on developer performance is theoretically ambiguous and remains an empirical question.

To test this hypothesis, we examine firm entry and exits for real estate companies relative to those in other industries, as presented in Table 9. The results demonstrate a statistically significant increase in exit probability for real estate firms post-RERA. The number of firm entries is marginally higher than the number of exits. In columns 5 to 6, we show that net entry, defined as the number of new entries minus the number of exits, is significantly higher for real estate industry. Specially, there are 5.7 more new entrants than exits per district per year. While we note that the coefficient estimates for entry may be imprecise due to the limited sample period, the overall evidence suggests a substantial effect of RERA on the survival rates of real estate firms. These findings imply that as the pre-sale housing market becomes more transparent, the developers no longer need large capital to signal credibility. As a result, high-quality but previously constrained developers are more likely to enter the market, while less efficient or non-compliant firms are pushed out due to their inability to meet the regulatory standards.

In Table 10, we compute the Herfindahl-Hirschman Index (HHI) by state and industry to assess the level of competitiveness. The HHI value, measured by firm size and total profit, are 15% and 25% lower, respectively, in the post-RERA period. This indicates a more even distribution of firm size and profit are distributed more evenly, suggesting increased competition among the real estate developers. These findings align with previous result that

firm entries exceeds exits in the real estate sector after RERA implementation.

Using a dataset that include the financial statements of all firms in India, we analyze the profitability of real estate firms relative to firms in other sectors, as reported in Table 11. Columns 1 to 3 show a decline in return on assets (ROA), return on total assets (ROTA), and return on equity (ROE) by approximately 24 to 30 basis points following RERA implementation. We also show that the negative impact is most pronounced among large firms, those ranked above 50% by total asset, while firms in the bottom 25% of the size experience an increase in profitability relative to the pre-RERA period. This result is consistent with our hypothesis that with higher market transparency, the developers no longer need large capital to signal creditability. As a result,small developers benefit more than the large developers due to greater regulatory scrutiny.

Overall, our results in this section show that RERA improves the transparency of pre-sale housing market by crowding out the developers that fail to comply with the new regulations, while facilitating the entry of higher-quality developers who benefit from a more transparent environment. These changes lead to a healthier and more competitive real estate sector and potentially support broader access to homeownership,

7 Concluding Remarks

In conclusion, the growing influence of real estate developers on home ownership globally highlights a significant trend with implications for housing accessibility. However, this rise in prominence is accompanied by risks such as project delays, cost overruns, defaults, and fraud. However, empirical evidence linking these risks to the broader real economy remains limited. This study addresses this gap by examining the interplay between regulatory oversight, improved business practices, and their collective impact on shaping the home ownership landscape, focusing on the adoption of RERA in India.

The implementation of RERA in India, designed to safeguard home buyers and regu-

late real estate developers, has unique implications. Analyzing data on more than 1 million individuals, our study uncovers significant findings. Firstly, RERA significantly boosts mortgage origination, particularly benefiting first-time borrowers and marginalized groups. This supports the idea that transparency requirements introduced by RERA decrease risks associated with collateral, making banks more inclined to originate mortgages. Secondly, RERA prompts a shift towards more affordable housing, reducing delays, defaults, and enhancing overall market transparency. This not only addresses the uncertainties surrounding the quality of collateral but also leads to a democratization of the home ownership landscape.

The study's empirical strategy, leveraging the staggered implementation of RERA across states, overcomes potential challenges such as broader macroeconomic shocks, time-invariant differences, and confounding events. The robustness of our baseline results to various checks strengthens the credibility of our findings. Our back-of-envelope analysis indicates that the ratio of loan amounts issued to new borrowers versus existing borrowers was 248% before the policy implementation. After RERA, the ratio increases to 290%, reflecting a 1.7% rise (=(1+0.029)/(1+0.012)). Additionally, the ratio of loans issued in tier 1 cities compared to tier 3 cities was 25.5%, while decrease by 12.9% to 22.2% after the policy change. Moreover, our results show that regulations targeting real estate developers can impact allocative outcomes, mortgage origination, and home ownership across diverse demographic and geographic groups.

Beyond the impact on the mortgage market, RERA induces transformative effects on the housing market itself. It encourages real estate developers to provide more affordable, smaller houses, thereby democratizing access to home ownership. Additionally, RERA significantly reduces delays in project completion, leading to lower delinquency and default rates in mortgage loans. We also show that the real estate industry becomes more competitive and the developers' profitability is significantly lower, collectively underscore the positive influence of regulatory measures in enhancing market transparency, protecting home buyers' interests, and reshaping the dynamics of the real estate and mortgage markets.

In summary, this study aligns with economic theories highlighting the essential role of market participants in shaping allocative outcomes. Economic models often emphasize the significance of transparent information and reduced uncertainty in fostering efficient markets. Our study provides empirical insights into the regulatory mechanisms influencing real estate developers. This resonates with economic theories that underscore the role of regulatory interventions in correcting information asymmetries, fostering transparency, and mitigating risks. The findings contribute to the broader literature on government interventions in housing markets, demonstrating how regulatory measures, when well-designed, can democratize home ownership, reshape market dynamics, and align with fundamental economic principles. As economies worldwide grapple with the challenges posed by the housing sector, our findings offer valuable insights for policymakers, researchers, and industry stakeholders aiming to strike a balance between promoting market dynamism and safeguarding the interests of home buyers.

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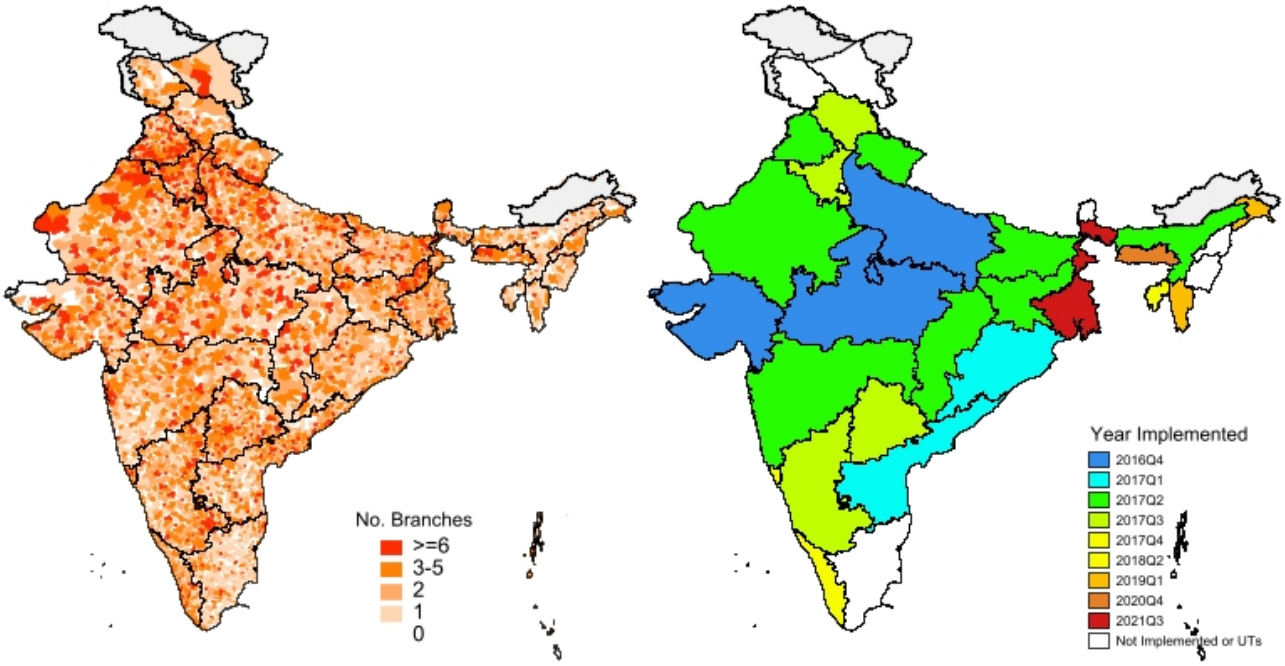
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Figure 1: Location of the Bank Branches and Timing of RERA Implementation

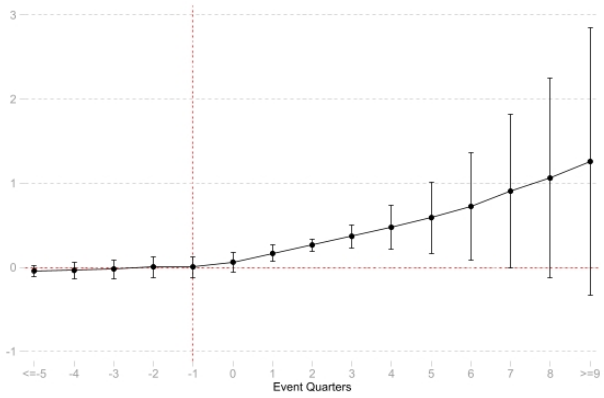


(a) Number of Branches in Each PIN code

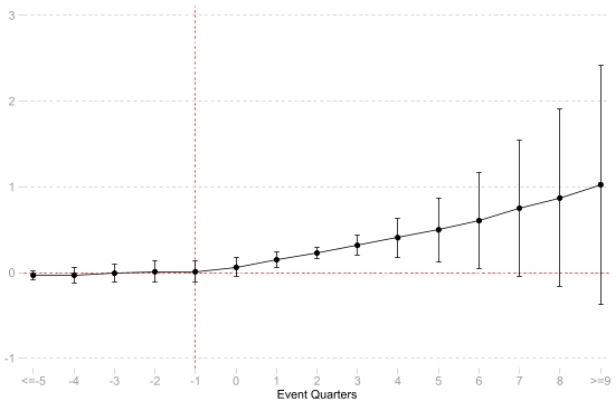
(b) Quarter Implementing RERA

This figure presents the distribution of branches across the various PIN codes in India, presented in Panel A. Panel B presents the timing for the implementation of RERA across different states in India. Map data is acquired from UN Geospatial Information Section. The areas in grey are disputed territories. Boundaries shown and the designations used on this map do not imply official endorsement or acceptance by the author or affiliated institution.

