Do mandatory disclosures squeeze the lemons? The case of housing markets in India*

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Abstract

Mandatory disclosure laws, which require businesses or individuals to disclose specific information to their counterparties, the government, or the public, have become an important aspect of corporate, environmental, and housing law. These regulations aim to reduce information asymmetries and enhance market efficiency. We study the effect of a law mandating disclosure of litigation status on house prices in India. Information asymmetries between developers and buyers results in over-pricing of litigated houses (lemons). We find that the introduction of the disclosure law led to a 5-6% decline in the prices of lemons relative to non-lemons. Our data on unit-level transactions, project details, and buyer characteristics let us to separate out the price effects across housing sub-markets and income groups. Our paper demonstrates that a mandatory disclosure law can have important, pro-efficiency, effects in a developing country and suggests that such laws may be efficient in a regime of low-state capacity.

Keywords: Housing, property rights, information asymmetry, mandatory disclosure laws, India

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1 Introduction

Mandatory disclosure laws have become an important aspect of corporate, environmental, public health, and housing regulation across countries (see Ben-Shahar and Schneider, 2014; Dranove and Jin, 2010; Ho et al., 2019). Governments, legislators, and courts have introduced mandatory disclosures in many sectors, thereby replacing *caveat emptor* with *caveat venditor* regimes, with the intended purpose of reducing information asymmetries between sellers and buyers. Disclosures can be of different types such as third-party certifications of quality, direct disclosures by sellers, or online disclosures.

A country's institutional context also matters in determining the need for and success of mandatory disclosures. In countries with weak rule of law and poor state capacity for regulation and contract enforcement, markets are inundated with poor quality goods and services (see Akerlof, 1970). In this context, regulatory mechanisms requiring direct monitoring and adherence to strict quality control standards are likely to fail (Rajagopalan and Tabarrok, 2021). Hence, carefully designed disclosure laws that do not require high state capacity for enforcement, that are not costly for sellers to disclose, and that are simple to understand and easy to access are more likely to be efficiency-enhancing.

The evidence on the impact of mandatory disclosure of quality in various industries has been mixed. A few studies (Fung et al., 2007; Hino and Burke, 2021; Jin and Leslie, 2003; Johnson, 2020; Myers et al., 2022) have found a positive impact of disclosure laws while others found limited or no evidence (Ben-Shahar and Schneider, 2014; Ho et al., 2019; Werner et al., 2012).[1] The success of mandatory disclosures in addressing market failure depends on the cost to the sellers of disclosing the necessary details, the potential to manipulate the attributes being disclosed, and the ease of buyers in accessing and understanding the disclosures. Further, the impact of disclosures may vary for different groups of buyers (Ben-Shahar and Schneider, 2014; Mathios, 2000).

Housing markets are a useful and important domain to study the efficacy of disclosure laws due to high information asymmetry between buyers and sellers. In this paper, we study the impact of mandatory disclosure of the quality of multi-family residential projects on house prices in Mumbai – India's most populous city. We also study the differential impact of the disclosure law across different housing sub-markets.

Housing markets in developing countries are characterized by insecure property rights due to poor land titles and weak contract enforcement (Djankov et al., 2003). Across Indian cities, insecure property rights lead to disputes over the right to build. Litigation in the real estate sector is common; 30% of the new real estate projects in Mumbai are embroiled in legal disputes (Gandhi et al., 2021).[2] Litigation is a signal that a project

[1] See Loewenstein et al. (2014), Goldstein and Yang (2017) and Dranove and Jin (2010) for a review of this literature.

[2] Disputes over land titles and civil society action against developers comprise a large share of litigation. Civil society actors go to the courts via the public interest litigation (PIL) route. PIL was

may be of low quality (if disputes are due to irregularities in approvals or poor land titles). Further, litigation impedes timely completion of projects due to extremely high rates of judicial pendency[3] and increases risks of real estate projects being demolished[4] or left unfinished[5]. Thus, litigated real estate projects may be classified as lemons.[6]

Information about legal disputes and underlying issues with real estate projects is costly to acquire for prospective buyers. In 2017, the state government made it mandatory for housing developers to register their projects with a newly created regulatory authority. Developers had to disclose information about their projects, including the litigation status, to the public on the regulator's website.[7]