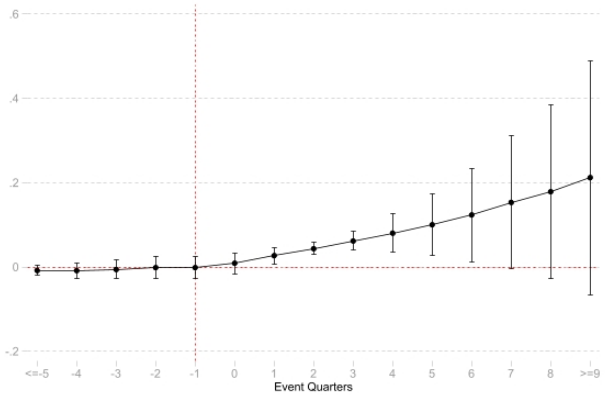
Figure 2: Evolution Lending around RERA Act



(a) Amount of Loan Disbursal



(b) Number of Loan Disbursal



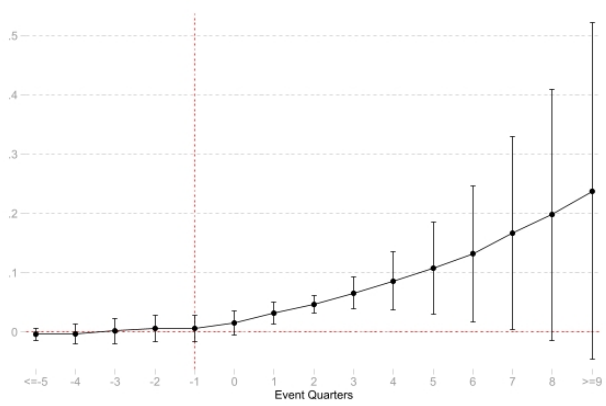
(c) Probability of Loan Disbursal

This figure plots the evolution of the loans disbursed around the passage of Real Estate Regulatory Authority (RERA) Act. We plot $\{\beta_q\}$ from the specification

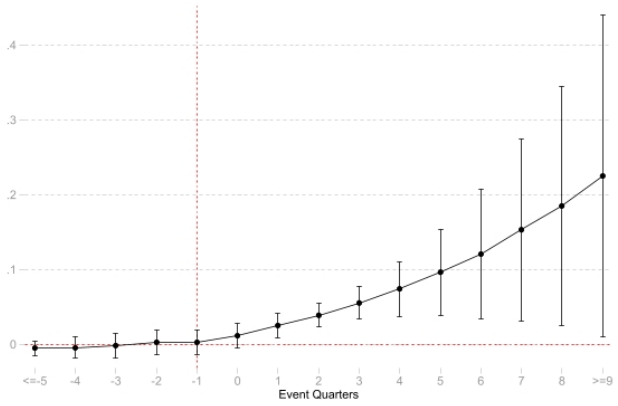
$$Y_{bpq} = \beta_q(<= -5) \cdot Event_{pq(<=-5)} + \sum_{q=-4, q\neq -1}^{8} \beta_q \cdot Event_{pq} + \beta_q(>= 9) \cdot Event_{pq(>=9)} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

Where Y_{bpq} is: the amount of loan disbursal by branch b to PIN code p in quarter q in Panel (a), the number of loan disbursal by branch b to PIN code p in quarter q in Panel (b), the probability of disbursal of a loan by branch b to PIN code p in quarter q in Panel (c), the average size of loan by branch b to PIN code p in quarter q in Panel (c). We include branch × PIN code fixed effects α_{bp} and branch × quarter fixed effects α_{bq}

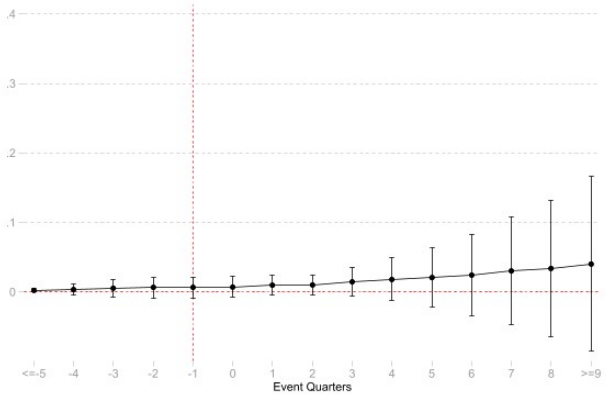
Figure 3: New vs. Existing Borrowers around RERA Act



(a) Total Number of Borrowers



(b) Number of New Borrowers



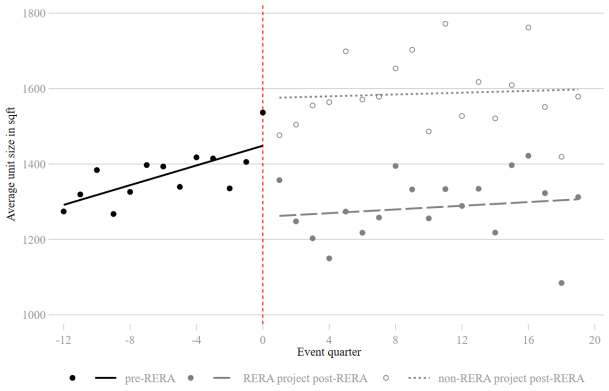
(c) Number of Existing Borrowers

This figure plots the evolution of the number of borrowers around the passage of Real Estate Regulatory Authority (RERA) Act. We plot $\{\beta_q\}$ from the specification

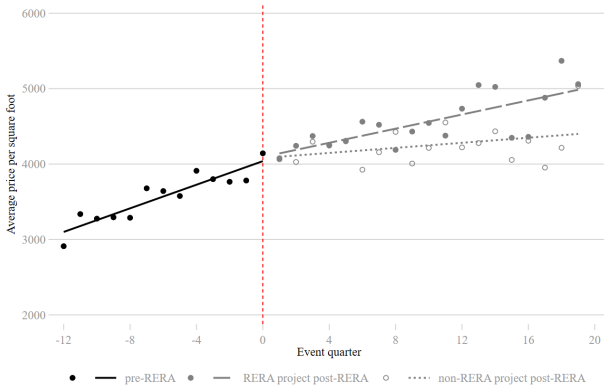
$$Y_{bpq} = \beta_q(<= -5) \cdot Event_{pq(<=-5)} + \sum_{q=-4, q\neq -1}^{8} \beta_q \cdot Event_{pq} + \beta_q(>= 9) \cdot Event_{pq(>=9)} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

Where Y_{bpq} is: the amount of loan disbursal by branch b to PIN code p in quarter q in Panel (a), the number of loan disbursal by branch b to PIN code p in quarter q in Panel (b), the probability of disbursal of a loan by branch b to PIN code p in quarter q in Panel (c), the average size of loan by branch b to PIN code p in quarter q in Panel (c). We include branch × PIN code fixed effects α_{bp} and branch × quarter fixed effects α_{bq}

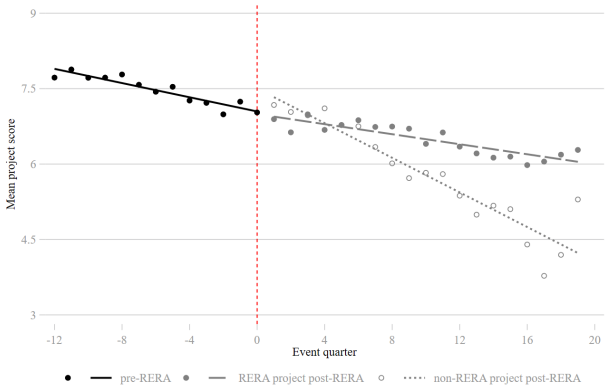
Figure 4: Trends in Housing Project Characteristics by RERA-Registration Status



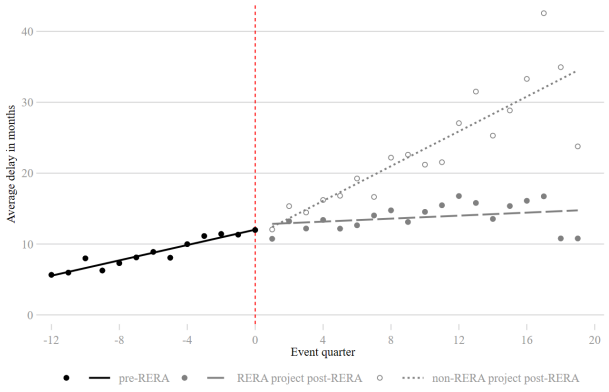
(a) Unit size



(b) Price per square foot



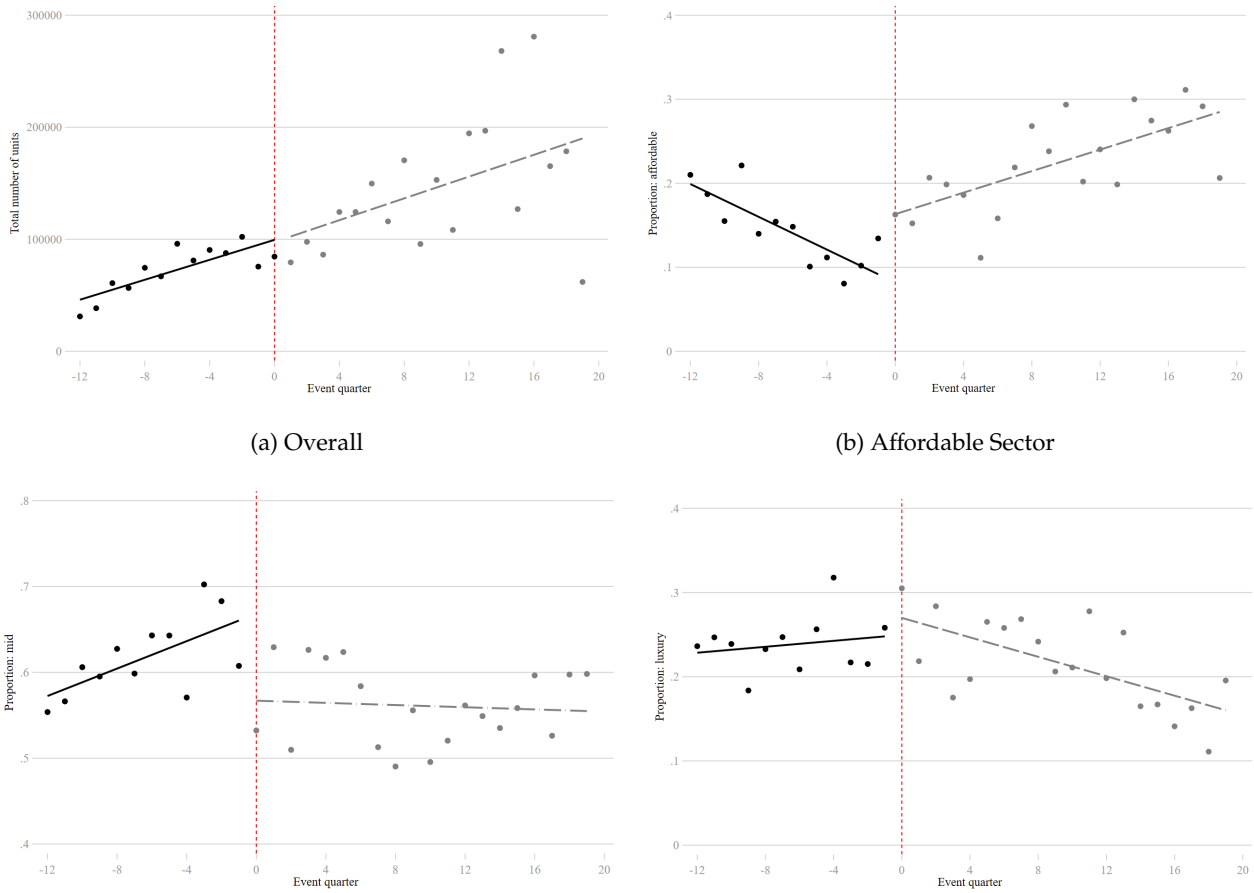
(c) Project Score



(d) Delay

The figure shows the trends in the mean unit size (Panel (a)), price per square foot (Panel (b)), project score (Panel (c)), delay in month (Panel (d)) for all housing development projects in each quarter before the state-level RERA-enactment and for housing projects by RERA-registration status in each quarter after the state-level RERA-enactment.

Figure 5: Trends in Various Segments of Housing Market



(a) Overall

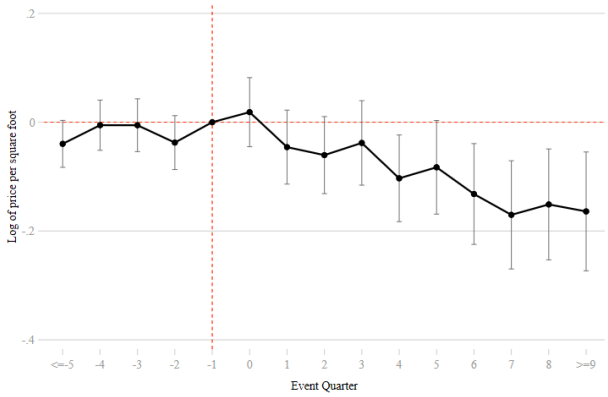
(b) Affordable Sector

(c) Mid-Tier Sector

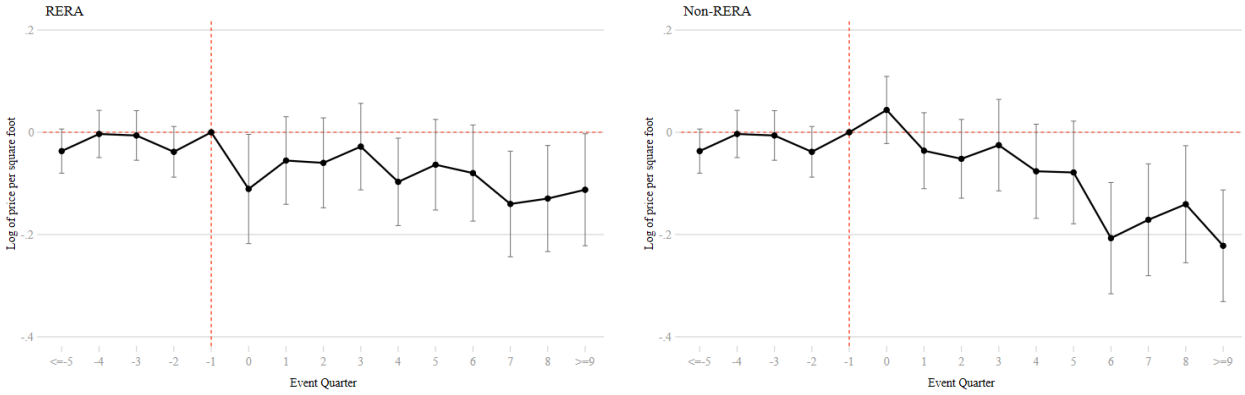
(d) Luxury Sector

The figure shows the trends in the total number of housing units developed (Panel (a)) and the proportion of affordable, mid-tier, and luxury housing units (Panels (b)-(d)) in each quarter before and after the state-level RERA-enactment.

Figure 6: Evolutionary Effect of RERA on Price Per Square Foot



(a) Overall



(b) RERA

(c) Non-RERA

Panel (a) of this figure plots the evolutionary effect of RERA on price per square foot estiamted using the following specification:

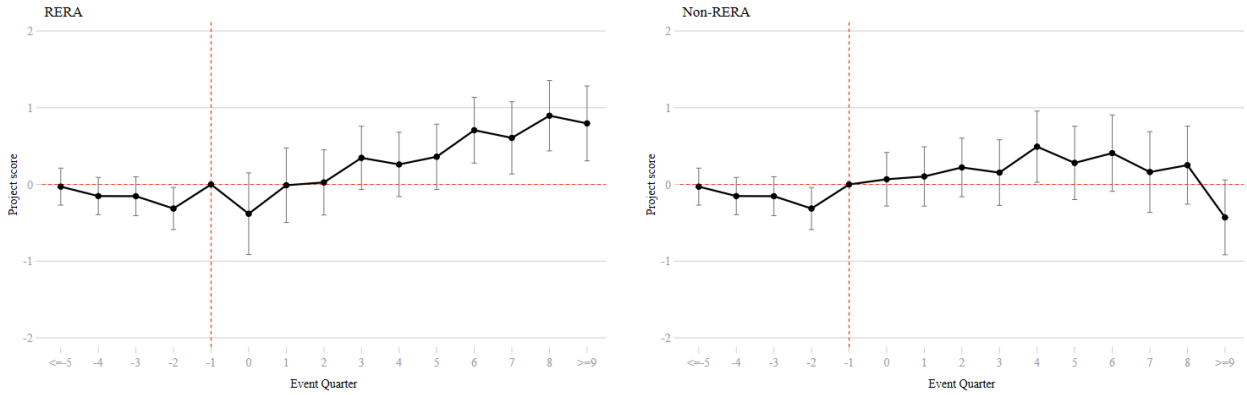
$$Y_{ijq} = \sum_{q=-5}^{-2} \beta_q \cdot Event_{jq} + \sum_{q=0}^{9} \beta_q \cdot Event_{jq} + \alpha_j + \gamma_q + \varepsilon_{ijq}$$

Panel (b) plots the evolutionary effects by registration status estimated from the specification of

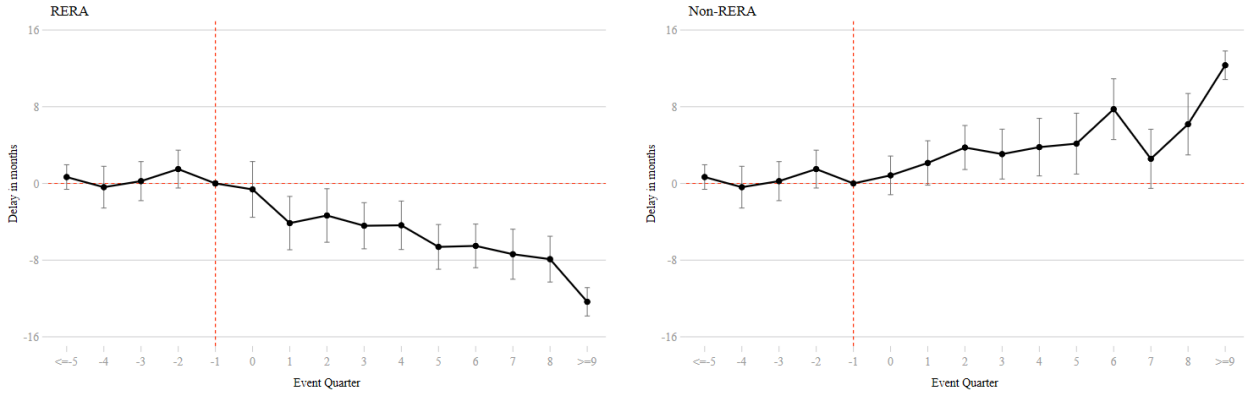
$$Y_{ijq} = \sum_{q=-5}^{-2} \beta_q \cdot Event_{jq} + \sum_{q=0}^{9} \beta_{1q} \cdot Event_{jq} \times R + \sum_{q=0}^{9} \beta_{2q} \cdot Event_{jq} \times NR + \alpha_j + \gamma_q + \varepsilon_{ijq}$$

where Y_{ijq} is the log of price per square foot, project score, and delay in month for project i in city j in the quarter q. We include city fixed effects α_j and year-quarter fixed effects γ_q.

Figure 7: Evolutionary Effect of RERA on Housing Project Characteristics



(a) Project score



(b) Delay

This figure plots the evolutionary effect of RERA on housing project characteristics by registration status estimated from the specification

$$Y_{ijq} = \sum_{q=-5}^{-2} \beta_q \cdot Event_{jq} + \sum_{q=0}^{9} \beta_{1q} \cdot Event_{jq} \times R + \sum_{q=0}^{9} \beta_{2q} \cdot Event_{jq} \times NR + \alpha_j + \gamma_q + \varepsilon_{ijq}$$

where Y_{ijq} is project score (Panel (a)) and delay in month (Panel (b)) for project i in city j in the quarter q. We include city fixed effects α_j and year-quarter fixed effects γ_q.