To study the reform's impact, we use property prices of housing units bought between 2015-2020 from the mortgage database of India's largest private sector bank. This data also provides us with details such as the area of the residential unit, the homebuyer's income, gender, among others. The housing units in this database belong to multi-family residential projects in Mumbai. We match these units to residential projects using the database of projects registered on the regulator's website. From this database, we get details about a project's litigation status, and details of amenities provided (gymnasium, swimming pool etc). We create a dummy variable taking value one for a project having litigation and zero otherwise. A project may have one or more legal disputes that began at any point before 2015 or between 2015-2020. The dummy variable switches on starting from the year of the first legal dispute. Thus, projects in our dataset had litigation before and after the reform but information about a project's litigated status was not publicly available before the reform. Our final dataset comprises 11,553 housing units in 972 real estate projects transacted between 2015-2020.

Our identification uses house purchases before and after the mandatory disclosure reform – when a project's litigation status became publicly known – to test the impact of the policy on prices of units in litigated projects.[8] Using project and year-quarter fixed

introduced in the 1970s to empower civil society to protect the interests of citizens. The scope of PIL in the real estate sector is wide and could include heritage or environmental conservation or challenging the legal validity of building permissions granted.

[3]Data by the National Judicial Data Grid of India shows that there were 42 million pending cases in the Indian courts in October 2022 and nearly 40% of these had been pending for more than two years.

[4]Two high-rise residential towers in the national capital region of Delhi, which had been under construction since mid 2000's, were demolished in August 2022, following a court order, for not adhering to planning rules. The court ruling was with respect to a PIL against the development filed by a resident welfare association (Indian Express, 2022).

[5]A luxury residential apartment tower in Mumbai, that began construction in 2007, has been left unfinished due to legal disputes (Crabtree, 2014).

[6]While litigation could result in demolition or unfinished projects only in extreme cases, even non-severe litigation affects ongoing projects since it increases completion times by on average 30% as cases are stuck in courts for long periods (Gandhi et al., 2021).

[7]To be precise, developers had to submit a valid legal land title report prepared by a lawyer and provide details of encumbrances on the land, including litigation, as well as any legal proceedings against the project. They also had to report the year in which the legal dispute began, and the court it was being heard in.

[8]We use "units in litigated projects" and "litigated units" interchangeably.

effects, we find that the reform led to a 5-6% decline in the average price per square foot of litigated units relative to non-litigated units. Our pre-trends test show that the parallel trends assumptions holds. We also check for sensitivity to violation of parallel trends and find our results to be robust.

We address potential violation of the Stable Unit Treatment Value Assumption (SUTVA) by dropping units in non-litigated real estate projects by developers who had other projects that were facing litigation. We address potential bias due to the presence of unobserved covariates (such as neighborhood-specific factors) that impact selection into litigation and prices by matching litigated and non-litigated units on distance and also by propensity score matching based on project size and luxury/non-luxury classification. Our results continue to hold for these different specifications.

We also estimate the impact of the policy separately for luxury and non-luxury sub-markets and sub-markets based on different income groups. The reform had no effect on litigated units in luxury real estate projects whereas litigated units in non-luxury projects saw the average price per square foot decline by more than 6% relative to non-litigated units. Moreover, litigated units in luxury projects had lower prices on average relative to non-litigated units in the pre-reform period. We also find that homebuyers belonging to the lowest income quartile saw the highest decline in prices of litigated units after the reform. On the other hand, there was no effect for homebuyers in the highest income quartile. Thus, the regulatory reform, by providing equal and public access to information to all buyers, reduced inequity across housing sub-markets and income class of buyers.

If the severity of litigation (and hence the likelihood of demolition, unfinished projects, or major delays in construction) systematically differs across sub-markets, then the finding of heterogeneous impact of litigation in luxury and non-luxury housing may be due to this difference in the nature of litigation rather than due to unequal access to information. To address this concern, we compare the impact of the reform on prices in the luxury and non-luxury sub-markets separately for units with severe litigation and units with less severe litigation. We find that the reform had an impact on the prices of units with severe litigation in the non-luxury sub-market but had no impact on the prices of units with severe litigation in the luxury sub-market.

Our paper contributes to a number of literature sets. It adds to the body of empirical work on the impact of mandatory disclosures. Our findings lend support to mandatory disclosures improving market outcomes in situations of weak rule of law and poor state capacity. Our paper relates to the literature that studies the distributional impact of disclosure policies. Luco (2019) studies the impact of a price disclosure law on gas price margins and price dispersion in Chile. He finds that price margins in low-income (high-income) areas that had lesser (more) search activity increased the most (least), thus leading to greater inequality. Our paper also finds heterogeneous impact across income groups but in a progressive direction.