Table 1: Summary Statistics

Variables	(1) N	(2) Mean	(3) Std. Dev.	(4) Median
		Panel A Branch×PIN level		
Loan Amount	3,004,584	713,098.10	3,267,849.95	0.00
Loan Number	3,004,584	0.36	1.57	0.00
No. of Borrowers	3,004,584	0.35	1.52	0.00
No. of New Borrowers	3,004,584	0.26	1.26	0.00
Loan Size	474,800	2,115,340.25	1,338,859.11	1,800,000.00
Prob. of Getting Loan	3,004,584	0.16	0.36	0.00
		Panel B Branch×State level		
No. of PIN	148,124	1.07	2.41	0.00
No. of New PIN	148,124	0.00	0.06	0.00
No. of Existing PIN	148,124	1.07	2.40	0.00
		Panel C Loan Level		
Interest Rate	962,763	8.69	1.21	8.75
Loan Amount	950,154	1,904,126.70	1,301,430.76	1,600,000.00
Square Footage	944,246	885.80	767.56	824.37
Purchase Cost	943,606	3,238,181.82	2,547,394.55	2,775,000.00
LTV	910,014	56.26	23.50	59.34
Price\Sq. Feet	927,929	166,166.46	3,461,991.35	3,742.68
Loan\Sq. Feet	932,154	117,914.30	2,125,319.57	2,388.80
Female borrower=1	962,763	0.27	0.44	0.00
New borrower=1	962,763	0.82	0.38	1.00
Backward Caste	962,763	0.05	0.22	0.00
		Panel D Project level		
Number of Units	13,357	297.97	490.51	134.00
Project Segment (Affordable=1)	13,357	0.21	0.41	0.00
Project Segment (Luxury=1)	13,357	0.21	0.41	0.00
Project Score	13,357	6.64	2.07	6.90
Delay in Months	13,357	14.41	17.59	8.00
Square Footage	13,357	1,378.14	885.13	1,200.00
Price\Sq. Feet	13,357	4,183.88	2,107.49	3,700.00

This table reports the summary statistics of the primary variable of interest. Panel A reports the summary with the data granularity being branch × PIN of collateral × quarter. The granularity of Panel B being branch × state of collateral × quarter. Panel C is the analysis at the loan level. Panel D provides summary statistics of the data on real estate development projects.

Table 2: Effect of RERA on Mortgage Lending

Dep. Var.	(1) Binary loan = 1	(2) Binary loan = 1	(3) Amount of Loan	(4) Amount of Loan	(5) Number of Loan	(6) Number of Loan	(7) Average Loan Size	(8) Average Loan Size
Post	0.008***	0.008***	0.043***	0.043***	0.037***	0.037***	-0.010	-0.092
	(0.001)	(0.001)	(0.007)	(0.007)	(0.006)	(0.006)	(0.036)	(0.079)
Observations	3,004,584	3,004,584	3,004,584	3,004,584	3,004,584	3,004,584	378,737	281,469
R-squared	0.180	0.375	0.185	0.415	0.194	0.434	0.499	0.638
Branch*PIN FE	No	Yes	No	Yes	No	Yes	No	Yes
PIN FE	Yes	No	Yes	No	Yes	No	Yes	No
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the results from the following regression specification:

$$Y_{bpq} = \beta_q \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

Where Y_{bpq} is: the probability of PIN code p to receive a loan from branch b in quarter q in columns 1 and 2; the amount of loan from branch b to PIN code p in quarter q in columns 3 and 4; the number of borrowers in PIN code p receiving a loan from branch b in quarter q in columns 5 and 6; the average size of a loan from branch b to PIN code p in quarter q in columns 7 and 8. *Post* is the binary variable that takes 1 if a PIN code p belongs to the state after the adherence to RERA. The regression specifications include α_{bp} representing branch×PIN fixed effects and α_{bq} representing the branch × quarter fixed effects. Robust standard errors clustered by state are reported in parenthesis.

Table 3: Effect of RERA on Mortgage Lending – New vs Existing Borrowers

Dep. Var.	(1) Number of New Borrowers	(2) Number of Existing Borrowers	(3) Amount Loan to New Borrowers	(4) Amount Loan to Existing Borrowers	(5) Number of PIN codes
Post	0.024***	0.009	0.029***	0.012	0.095***
	(0.003)	(0.001)	(0.006)	(0.010)	(0.024)
Observations	3,004,584	3,004,584	3,004,584	3,004,584	148,124
R-squared	0.528	0.466	0.397	0.378	0.297
Branch*PIN FE	Yes	Yes	Yes	Yes	No
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes
Branch*State FE	No	No	No	No	Yes

Columns 1 to 4 of this table report the results from the following regression specification:

$$Y_{bpq} = \beta_q \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

where Y_{bpq} include (1) the number of new borrowers (column 1), (2) the number of existing borrowers (column 2), (3) the amount of loans to new borrowers (column 3), (4) the amount of loans to existing borrowers (column 4) from branch b to PIN code p in quarter q. The regression specifications include α_{bp} for branch×PIN fixed effects and α_{bq} for branch × quarter fixed effects. Column 5 estimate the following regression:

$$Y_{bsq} = \beta_q \cdot Post_{s(b)q} + \alpha_{bs} + \alpha_{bq} + \varepsilon_{bsq}$$

where Y_{bsq} is the number of PIN codes in a state s that receive the loans from branch b in quarter q. The regression specifications include α_{bs} for branch×state fixed effects and α_{bq} for branch × quarter fixed effects.
In columns 1 to 4 the granularity of the specification is at branch ×PIN × quarter level. In column 5 the granularity of the specification is at branch ×state × quarter level. Robust standard errors clustered by state are reported in parenthesis.

Table 4: Effect of RERA on Mortgage Lending – New vs Resale Apartments

Collateral Status	(1) New	(2) Resale	(3) New	(4) Resale	(5) New	(6) Resale	(7) New	(8) Resale
Dep. Var.	Binary loan = 1		Amount of Loan		Number of Loan		Number of Borrowers	
Post	0.006***	0.002	0.033***	0.008	0.029***	0.008	0.028***	0.008
	(0.001)	(0.001)	(0.006)	(0.007)	(0.005)	(0.006)	(0.005)	(0.006)
Observations	3,004,584	3,004,584	3,004,584	3,004,584	3,004,584	3,004,584	3,004,584	3,004,584
R-squared	0.353	0.384	0.375	0.409	0.391	0.426	0.392	0.427
Branch*PIN FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table repeats the baseline regression reported in Columns 2, 4, and 6 of Table 2 by replacing the dependent variable considering the loan originated against new (Columns 1, 3, 5, and 7) and resale apartments (Columns 2, 4, 6, and 8).

The regression specification is

$$Y_{bpq} = \beta_q \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

Where Y_{bpq} is: the probability of PIN code p to receive a loan from branch b in quarter q in panel in columns 1 and 2; the amount of loan from branch b to PIN code p in quarter q in columns 3 and 4; the number of borrowers in PIN code p receiving a loan from branch b in quarter q in columns 5 and 6. *Post* is the binary variable that takes 1 if a PIN code p belongs to the state after the adherence to RERA. The regression specifications include α_{bp} representing branch×PIN fixed effects and α_{bq} is the branch × quarter fixed effects. Robust standard errors clustered by state are reported in parenthesis.

Table 5: Effect of RERA on Mortgage Lending – Geographic Disparity

Dep. Var.	(1) Binary loan = 1	(2) Amount of Loan	(3) Number of Loan	(4) Number of New Borrowers
Post*	0.008***	0.048***	0.039***	0.024***
	(0.002)	(0.012)	(0.010)	(0.008)
Post*Tier 2	0.002	0.003	0.012	0.009
	(0.004)	(0.026)	(0.026)	(0.023)
Post*Tier 1	-0.006**	-0.043***	-0.037**	-0.020
	(0.002)	(0.015)	(0.015)	(0.012)
Observations	3,004,584	3,004,584	3,004,584	3,004,584
R-squared	0.375	0.415	0.434	0.416
Branch*PIN FE	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes

This table reports the results from the following regression specification:

$$Y_{bpq} = \beta_1 \cdot Post_{p(b)q} + \beta_2 \cdot Post_{p(b)q} \times Tier2 + \beta_3 \cdot Post_{p(b)q} \times Tier1 + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

where Y_{bpq} includes (1) the probability of a PIN code p receiving a loan from branch b in quarter q in column 1; (2) the amount of loan from branch b to a PIN code p in quarter q in column 2; (3) the number of borrowers in a PIN code p receiving a loan from branch b in quarter q in column 3; (4) the number of new borrowers in a PIN code p who receive a loan from branch b in quarter q in column 4. $Post_{p(b)q}$ is the binary variable that takes 1 if a PIN code p belongs to the state after the adherence to RERA. The regression specifications include α_{bp}, branch×PIN fixed effects and α_{bq}, branch × quarter fixed effects. Robust standard errors clustered by state are reported in parenthesis.

Table 6: Effect of RERA on Loan Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Group by	All		New Borrowers		Female		Low Income		Backward Caste	
Dep. Var.	LTV	Interest Rate	LTV	Interest Rate	LTV	Interest Rate	LTV	Interest Rate	LTV	Interest Rate
Post	4.967*	0.058								
	(2.481)	(0.066)								
Post*Group			2.805***	-0.041*	0.406	-0.039**	0.693***	-0.105***	0.453**	-0.174
			(0.473)	(0.022)	(0.323)	(0.014)	(0.183)	(0.019)	(0.201)	(0.015)
Observations	948,856	962,763	948,856	931,369	948,856	928,713	468,030	475,810	948,856	963,214
R-squared	0.361	0.510	0.477	0.528	0.363	0.524	0.410	0.537	0.361	0.510
Branch*PIN FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State * Group FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State* YQ FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Columns 1-2 in this table reports the results from the following regresion specification:

$$Y_{bpq} = \beta_q \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

Columns 3-8 in this table reports the results from the following regression specification separately for various groups:

$$Y_{bpq} = \beta_1 \cdot Post_{p(b)q} \times Group + \beta_2 \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + \alpha_{s,q} + \alpha_{s,g} + \varepsilon_{bpq}$$

Where Y_{bpq} is the loan to value (LTV) ratio and interest rate of a loan from branch b to PIN code p in quarter q. We study the effect for all borrowers in columns 1 and 2. The binary variable *Group* takes 1 when a borrower is first time borrower (columns 3 to 4), is female (columns 5 to 6), has an income below ₹480,000 (columns 7 to 8), or is from a backward caste (columns 9 to 10). *Post* is the binary variable that takes 1 if a PIN code p belongs to the state after the adherence to RERA. The regression specifications include α_{bp} for branch×PIN fixed effects, α_{bq} for branch × quarter fixed effects, $\alpha_{s,q}$ for state × quarter fixed effects, and $\alpha_{s,g}$ for state × group fixed effects. The granularity of the specification is at the loan level. Robust standard errors clustered by state are reported in parenthesis.

Table 7: Effect of RERA on Housing Project Characteristics

Dep. Var.	(1) Ln (size)	(2) Ln(price\sqft)	(3) Score	(4) Delay
Panel A Overall effect				
Post	-0.082***	-0.064**	0.224**	1.015
	(0.028)	(0.025)	(0.107)	(0.895)
Panel B Effect by RERA-registration status				
Post*Non-RERA	-0.061**	-0.086***	-0.023	3.667***
	(0.028)	(0.025)	(0.110)	(0.919)
Post*RERA	-0.130***	-0.013	0.791***	-5.088***
	(0.030)	(0.026)	(0.114)	(0.969)
Panel C: Effect by market segment				
Post*Affordable	-0.555***	-0.437***	-0.082	-2.095**
	(0.028)	(0.025)	(0.116)	(0.953)
Post*Mid	-0.143***	-0.086***	0.725***	-0.422
	(0.027)	(0.024)	(0.108)	(0.906)
Post*Luxury	0.475***	0.325***	-0.481***	6.717***
	(0.029)	(0.026)	(0.114)	(1.030)
Observations	13,357	13,357	13,357	13,357
City FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes

Panel A of this table reports the overall effect estimated from the following specification:

$$Y_{ijq} = \beta \cdot Post_{ijq} + \alpha_j + \gamma_q + \varepsilon_{ijq}$$

Panel B of this table reports the effects by RERA-registration status using the following specification:

$$Y_{bpq} = \beta_1 \cdot Post_{ijq} \times R + \beta_2 \cdot Post_{ijq} \times NR + \alpha_j + \gamma_q + \varepsilon_{ijq}$$

and Panel C of this table reports the effects by housing segment estimated using:

$$Y_{bpq} = \beta_1 \cdot Post_{ijq} \times Seg1 + \beta_2 \cdot Post_{ijq} \times Seg2 + \beta_3 \cdot Post_{ijq} \times Seg3 + \alpha_j + \gamma_q + \varepsilon_{ijq}$$

where Y_{ijq} is the log of unit size, log of price per square foot, project score, and delay in months for columns (1) to (4), respectively. *Post* is a binary variable that takes the value of 1 if project i in city j is launched after the state-level enactment of RERA. All regressions include city fixed effects α_j and quarter fixed effects γ_q. Robust standard errors are reported in parenthesis.

Table 8: Effect of RERA on Loan Performances

	(1)	(2)	(3)	(4)
		Loan Level		Branch*PIN
Dep. Var.	Default=1	ln(Amount Loan in Default)	ln(Number of Default Months)	Proportion of Loan in Default
Post	-0.013***	-0.074***	-0.067***	-0.019***
	(0.003)	(0.015)	(0.013)	(0.006)
Observations	963,320	961,562	961,112	281,399
R-squared	0.278	0.272	0.326	0.539
Branch*PIN FE	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes

This table reports the effect of RERA on loan performance, measured by four variables: the probability of default within one year after loan sanctioning ("*Default=1*", column 1), the amount of loan under default within one year after loan sanctioning ("*ln(Amount Loan in Default)*", column 2), the number of months a loan remains in default one year after loan sanctioning ("*ln(Number of Default Months)*", column 3), and the proportion of loan amounts in default within one year at the branch–PIN code–quarter level ("*Proportion of Loan in Default*", column 4). The coefficients are estimated from the following regression specification:

$$Y_{bpq} = \beta_q \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

$Post_{p(b)q}$ is the binary variable that takes 1 if PIN code p belongs to the state after the adherence to RERA. The regression specifications include α_{bp} for branch×PIN fixed effects and α_{bq} for branch × quarter fixed effects. Robust standard errors clustered by state are reported in parenthesis.

Table 9: Effect of RERA on Firm Entry and Exit

	(1)	(2)	(3)	(4)	(5)
Sample Period	2015-2019			2015-2016	
Regression Method	Poisson	Log1plus			
Dep.Var.	No. Exit	log(num exit)	Exit=1	No. Net Entry	Net Entry>0
Post * RE	0.276*	0.036***	0.003	5.720***	0.182***
	(0.151)	(0.014)	(0.002)	(1.499)	(0.050)
Observations	252	7,476	7,476	2,108	2,108
R-squared	0.9973	0.994	0.981	0.931	0.917
District*RE FE	Yes	Yes	Yes	Yes	Yes
District*Year FE	Yes	Yes	Yes	Yes	Yes
Mean DV	1108.42	1108.42	0.03	14.36	0.59

This table reports the effect of RERA on the exit and entry of firms into the real estate industry. The coefficients are estimated from the following regression specification:

$$Y_{dyi} = \beta_1 \cdot Post_{d(i)y} \cdot RE_i + \beta_2 \cdot Post_{d(i)y} + \alpha_{di} + \alpha_{dy} + \varepsilon_{dyi}$$

$Post_{d(i)y}$ is an indicator variable that takes 1 if district (d) belongs to the state after the adherence to RERA. RE_i is an indicator variables that takes 1 for the real estate industry. α_{di} and α_{dy} represent district *times* industry fixed effects and district *times* year fixed effects, respectively. The sample period for the district-level firm entry data only covers 2015 and 2016, thus we only use data from these two years from columns 7 to 8, while the firm exit data covers the period from 2015 to 2019. Robust standard errors clustered by district are reported in parenthesis.

Table 10: Effect of RERA on Industry Competiton

VARIABLES	(1) ln(HHI Asset)	(2) ln(HHI Profit)	(3) ln(HHI Asset)	(4) ln(HHI Profit)
Post*RE	-0.154***	-0.256**	-0.148***	-0.247**
	(0.045)	(0.103)	(0.045)	(0.106)
Post	0.123***	0.089*		
	(0.042)	(0.051)		
Observations	5,428	5,280	5,428	5,280
R-squared	0.968	0.976	0.973	0.981
Industry*State FE	Yes	Yes	Yes	Yes
Industry*Year FE	Yes	Yes	Yes	Yes
State*Year FE	No	No	Yes	Yes
Mean DV	3508.1	3505.47	3508.1	3505.47

This table reports the effect of RERA on the competition of firms in real estate industry. The coefficients are estimated from the following regression specification:

$$Y_{syi} = \beta_1 \cdot Post_{s(i)y} \cdot RE_i + \beta_2 \cdot Post_{s(i)y} + \alpha_{si} + \alpha_{sy} + \alpha_{iy} + \varepsilon_{syi}$$

$Post_{s(i)y}$ is an indicator variable that takes 1 for states after RERA implementation. RE_i is an indicator variables that takes 1 for real estate industry. α_{si}, α_{iy} and α_{sy} represent state $\times$ industry fixed effects, industry $\times$ year fixed effects and state $\times$ year fixed effects, respectively. Robust standard errors clustered by state are reported in parenthesis.

Table 11: Effect of RERA on Firm Profitability

Dep.Var.	(1) ROA	(2) ROTA	(3) ROE	(4) ROA	(5) ROTA	(6) ROE
Post * RE	-0.269***	-0.237***	-0.296**	0.321*	0.310*	1.408***
	(0.062)	(0.064)	(0.144)	(0.178)	(0.182)	(0.326)
Post * RE* Size_Q1-Median				-0.311	-0.335	-0.727
				(0.218)	(0.225)	(0.443)
Post * RE* Size_Median-Q3				-0.508**	-0.369*	-1.210***
				(0.208)	(0.214)	(0.432)
Post * RE* Size_AboveQ3				-0.443**	-0.072	-2.523***
				(0.192)	(0.196)	(0.412)
Post	0.347***	0.456***	0.684***	0.525***	0.803***	1.370***
	(0.048)	(0.049)	(0.104)	(0.076)	(0.079)	(0.144)
Post * Size_Q1-Median				-1.001***	-1.155***	-2.444***
				(0.082)	(0.085)	(0.144)
Post * Size_Median-Q3				-0.717***	-1.106***	-2.558***
				(0.076)	(0.078)	(0.139)
Post * Size_AboveQ3				-0.669***	-1.254***	-1.667***
				(0.070)	(0.072)	(0.131)
Observations	1,417,363	1,417,363	1,417,363	1,054,658	1,054,658	1,054,658
R-squared	0.615	0.627	0.492	0.564	0.582	0.447
Firm FE	Y	Y	Y	Y	Y	Y
FinYear FE	Y	Y	Y	Y	Y	Y
meanDV	-3.49	-1.18	0.27	-2.14	0.32	0.96

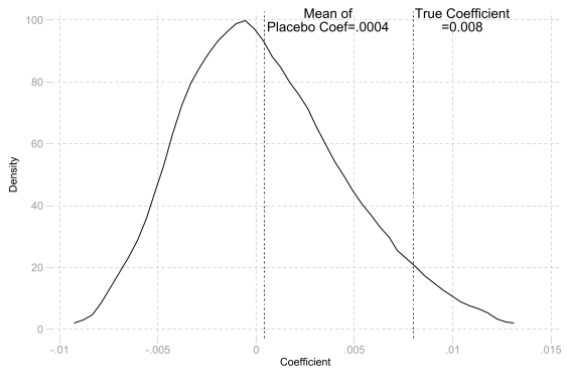
This table reports the effect of RERA on the performances of real estate developers, measured by ROA, ROAT, ROE. ROA is the net profit divided by the total asset, ROAT is the EBIT divided by the total asset, and ROE is the net profit divided by the book value of equity. From columns 1 to 3, the coefficients are estimated from the following regression specification:

$$Y_{fy} = \beta_1 \cdot Post_{f(s)y} \cdot RE_f + \beta_2 \cdot Post_{f(s)y} + \alpha_f + \alpha_y + \varepsilon_{fy}$$

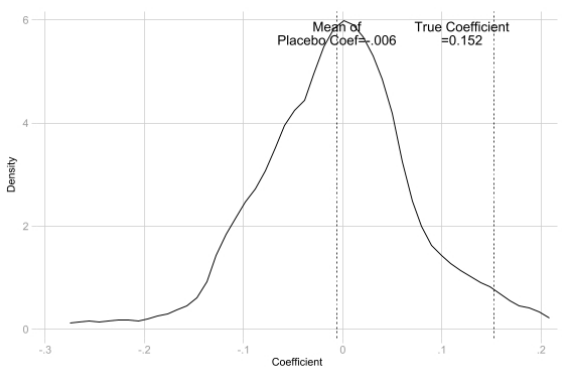
$Post_{f(s)y}$ is an indicator variable that takes 1 if firm f is located in the state s that has implemented RERA in year y. RE_f is an indicator variables that takes 1 for real estate developers. α_f and α_y represent firm fixed effects and financial year fixed effects, respectively. In columns 4 to 6, quartiles of firm size are interacted with $Post_{f(s)y} \times RE$ and $Post_{f(s)y}$ to reflect the heterogeneity. Robust standard errors clustered by firm are reported in parenthesis.