Specific to the context of disclosure laws in the housing market, we build on a few studies examining the impact of such laws on prices (see Chau and Choy, 2011; Hino and Burke, 2021; Nanda and Ross, 2012; Troy and Romm, 2004). Finally, by showing how frictions in information flow could create distortions in urban housing markets in developing countries, we add to the growing literature that focuses on the impact of regulations and institutional frictions on housing market outcomes in developing countries (see Brueckner et al., 2017; Brueckner and Sridhar, 2012; Gandhi et al., 2022; Harari, 2020; Henderson et al., 2021; Willis et al., 1990).[9]

Section 2 provides details about the mandatory disclosure policy with respect to housing in India. Section 3 lays down the theoretical underpinnings of our paper. Section 4 describes the data sources used in this paper and section 5 discusses the empirical strategy. Section 6 presents results and section 7 shows the robustness checks. Section 8 concludes.

2 Context

2.1 Indian Housing Market

Housing markets in Indian cities have been slow to respond to growing demand due to binding urban land regulations (see Annez et al., 2010; Brueckner and Sridhar, 2012; Sridhar, 2010). Complex and lengthy regulatory processes result in long project completion times and delays (Gandhi et al., 2021). Given the binding land use regulations, developers flout rules or get discretionary permissions from the local body for building above the restrictions (see Rajack et al., 2013; Sukhtankar and Vaishnav, 2015). This potentially opens them up to litigation. Weak property rights and contract enforcement also increase risks of legal disputes (see Gandhi et al., 2022). Since sales of units begin while the project is still under construction (these are called pre-sales), litigation that could potentially stall or delay construction increases the risk for buyers. For completed projects where buyers can move in, litigation could affect the value of their homes.

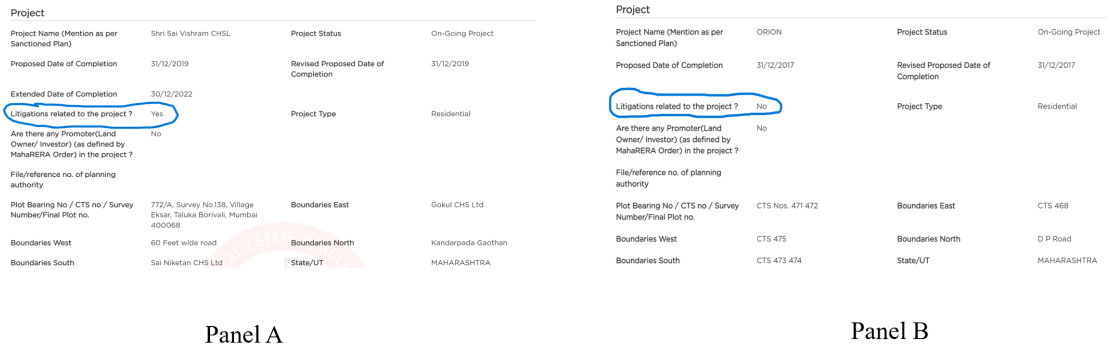
The nature of litigation is wide in scope. Besides legal disputes around land titles, public interest litigation in the real estate sector involving civil society groups has been on the rise. Resident welfare associations have filed cases against new developments in order to preserve heritage precincts.[10] Activists have challenged the legal validity of additional building permissions granted to developers.[11]

[9]By focusing on information asymmetry in the urban housing market in India, we also add to the literature on how information frictions affect markets in various contexts in developing countries like trade outcomes in Philippines (Allen, 2014), the fertilizer market in Tanzania (Michelson et al., 2021), agricultural markets in India (Goyal, 2010), among others.

[10]See for example, Normandie Cooperative Housing Society Limited Ors vs State of Maharashtra (PIL number 48 of 2016 in the Bombay High Court).