Appendix A

Figure A1: Placebo Test with Random Timing of RERA Implementation



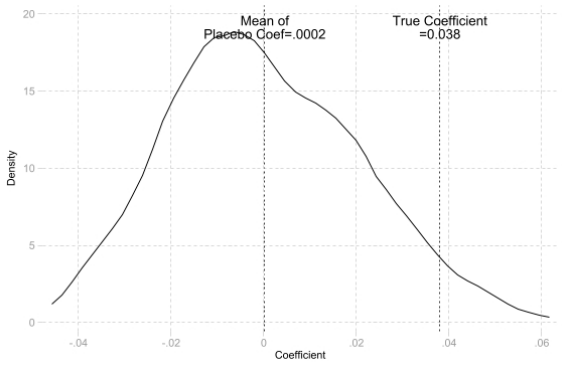
(a) Binary loan = 1



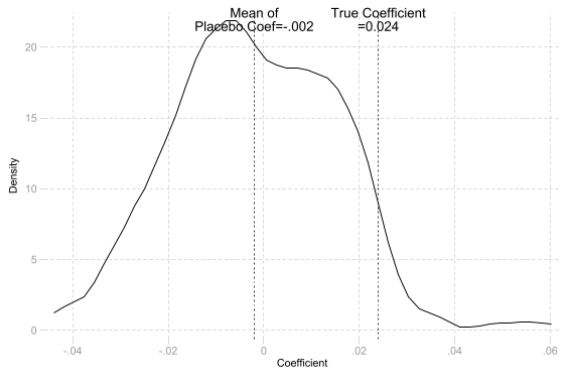
(b) Amount of Loan



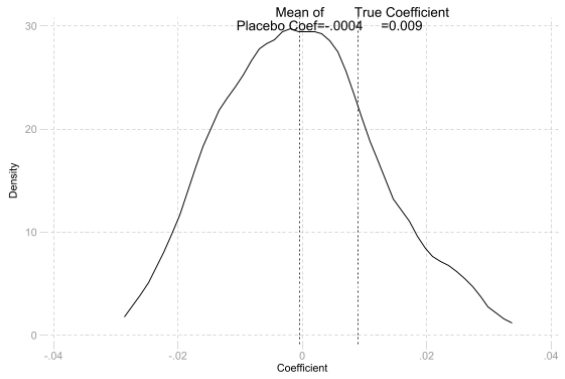
(c) Number of Loan



(d) Number of Borrower



(e) Number of New Borrower



(f) Number of Existing Borrower

This figure plots the coefficients of the placebo tests. We randomly assign a quarter of policy implementation for each state and rerun the baseline specifcation below:

$$Y_{bpq} = \beta_q \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

We plot the coefficient β_q in the figures for the dependent variables including *Binary loan* = 1, *Amount of Loan*, *Number of Loan*, *Number of Borrowers*, *Number of New Borrowers* and *Number Existing Borrowers*. The last five variables are in log term.

Figure A2: National Housing Price Index



The figure visualizes the housing price index from 2010 to 2020 in India. The grey shaded area is our sample period from 2015 Q2 to 2019 Q4. Data source: Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org/series/QINR628BIS).

Table A1: Effect of RERA on Mortgage Lending – Interaction Weighted Estimator

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.	Binary loan = 1	Amount of Loan	Number of Loan	Number of Borrower	Number of New Borrower	Number of Exsiting Borrower
Post	0.009***	0.054***	0.010***	0.010***	0.007***	0.003**
	(0.003)	(0.018)	(0.003)	(0.003)	(0.003)	(0.001)
Observations	1,897,632	1,897,632	1,897,632	1,897,632	1,897,632	1,897,632
R-squared	0.412	0.447	0.468	0.469	0.453	0.408
Branch*PIN FE	Yes	Yes	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes
SE Cluster	State	State	State	State	State	State

This table rerun the results reported in Tables 2 and 3 using the Interaction Weighted estimator as in Sun and Abraham (2021) to address the estimation bias of staggered DID. Robust standard errors clustered by state are reported in parenthesis.

Table A2: Effect of RERA on Mortgage Lending – Callaway & Sant' Anna (2021)

Dep. Var.	(1) Binary loan = 1	(2) Amount of Loan	(3) Number of Loan	(4) Number of Borrower	(5) Number of New Borrower	(6) Number of Exsiting Borrower
ATT	0.020***	0.116***	0.111***	0.110***	0.072***	0.083***
	(0.007)	(0.038)	(0.038)	(0.038)	(0.026)	(0.022)
Observations	1,920,348	1,920,348	1,920,348	1,920,348	1,920,348	1,920,348
Branch*PIN FE	Yes	Yes	Yes	Yes	Yes	Yes
YQ FE	Yes	Yes	Yes	Yes	Yes	Yes
SE Cluster	State	State	State	State	State	State

This table rerun the results reported in Tables 2 and 3 using the DID with multiple periods estimator developed in Callaway and Sant'Anna (2021) to address the estimation bias of staggered DID. Robust standard errors clustered by state are reported in parenthesis.

Table A3: Effect of RERA on Mortgage Lending – Poisson Regressions

	(1)	(2)	(3)	(4)	(5)
Data Structure	Branch-PIN-YQ				Branch-State-YQ
Dep. Var.	Amount of Loans	Number of Loans	Number of New Borrowers	Number of Borrowes	Number of PINs
Post	0.157***	0.169***	0.143***	0.162***	0.137***
	(0.022)	(0.024)	(0.036)	(0.045)	(0.024)
Observations	2,514,548	2,514,548	2,166,480	2,514,548	120,042
R-squared	0.66	0.56	0.53	0.56	0.66
Branch*PIN FE	Yes	Yes	Yes	Yes	No
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes
Branch*State FE	Yes	Yes	Yes	Yes	Yes

This table rerun the results reported in Tables 2 and 3 using poisson regression. We use the following regression specification:

$$Y_{bpq} = \beta_q \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + \varepsilon_{bpq}$$

$Post_{p(b)q}$ is a binary variable that takes 1 if PIN code p belongs to the state that has implemented RERA at time q. The regression specifications include α_{bp} representing branch×PIN fixed effects and α_{bq} representing the branch × quarter fixed effects. Robust standard errors clustered by state are reported in parenthesis.

Table A4: Effect of RERA on Mortgage Lending – Branch × State × Quarter

Dep. Var.	(1) Binary loan	(2) $=1$	(3) Amount of Loan	(4)	(5) Number of Loan	(6)	(5) Average Loan Size	(6)
Post	0.022***	0.022***	0.123***	0.123***	0.108**	0.108**	-0.023	0.001
	(0.005)	(0.005)	(0.029)	(0.029)	(0.027)	(0.027)	(0.048)	(0.032)
Observations	148,124	148,124	148,124	148,124	148,124	148,124	6,398	12,195
R-squared	0.797	0.302	0.814	0.299	0.855	0.297	0.740	0.583
Branch*PIN FE	Yes	No	Yes	No	Yes	No	Yes	No
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	No	Yes	No	Yes	No	Yes	No	Yes

This table rerun the results reported in Tables 2 and 3 using data at branch × state × quarter level. We use the following regression specification:

$$Y_{bsq} = \beta_q \cdot Post_{s(b)q} + \alpha_{bs} + \alpha_{bq} + \varepsilon_{bsq}$$

$Post_{s(b)q}$ is a binary variable that takes 1 for states after the adherence to RERA. The regression specifications include α_{bs} representing branch×state fixed effects and α_{bq} representing the branch × quarter fixed effects. Robust standard errors clustered by state are reported in parenthesis.

Table A5: Balance Test

Dep. Var.	(1)	(2)	(3) Post = 1	(4)	(5)
ln(GDP per Capita)	-0.430				-0.304
	(1.227)				(1.174)
ln(GVA Construction)		-0.237			0.010
		(0.675)			(0.535)
ln(CPI_HP Index)			0.133		0.130
			(0.136)		(0.126)
ln(Credit Scheduled Commercial Bank)				-0.009	-0.017
				(0.120)	(0.144)
Observations	91	91	91	90	90
R-squared	0.792	0.791	0.798	0.790	0.797
Year FE	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes

This table report the association between the timing of RERA implementation and the variables representing the economic development of each state. We run the following specification:

$$Post_{s,t} = X_{s,t} + \alpha_s + \alpha_t + \epsilon_{s,t}$$

where $Post_{s,t}$ is the binary variable that take 1 if a state s is treated in year t. $X_{s,t}$ includes GDP per capita, Gross value addded for the construction sector, the CPI of housing, and the credit issued by scheduled commercial banks. In columns 1 to 5, the sample period is from 2014 to the year that RERA is adopted in a state. Robust standard errors clustered by state are reported in parenthesis.