[11]See for example Mr. Nitesh Mohanlal Doshi vs The State of Maharashtra Ors (PIL number 6 of

Figure 1: **Disclosure on RERA website**



Project

Project Name (Mention as per Sanctioned Plan)	Shri Sai Vishram CHSL	Project Status	On-Going Project
Proposed Date of Completion	31/12/2019	Revised Proposed Date of Completion	31/12/2019
Extended Date of Completion	30/12/2022		
Litigations related to the project ?	Yes	Project Type	Residential
Are there any Promoter(Land Owner/ Investor) (as defined by MahaRERA Order) in the project ?	No		
File/reference no. of planning authority			
Plot Bearing No / CTS no / Survey Number/Final Plot no.	772/A, Survey No.138, Village Eksar, Taluka Borivali, Mumbai 400068	Boundaries East	Gokul CHS Ltd
Boundaries West	60 Feet wide road	Boundaries North	Kandarpada Gaothan
Boundaries South	Sai Niketan CHS Ltd	State/UT	MAHARASHTRA

Panel A

Project

Project Name (Mention as per Sanctioned Plan)	ORION	Project Status	On-Going Project
Proposed Date of Completion	31/12/2017	Revised Proposed Date of Completion	31/12/2017
Litigations related to the project ?	No	Project Type	Residential
Are there any Promoter(Land Owner/ Investor) (as defined by MahaRERA Order) in the project ?	No		
File/reference no. of planning authority			
Plot Bearing No / CTS no / Survey Number/Final Plot no.	CTS Nos. 471 472	Boundaries East	CTS 468
Boundaries West	CTS 475	Boundaries North	D P Road
Boundaries South	CTS 473 474	State/UT	MAHARASHTRA

Panel B

Note: The figure shows two projects on the Maharashtra RERA website. Panel A is an example of a project with litigation and Panel B an example of a project without litigation.

2.2 Policy Reform

In recent years, states in India have enacted laws to regulate real estate developers and protect the interests of homebuyers. The Real Estate (Regulation And Development) Act, 2016 was a federal law requiring all states to frame rules for regulating real estate development and setting up a real estate regulatory authority. The state of Maharashtra was among the first states to set up a Real Estate Regulatory Authority (RERA). The state rules required developers to register their ongoing projects with the authority.[12] Each project would then get a unique registration number which had to be displayed on any advertisements and promotional materials of the project (Economic Times, 2017). In addition, at the time of registration, developers were required by law to provide project-specific details through an online portal set up by the authority. The list of registered projects and their details were made available on a public website. The details include the location, size and type of project, regulatory permissions received, estimated completion times, details of any legal disputes, and developer details and past experience (see figure 1).[13] The rules under the Act came into effect on 1st May 2017. The website and registration portal went live on the same day. By July 2017, more than 13,000 projects across the state of Maharashtra were registered on the website. The figure rose to 14,400 projects by December 2017. Thus, the Act led to the creation of a public website where potential homebuyers could easily find crucial information like the estimated completion time and litigation status of real estate projects.

Of the 14,400 new projects, around 20% were in Mumbai. Mumbai had the largest share of projects under litigation at 30%. The projects under litigation account for more

2016 in the Bombay High Court).

[12]The law mandates that all projects having more than eight apartments or with a land area exceeding five hundred square meters should register with the real estate authority. In major cities like Mumbai, this entails near universal coverage of all upcoming real estate development.

[13]Heavy penalties charged to developers found to be providing incorrect information about their projects safeguards against misreporting.

than 40% of the total built-up area that is being constructed in Mumbai.

3 Theoretical underpinnings

Housing markets in developing countries are informationally imperfect (see Chau and Choy, 2011; Nanda, 2019; Nanda and Ross, 2012). Information sets of buyers and sellers differ significantly, with the sellers having better information about the quality of housing units. As a result, buyers face uncertainty regarding the quality of an asset. Further, in the case of new real estate projects, pre-sales are common around the world. Information asymmetry can play out more prominently in pre-sales as there are uncertainties around the timing of delivery and quality of units. Moreover, in pre-sales, developers have the ability to control information in order to increase sales completions. This raises the typical case for a market for lemons.

Information asymmetry in the housing market often leads to a pooling equilibrium where both lemon and non-lemon housing units are transacted and cannot be distinguished by the buyers. Here, lemons are sold at prices that are greater than their underlying value and developers selling lemons capture the difference between the equilibrium price and true value of lemons. A mandatory disclosure can dissipate information asymmetry and transform a pooling equilibrium into a separating one, where either only non-lemons are transacted or where both types are transacted with a clear distinction in terms of quality and price.[14]

Suppose, i denotes a non-lemon housing unit, j denotes lemons, t is the timing of enacting a mandatory disclosure law with $t+k$ being the post-disclosure period and t-k being the pre-disclosure period. In the pre-disclosure period in t-k, price of a non-lemon housing unit is P_i^{t-k} and for a lemon, it is P_j^{t-k}. Similarly, in the post-disclosure period in $t+k$, price of a non-lemon housing unit is P_i^{t+k} and for a lemon, it is P_j^{t+k}. Under a pooling equilibrium in the pre-disclosure period, as both types are not readily distinguishable, P_j^{t-k} - $P_i^{t-k} = 0$. We expect that in the post-disclosure period, the price of non-lemons will reflect a greater level of confidence in quality and willingness to pay compared to that in the pre-disclosure period i.e. $P_i^{t+k} > P_i^{t-k}$. Similarly, exposure as lemons will lead to lower willingness to pay i.e. $P_j^{t+k} < P_j^{t-k}$, which would entail P_j^{t+k} - $P_i^{t+k} < 0$. Thus, the difference between prices of lemons and non-lemons in the pre- and post- disclosure periods will be negative i.e. $[P_j^{t+k}$ - $P_i^{t+k}]$ - $[P_j^{t-k}$ - $P_i^{t-k}] < 0$.

However, there could be some heterogeneity in prices of lemons and non-lemons in the pre- and post-disclosure periods. In the absence of mandatory or public disclosures,

[14] In a typical market for lemons, there is adverse selection which drives out higher-quality products unless there are public or private counteracting institutions such as branding or regulation (see Akerlof, 1970). Because housing is a highly heterogeneous commodity whose value is determined by a bundle of attributes, we may see both lemons and non-lemons being sold with litigation as an additional attribute in the price function in the post-disclosure period.

buyers need to incur costs for acquiring private information. The degree of information asymmetry is likely to have a strong positive association with transaction costs. These transaction costs are monetary (costs for hiring intermediaries such as brokers, solicitors, surveyors) and non-monetary (time spent in gathering information or acquiring knowledge of the market) in nature. Low-income households may lack the resources to incur these transaction costs. Hence, in a market with acute information asymmetry, high-income buyers may be able to alleviate information asymmetry more effectively than low-income buyers. Hence, for a high-income buyer H, there could be a difference in prices between lemons and non-lemons in the pre-disclosure period i.e. P_{jH}^{t-k} - $P_{iH}^{t-k} < 0$ but not for a low-income buyer L i.e. P_{jL}^{t-k} - $P_{iL}^{t-k} = 0$. As a result, when information about housing quality is not publicly available we may observe a high level of heterogeneity in terms of prices of low-quality housing. However, the literature on this is somewhat ambivalent (see Turnbull and Sirmans, 1993).

In the following sections, we test whether the mandatory disclosure policy led to a lower willingness to pay for the lemons (and higher willingness to pay for non-lemons) and if the policy had a differential impact across sub-markets and income groups.

4 Data

To examine how the reform affected prices of houses with litigation, we use two data sets – a housing unit-level mortgage dataset and a database of ongoing residential real estate projects.

4.1 Mortgage data

We use housing unit transactions reported in a proprietary database by one of India's largest private mortgage lenders. The data was provided to us in 2021. We use data from 2015 to 2020 for the city of Mumbai.

The data contains details on mortgage applications approved by the bank, which includes the price and area of the unit being purchased by the applicant. Using both, we calculate the price per square foot.[15] We convert the price per square foot from nominal to real terms using the Maharashtra urban consumer price index. The log transformation of real price per square foot of the housing unit is the outcome variable of interest. The dataset includes other details like postcode of the unit, loan approval date, loan amount sanctioned, and age, occupation, gender and income of the homebuyer. We use these variables as controls. All units in the dataset are apartments in multi-family residential

[15]Given the high prevalence of under-reporting property values in sales agreements in India to evade taxes and fees, valuations reported in mortgage datasets are more likely to be closer to the true value of the property(Anagol et al., 2022).

projects and the data includes the unique registration number allotted by the Real Estate Regulatory Authority to all ongoing real estate projects in the city.

There could be a selection issue in this dataset if banks were able to verify whether a property being purchased by an applicant faced litigation and rejected applications involving the purchase of litigated properties. This could change the composition of litigated and non-litigated units in our sample, especially after the disclosure reform which made it easier for banks to verify the litigation status of a property. To know more about the approval process and ascertain whether the litigation status is verified before approving a loan application, we sought information about the loan approval process from the bank. The process involves assessing a loan applicant's eligibility based on criteria such as income and employment status, verifying property-related documents such as the sale agreement with the developer and the building permissions given to the property (if it is under construction), and conducting a physical inspection of the property. However, the litigation status of a property is not explicitly checked.