Table A6: Baseline Results with State × Year-Level Controls

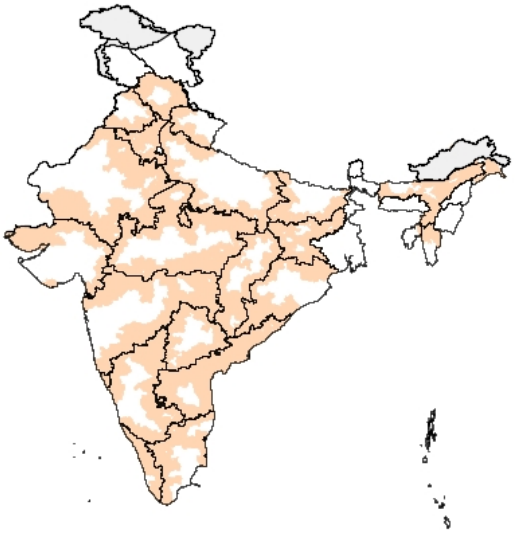
Dep. Var.	(1) Binary loan = 1	(2) Amount of Loan	(3) Number of Loan	(4) Number of Borrower	(5) Number of New Borrower	(6) Number of Exsiting Borrower
Post	0.007***	0.040***	0.034***	0.034***	0.019**	0.008
	(0.002)	(0.010)	(0.008)	(0.008)	(0.008)	(0.009)
Observations	3,003,748	3,003,748	3,003,748	3,003,748	3,003,748	3,003,748
R-squared	0.375	0.414	0.434	0.435	0.416	0.390
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Branch*PIN FE	Yes	Yes	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes

In this table, we rerun the baseline results reported in Tables 2 and 3 by controlling for variables indicating the economic development of each state. We use the following regression specification:

$$Y_{bpq} = \beta_q \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + X_{sq} + \varepsilon_{bpq}$$

Post is the binary variable that takes 1 if a PIN code p belongs to the state after the adherence to RERA. The regression specifications include α_{bp} representing branch×PIN fixed effects and α_{bq} representing the branch × quarter fixed effects. The control variables denoted by X_{sq} include GDP per capita, gross value added of the construction sector, the CPI of housing, and credit issued by scheduled commercial banks. Robust standard errors clustered by state are reported in parenthesis.

Figure A3: Districts on State Borders Included in the Sample



The map visualizes the districts on the state borders included in the regressions reported in Table A7. Map data is acquired from UN Geospatial Information Section. The areas in grey are disputed territories. Boundaries shown and the designations used on this map do not imply official endorsement or acceptance by the author or affiliated institution.".

Table A7: Baseline Results Keeping Border Districts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep. Var.	Binary loan = 1		Amount of Loan		Number of Loan		Number of Borrower		Number of New Borrower		Number of Existing Borrower	
Post	0.008***	0.016**	0.042***	0.081*	0.039***	0.079**	0.039***	0.079**	0.024***	0.062*	0.016	0.033*
	(0.002)	(0.007)	(0.010)	(0.044)	(0.008)	(0.038)	(0.008)	(0.037)	(0.007)	(0.034)	(0.010)	(0.017)
Observations	1,597,919	1,597,919	1,597,919	1,597,919	1,597,919	1,597,919	1,597,919	1,597,919	1,597,919	1,597,919	1,597,919	1,597,919
R-squared	0.400	0.401	0.441	0.442	0.458	0.459	0.459	0.459	0.439	0.440	0.408	0.409
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Pair*YQ FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Branch*PIN FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table rerun the results reported in Tables 2 and 3 by restricting the sample to bordering areas as shown in Figure A3. We use the following regression specification:

$$Y_{bpq} = \beta_q \cdot Post_{p(b)q} + \alpha_{bp} + \alpha_{bq} + \alpha_{pair,q} + \varepsilon_{bpq}$$

$Post_{p(b)q}$ is the binary variable that takes 1 if PIN code p belongs to the state after the adherence to RERA. The regression specifications include α_{bp} representing branch×PIN fixed effects, α_{bq} representing the branch × quarter fixed effects and $\alpha_{pair,q}$ representing the state-pair×quarter fixed effects. Robust standard errors clustered by state are reported in parenthesis.

Table A8: Robustness Test: Adding Controls to Table 6

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Group by	All		New Borrowers		Female		Low Income		Backward Caste	
Dep. Var.	LTV	Interest Rate	LTV	Interest Rate	LTV	Interest Rate	LTV	Interest Rate	LTV	Interest Rate
Post	7.842***	-0.158								
	(1.424)	(0.104)								
Post*Group			2.704***	-0.037***	0.205	-0.045***	0.516***	-0.100***	0.376*	-0.023
			(0.445)	(0.013)	(0.350)	(0.010)	(0.177)	(0.019)	(0.194)	(0.019)
ln(income)	0.075	-0.033***	0.075***	-0.033***	0.077	-0.033***		0.074	-0.033***	
	(0.045)	(0.003)	(0.045)	(0.001)	(0.045)	(0.001)		(0.045)	(0.003)	
Female	0.715**	-0.010	0.699***	-0.010**			0.746**	-0.011	0.714**	-0.010
	(0.289)	(0.021)	(0.285)	(0.005)			(0.295)	(0.022)	(0.288)	(0.021)
New Borrower	23.164***	0.033**			23.157***	0.033***	23.183***	0.031*	23.166***	0.033**
	(0.553)	(0.016)			(0.553)	(0.006)	(0.554)	(0.015)	(0.553)	(0.016)
Age	-0.309***	-0.002	-0.308***	-0.002***	-0.309***	-0.001***	-0.308***	-0.002	-0.308***	-0.002
	(0.019)	(0.001)	(0.019)	(0.000)	(0.019)	(0.000)	(0.019)	(0.001)	(0.019)	(0.001)
Govt Staff	1.570***	-0.287***	1.580***	-0.286***	1.577***	-0.284***	1.503***	-0.279***	1.544***	-0.284***
	(0.276)	(0.029)	(0.272)	(0.006)	(0.271)	(0.006)	(0.271)	(0.029)	(0.276)	(0.029)
Observations	467,549	475,312	467,549	475,007	467,549	475,007	467,549	475,312	467,549	475,312
R-squared	0.526	0.543	0.527	0.543	0.526	0.543	0.526	0.544	0.526	0.543
Branch*PIN FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State * Group FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State* YQ FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table rerun the results reported in Table 6 by including borrower characteristics, including the annual income, gender, an indicator of first-times borrower, age and an indicator of government staff. Branch × PIN fixed effects and branch × quarter fixed effects are included in columns 1-2. Branch × PIN, branch × quarter, state × group, and state × quarter fixed effects are included from columns 3 to 10.

Table A9: Robustness Test: Effect on Interest Rate Spread

	(1)	(2)	(3)	(4)	(5)
Group by	All	New Borrowers	Female	Low Income	Backward Caste
Dep. Var.			Interest Spread		
Post	0.064				
	(0.064)				
Post*Group		-0.041*	-0.039**	-0.105***	-0.018
		(0.022)	(0.014)	(0.019)	(0.015)
Observations	963,214	963,214	963,214	475,810	963,214
R-squared	0.541	0.542	0.542	0.576	0.542
Branch*PIN FE	Yes	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes
State * Group FE	No	Yes	Yes	Yes	Yes
State* YQ FE	No	Yes	Yes	Yes	Yes

This table rerun the results reported in Table 6 by replacing the dependent variable with the interest spread. Prior to April 2016, interest spread is calculated by deducting the base rate from the loan interest rate. Beginning in April 2016, the interest spread was calculated by subtracting the Marginal Cost of Funds based Lending Rate (MCLR) from the loan interest rate, in accordance with the formula change mandated by the Reserve Bank of India.

Appendix B

In this Appendix, we derive a simple model to identify the buyers that benefit the most from increased developer accountability by illustrating the factors that influence the buyers' sensitivity to developer default.

Let $U(W)$ denote the utility function of homebuyers. If the presale house is delivered as promised, the utility is:

$$U(W_1) = U(W_0 - C + V)$$

where W_0 represents the buyer's wealth excluding the house, C is consumption of numeraire goods, and V is the value of the housing.

In the case of developer default, the homebuyer loses the house and may incur extra costs, such as temporary housing expenses, search costs for a new property, and legal fees if litigation is required. These extra costs are denoted by L. The utility under default is:

$$U(W_2) = U(W_0 - C - L)$$

Let θ denote the probability of developer default. The expected utility of home buyers is:

$$E(U) = \theta \times U(W_0 - C + V) + (1 - \theta) \times U(W_0 - C - L)$$

Buyers' sensitivity to the probability of default is:

$$\frac{\partial E(U)}{\partial \theta} = U(W_0 - C + V) - U(W_0 - C - L) \tag{B1}$$

Equation (B1) shows that buyers' sensitivity to developer default depends on W_0, V and L, as well as their risk attitude, which influences the curvature of the utility function. The relationship between default and buyers' utility with respect to these parameters is derived below:

$$\frac{\partial^2 E(U)}{\partial \theta \partial W} = \frac{\partial U(W_0 - C + V)}{\partial W_0} - \frac{\partial U(W_0 - C - L)}{\partial W_0} < 0 \tag{B2}$$

$$\frac{\partial^2 E(U)}{\partial \theta \partial L} = \frac{\partial U(W_0 - C - L)}{\partial L} > 0 \tag{B3}$$

$$\frac{\partial^2 E(U)}{\partial \theta \partial V} = \frac{\partial U(W_0 - C + V)}{\partial V} > 0 \tag{B4}$$

$$\frac{\partial^2 E(U)}{\partial \theta \partial \sigma} = \frac{\partial U(W_0 - C + V)}{\partial \sigma} - \frac{\partial U(W_0 - C - L)}{\partial \sigma} < 0 \tag{B5}$$

Model Interpretation:

- From equation (B2), all else equal, the sensitivity to default is stronger when the households have lower wealth.
- From equation (B3), all else equal, the sensitivity to default is stronger when the loss from developer default is higher.
- From equation (B4), all else equal, the sensitivity to default is stronger when the house adds more value to household wealth.
- From equation (B5), all else equal, the sensitivity to default is stronger for households with weaker risk aversion.