4.2 Real estate projects data

Our second dataset comprises all ongoing real estate projects in Mumbai that were registered with the Real Estate Regulatory Authority after its creation in May 2017. Each registered project is assigned a unique registration number by the authority. These projects had begun at different points in time, including in the years prior to and after the introduction of RERA, and were still under construction when the regulatory reform came into effect. Developers provide a range of information about the registered projects on a public website (see figure A.1). We scraped the website to compile a dataset of about 3,000 under-construction real estate projects in Mumbai.

The dataset includes attributes such as the size of the project, amenities provided in the project, start date and estimated completion dates of the project, litigation status, and details of the developers. We also found geocoordinates for around 2,600 projects through a name search of each project on popular property search portals which provided their location on google maps.

4.3 Construction of dataset and key variables

We were able to match 11,553 units bought between 2015-2020 from the mortgage dataset to 972 real estate projects from the real estate project dataset using the unique registration number reported in the two datasets. This is the sample used in our analysis. Appendix table A.1 provides detailed description for each variable and the data source. Around 25% of these units were bought before the introduction of RERA and 75% were bought in the post-RERA period.

We check if the sample of 972 matched projects is representative of the population of 3,000 projects in terms of observed attributes like size, litigation status, and developer experience. For this, we use a t-test of differences in means of these attributes for projects in our sample and projects that are not within our sample. The mean share of projects built by developers with prior experience is slightly higher in our sample.[16] However, there is no difference between the two groups in terms of the average share of projects with litigation and average project size.

Litigation status

The real estate project dataset reports the following details with respect to litigation: whether there is any litigation related to the project, the year of the litigation, and the court in which the dispute is being heard. Appendix figure A.1 shows the litigation details available on the website. These were self-reported by developers at the time of registering their project with the regulatory authority and include details of legal disputes that may have occurred before the reform. The litigation details are updated by developers periodically. Thus, if a project did not have litigation in 2017 but had a dispute at some point later, the litigation status is updated from "No" to "Yes" with details of the litigation (including the year of the litigation) uploaded on the project webpage. Hence, our dataset has projects with litigation that began before and after the disclosure reform in 2017.

We create a litigation dummy that is assigned a value 1 for projects that are involved in litigation, and 0 for projects that have no litigation. 30% of all projects in the real estate dataset face litigation and 48% of all units in our sample belong to projects facing litigation. If the litigation began between 2015-2020, the unit switches from being non-litigated to litigated – that is the litigation dummy switches from 0 to 1 – starting from the year of the dispute. For units in projects where the litigation began before 2015, the litigation dummy is 1 throughout. Of the 5,561 litigated units, 1,424 units were in projects where the dispute began between 2015-2020 and the remaining were in projects where the dispute began before 2015. In cases where projects were under litigation since before 2015, some units were sold in the pre-disclosure period and some units were sold in the post-disclosure period when information about litigation status of a project became freely and publicly available. In the pre-disclosure period, potential homeowners may not have been easily able to determine if a project faced litigation. Getting this information involved incurring substantial transactions costs and expending time and resources. If buyers or lenders were able to identify and hence avoid units facing litigation due to the disclosure, then we would see a fall in the share of litigated units in our dataset in the post-reform period. Moreoever, if sellers anticipated the reform and timed the sale of litigated units right before its introudction, the share of litigated units in our dataset would be much higher in the period before the reform. In our sample, the share of

[16] The difference in means is 1% and is statistically significant at 5%.

litigated units sold in the pre-reform period is 45% and the share of litigated units sold in the post-reform period is 49% (see appendix figure A.3). The average share of litigated units sold in the last quarter before the reform is 51% and the average share of litigated units sold in the quarter after the reform is 53%. Hence, the composition of litigated and non-litigated units in our sample is similar across the pre- and post-reform periods.

Projects could have undergone a change in litigation status over time in terms of new legal disputes or cases getting resolved. Further, projects can have one or many legal disputes across different years. For units in projects with more than one legal cases, the litigation dummy switches to 1 starting from the year of the first case.

Table 1 provides summary statistics of the outcome variable and covariates for litigated and non-litigated units. The mean price per square foot is higher for litigated units compared to non-litigated units. The mean loan-to-value ratio is similar for litigated and non-litigated units, implying that on average lenders do not attribute a greater risk for litigated units.[17]

As seen in appendix figure A.1, we have information on the type of court in which the dispute is being heard. The Indian judiciary is made up of the Supreme Court of India at the apex and a high court for every state. These upper courts hear appeals of cases filed in lower courts. In addition, cases can directly be taken to the Bombay High Court if they are above a monetary value of INR 10 million. Thus, we consider cases that are in these upper courts (that is, the Bombay High Court and the Supreme Court of India) to be more severe. Projects can have multiple legal disputes in multiple courts. Accordingly, projects with at least one case being heard in the upper court are considered to be affected by severe litigation[18] and projects where all cases are in the lower court are considered to be affected by less severe litigation. Of the total units affected by litigation, 68.6% had cases in the upper courts, that is, were affected by severe litigation.

There could be a further selection issue due to a switch from units facing more severe litigation being sold in the pre-reform period to units facing less severe litigation being sold in the post-reform period. We do not see a significant change in the severity of litigation in the post-reform period. In appendix figure A.3, we see that the share of units facing severe litigation sold in the pre-reform period was 31.8%, which rose slightly to 33.4% in the post-reform period.

Identifying sub-markets

[17]Comparing across sub-markets, the loan-to-value ratio is lower for litigated units in luxury projects. A t-test comparing the mean loan-to-value ratio across litigated and non-litigated units in luxury projects confirms that the means are statistically different for the two groups. On the other hand, there is no difference in the mean loan-to-value ratios between litigated and non-litigated units in high-priced sub-markets when sub-markets are classified using homeowners' incomes. Thus, it is difficult to say whether lenders systematically discriminate between litigated and non-litigated units by lowering their risk in case of lending to purchase litigated units in the high-income or luxury housing sub-market.

[18]For instance, if a project has two cases with one case in an upper court and one case in a lower court, it is classified as being affected by severe litigation. If a project has two cases and both are in a lower court, it is classified as being affected by less severe litigation.

Table 1: **Summary statistics**

Variables	ALL		Litigated units		Non-litigated units	
Panel A: Variables used in baseline						
	Mean	Std dev	Mean	Std dev	Mean	Std dev
Unit price per sq. ft. (INR)	14903	6475	15894	6456	13984	6356
Log of price per sq. ft.	9.54	0.38	9.61	0.36	9.47	0.39
Unit area (sq. ft.)	796	528	872	542	726	505
Unit completion (Dummy)	0.48	0.50	0.50	0.50	0.46	0.50
Buyer's annual income (INR million)	3.06	10.90	3.78	13.67	2.40	7.41
Loan to value ratio	0.60	0.20	0.60	0.20	0.60	0.20
Buyer's gender (Female =1)	0.18	0.39	0.17	0.37	0.20	0.40
Obs	11,553		5,561		5,992	
Panel B: Luxury and non-luxury projects						
	Mean	Std dev	Mean	Std dev	Mean	Std dev
Luxury projects						
Log of price per sq. ft.	9.59	0.3	9.66	0.32	9.49	0.33
Unit area (sq. ft.)	831	624	880	505	756	768
Buyer's annual income (INR million)	3.29	8.92	3.87	11.00	2.38	3.68
Loan to value ratio	0.60	0.20	0.59	0.20	0.62	0.20
Obs	3,427		2,090		1,337	
Non-luxury projects						
Log of price per sq. ft.	9.51	0.4	9.58	0.38	9.46	0.41
Unit area (sq. ft.)	782	482	867	564	719	399
Buyer's annual income (INR million)	2.97	11.65	3.72	15.07	2.42	8.18
Loan to value ratio	0.60	0.20	0.60	0.20	0.59	0.20
Obs	8,104		3,465		4,639	
Panel C: Homeowner income						
	Mean	Std dev	Mean	Std dev	Mean	Std dev
Income Quartile 1 (= Poorest)						
Log of price per sq. ft.	9.26	0.33	9.3	0.3	9.2	0.3
Unit area (sq. ft.)	544	288	559	311	535	272
Buyer's annual income (INR million)	0.58	0.17	0.59	0.17	0.57	0.17
Loan to value ratio	0.53	0.22	0.51	0.22	0.54	0.21
Income Quartile 2						
Log of price per sq. ft.	9.44	0.29	9.49	0.27	9.40	0.31
Unit area (sq. ft.)	662	308	674	248	652	347
Buyer's annual income (INR million)	1.21	0.22	1.22	0.22	1.19	0.22
Loan to value ratio	0.61	0.20	0.60	0.20	0.62	0.20
Income Quartile 3						
Log of price per sq. ft.	9.60	0.29	9.62	0.27	9.57	0.30
Unit area (sq. ft.)	816	316	846	332	784	295
Buyer's annual income (INR million)	2.30	0.44	2.31	0.44	2.28	0.44
Loan to value ratio	0.62	0.19	0.62	0.19	0.63	0.19
Income Quartile 4 (= Richest)						
Log of price per sq. ft.	9.85	0.35	9.87	0.34	9.83	0.37
Unit area (sq. ft.)	1171	788	1238	725	1071	865
Buyer's annual income (INR million)	8.26	21.04	8.96	23.81	7.22	15.98
Loan to value ratio	0.63	0.19	0.63	0.19	0.63	0.19