Proof of equation (B5):
Assuming CRRA utility function, $U(W) = \frac{W^{1-\sigma}}{1-\sigma}$,

$$\frac{\partial^2 U}{\partial \sigma \partial W} = -ln(W) \times W^{-\sigma}$$

Above equation is negative when $W > 1$. Therefore, when $W_1 > W_2 > 1$, it can be proved that:

$$\frac{\partial U(W_1)}{\partial \sigma} < \frac{\partial U(W_2)}{\partial \sigma}$$

Therefore, we have

$$\frac{\partial U(W_0 - C + V)}{\partial \sigma} < \frac{\partial U(W_0 - C - L)}{\partial \sigma}$$

when $W_0 - C + V > W_0 - C - L > 1$. This condition holds when W_0 is large, $V > 0$ and $L > 0$.
Q.E.D.

Appendix C

In this Appendix, we derive a simple model to illustrate how RERA affects the developer market structure.

C1.1 Demand Function

For tractability, we define the following linear demand function:

$$Q^D = q_0 - \frac{P}{\theta}$$

where θ represents the probability that the house is delivered on time. We assume that higher developer creditworthiness, reflected in a larger θ, increases market demand.

C1.2 Cost Function

We model the cost function as linear-quadratic with decreasing return to scale, consistent with standard formulations in the literature.

Before RERA:

$$C(q) = c_0 q + \frac{1}{2} c_1 q^2 + \frac{\alpha}{S} q + F \tag{C1}$$

where S denotes firm size, and $\frac{\alpha}{S} q$ represents the signaling cost required to establish buyer trust. Since firm size may act as a positive signal for credibility (see Bafera and Kleinert (2023) for a comprehensive review), signaling costs are assumed to decline with firm size. F represents fixed cost. θ denotes the creditworthiness of the developers.

After RERA:

$$C(q) = c_0 q + \frac{1}{2} c_1 q^2 + \gamma(1-\theta) q + \frac{\beta}{S} q * 1_{q>\bar{q}} + F \tag{C2}$$

where 1-θ represents the probability of default. $\frac{\beta}{S}$ denotes the financial cost incurred after RERA, arising when sale proceeds are deposited into an escrow account and cannot be utilized for financing other projects. We assume that the financial cost decreases with firm size S and only appears once the firm exceeds an exogeneous development threshold, $\bar{q}$.

C1.3 Market Equilibrium

This section derives the market equilibrium before and after the implementation of RERA.

C1.3.1 Before RERA

(1) Profit Maximization

Let $C'(q) = P$, we can drive the following function:

$$q = \frac{1}{c_1}(P - c_0 - \frac{\alpha}{S}) \tag{C3}$$

(2) Free-entry

New firms will enter the market until profit of all firms becomes zero. Thus, let $Pq = C(q)$ and derive the equilibrium price.

$$P^*_{small} = \sqrt{2Fc_1} + c_0 + \frac{\alpha}{S}$$

$$P^*_{large} = \sqrt{2Fc_1} + c_0 + \frac{\alpha}{\bar{S}} \tag{C4}$$

Because $P^*_{large} < P^*_{small}$, small firms will exit the market, and the equilibrium price $P^* = P^*_{large}$. Substitute equation (C4) into equation (C3), and derive the equilibrium supply.

$$q^* = \sqrt{\frac{2F}{c_1}} \tag{C5}$$

(3) Market clearing condition

Define N as the number of developers. The total supply can be expressed as $Q^S = N_\times q^*$. Let $Q^S = Q^D$, and substitute equation (C4) into this equation, we can derive the equilibrium number of firms:

$$N^* = \frac{c_1\left[q_0 - \frac{1}{\theta}(\sqrt{2Fc_1} + c_0 + \frac{\alpha}{S})\right]}{\sqrt{2Fc_1}} \tag{C6}$$

C1.3.2 After RERA & $q < \bar{q}$ (Case 1)

(1) Profit Maximization

Let $C'(q) = P$, we can drive the following function:

$$q = \frac{1}{c_1 + \frac{\beta}{S}}\left[P - c_0 - \gamma(1-\theta)\right] \tag{C7}$$

(2) Market clearing condition

Let $Q^D = Q^S$, we can derive the number of firms:

$$N = \frac{c_1(q_0 - \frac{P}{\theta})}{P - c_0 - \gamma(1-\theta)} \tag{C8}$$

(3) Free-entry

New firms will enter the market until profit is zero. Thus, let $Pq = C(q)$, and derive the equilibrium price:

$$P^* = \sqrt{2Fc_1} + c_0 + \gamma(1-\theta) \tag{C9}$$

Substituting equation (C9) into equation (C8) and derive the number of firms in equilibrium:

$$N^* = \frac{c_1\left\{q_0 - \frac{1}{\theta}\left[\sqrt{2Fc_1} + c_0 + \gamma(1-\theta)\right]\right\}}{\sqrt{2Fc_1}} \tag{C10}$$

Substituting equation (C9) into equation (C7) and derive the equilibrium supply of each developer:

$$q^* = \sqrt{\frac{2F}{c_1}} \tag{C11}$$

C1.3.3 After RERA & $q > \bar{q}$ (Case 2)

(1) Profit Maximization

Abundant empirical evidence shows that the financial costs of small firms are higher than those of the large firms (for example, Hall and Weiss (1967); Beck, Demirgüç-Kunt and Maksimovic (2005)). Consequently, if small firms exceed the threshold $\bar{q}$, their equilibrium price will exceed that of large firms, forcing them to exit the market. Therefore, each small firm will develop at most $\bar{q}$ units.

$$q^*_{small} = \bar{q}$$

The supply of large firms can be derived by letting $C'(q) = P$:

$$q_{large} = \frac{P - c_0 - \gamma(1-\theta) - \frac{\beta}{S}}{c_1} \tag{C12}$$

(2) Market Clearing Condition

Assuming there are equal number of large and small firms, the total supply can be expressed as

$$Q^S = \frac{1}{2} \times N \times (q_{large} + \bar{q})$$

Let $Q^S = Q^D$, the number of firms can be expressed as

$$N = \frac{2(q_0 - \frac{P}{\theta})}{q_{large} + \bar{q}} \tag{C13}$$

(3) Free-entry

Let the profit of large firms be zero, we can derive the the optimal supply of large firms:

$$q^*_{large} = \sqrt{\frac{2F - \bar{q}\frac{\beta}{S}}{c_1}} \tag{C14}$$

Substituting equation (C12) into equation (C14), we can derive the equilibrium price P^*:

$$P^* = \sqrt{2c_1(F - \bar{q})\frac{\beta}{S}} + c_0 + \gamma(1-\theta) + \frac{\beta}{S} \tag{C15}$$

Substituting equations (C15) and (C14) into equation (C13), we can derive the equilibrium number of firms:

$$N^* = \frac{2c_1\left(q_0 - \frac{1}{\theta}\sqrt{2c_1(F - \bar{q}\frac{\beta}{S})} + c_0 + \gamma(1-\theta) + \frac{\beta}{S}\right)}{\sqrt{2c_1(F - \bar{q}\frac{\beta}{S})} + c_1\bar{q}} \tag{C16}$$

C1.4 Comparative Statics After RERA

C1.4.1 Case 1

From equations (C6) and (C10), we have $N^*_{Before} < N^*_{After}$ if $\gamma(1-\theta) < \frac{\alpha}{S}$. This condition implies that the number of firms increases after RERA when the additional cost imposed by RERA is less than or equal to the signaling cost previously borne by small firms.

From equations (C4) and (C9), we have $P^*_{After} < P^*_{Before}$ if $\gamma(1-\theta) < \frac{\alpha}{S}$. The lower equilibrium price after RERA implies a higher transaction volume Q^*, assuming the demand curve is unchanged or shifts upward.

Therefore, after the introduction of RERA, as developer credibility improves (i.e., higher θ), the model predicts a lower equilibrium price (P^*), a greater number firms (N^*) and a higher volume of transactions (Q^*). Both total supply and total demand increase in equilibrium.

C1.4.2 Case 2

(1) Comparison of P^*_{after} and P^*_{before}

From equations (C15) and (C4), the equilibrim price after RERA, P^*_{after} is lower than the

price before RERA, P^*_{before} if the following condition holds:

$$\gamma(1-\theta) + \frac{\beta}{S} - \frac{\alpha}{S} < \sqrt{2c_1F} - \sqrt{2c_1(F - \bar{q}\frac{\beta}{S})} \tag{C17}$$

The left-hand-side of condition (C17) captures the net additional cost under RERA: the delay penalty and the extra financing cost minus the signaling cost saved.

The RHS is always positive. Therefore, if the net cost incurred by RERA is negative (i.e., $\gamma(1-\theta) + \frac{\beta}{S} - \frac{\alpha}{S} < 0$), the LHS is negative and the condition is automatically satisfied. In this case, RERA leads to a lower equilibrium price.

(2) Comparison of N^*_{after} and N^*_{before}

To compare the number of firmsbefore and after RERA, we first examine the nominator of N^*. The nominator is $c_1 * (a - \frac{P^*}{\theta})$ in both periods. Since $P^*_{after} < P^*_{before}$, the nominator after RERA is alrger than before.

Next, we examine the denominator. Define

$$E_1 = \sqrt{2Fc_1} \tag{C18}$$

$$E_2 = \frac{1}{2} * \sqrt{2c_1(F - \bar{q}\frac{\beta}{S})} + c_1\bar{q}$$

Using a first-order Taylor approximation for small B (i.e., when $B << A$) with $A = 2c_1F$ and $B = 2c_1\bar{q}\frac{\beta}{S}$, we have $\sqrt{A-B} \approx \sqrt{A} - \frac{B}{2\sqrt{A}}$, which implies that

$$E_2 \approx \frac{1}{2}(\sqrt{2c_1F} - \frac{c_1\bar{q}\frac{\beta}{S}}{\sqrt{2c_1F}} + c_1\bar{q}) \tag{C19}$$

Subtracting (C19) from equation (C18) yields:

$$E_1 - E_2 \approx \frac{1}{2}\sqrt{2c_1F} + \frac{1}{2}\frac{c_1\bar{q}\frac{\beta}{S}}{\sqrt{2c_1F}} - \frac{1}{2}c_1\bar{q}$$

Thus, $E_1 > E_2$ if the following condition is satisfied:

$$2F + \bar{q}\frac{\beta}{S} - \bar{q}\sqrt{2c_1F} > 0 \tag{C20}$$

In summary, $N^*_{after} > N^*_{before}$ if both conditions (C20) and (C17) are satisfied. In this case, RERA leads to a greater number of active firms and a lower equilibrium price.