Note: Data spans years 2015 to 2020. Unit price and buyer's income are in real terms. Loan to value ratio is the ratio of the total loan amount and the value of the property. Property completion is a dummy variable with units under construction at the time of the loan application being assigned value 0, and completed units being assigned value 1. Some units get dropped when categorising projects as luxury or non-luxury as not all projects have data on amenities. For data sources see table A.1.

The data with the real estate authority contained detailed information about the different types of amenities provided in the project. These amenities include standard amenities like basement, podium, elevator, terrace, compound wall and so forth, and additional amenities (such as swimming pool or gymnasium). This allows us to distinguish between luxury projects and non-luxury projects. We classify projects as non-luxury if they only have amenities that are available in a typical real estate project (such as elevator or terrace) and luxury if they have amenities like swimming pools, gymnasiums, club houses

etc. Panel B in Table 1 provides unit prices and litigation status by luxury and non-luxury projects. Log prices of units in luxury projects are higher than those in non-luxury projects. Panel C in Table 1 provides unit prices by homeowner income quartiles, which are also used as a way to classify housing sub-markets.

5 Empirical Strategy

Our identification for testing the impact of the policy relies on using data on transactions before (when buyers had no public information on the unit's litigation status) and after the policy shock (when a unit's litigation status became publicly known). Using a two-way fixed effects regression we look at whether the difference in mean log of prices between litigated and non-litigated units changed post reform. We use the following specification to estimate the impact of the reform:

$$ln\ Price_{ijt} = \rho\ \text{Litigation}_{ijt} + \mu\ \text{Post} + \beta\ \mathbf{1}(\text{Litigation=1}) \times 1(\text{Post}) + \mathbb{X}_i + \delta_j + \lambda_t + \epsilon_{ijt} \quad (1)$$

where $ln\ Price_{ijt}$ is the log of price per square foot of housing unit i in real estate project j in year-quarter t in real terms. $Litigation_{ijt}$ is a dummy variable taking value 1 if unit i within project j in time t is litigated and 0 otherwise. *Post* is a dummy variable taking value 1 for all time periods after the introduction of RERA (in May 2017) and 0 for all time periods before. δ_j are project fixed effects that control for time-invariant project specific characteristics. $\mathbb{X}_i$ is a vector of unit and buyer characteristics. We include year-quarter fixed effects (λ_t) to control for factors varying across time periods that affected all units. ϵ_{ijt} is the error term and is clustered at the project level. We assume that the error term is not correlated with the interaction term of interest. [19]

The coefficient ρ estimates the impact of litigation on prices in the pre-reform period. If buyers have no information about the unit's litigation status in this period, ρ will not be statistically significantly different from zero. As discussed in section 3, we expect our coefficient of interest – β – to be negative. To control for time-varying changes within a postcode that could impact prices, we add a postcode-specific time-trend to eq. (1).

There could be potential measurement errors due to lack of information on the date, month, or quarter in which the litigation started. Our litigation dummy is assigned value one starting from the year of the first legal case. Our transaction prices are for each

[19] On 8th November, 2016, the Indian government demonetised INR 500 and 1000 currency notes in order to tackle tax evasion (see Lahiri, 2020). According to the Economic Division, Ministry of Finance (2017, p.66), "[D]emonetisation could have particularly profound impact on the real estate sector. In the past, much of the black money accumulated was ultimately used to evade taxes on property sales." Year-quarter fixed effects would control for possible impact of demonetisation on the real estate sector as a whole.

year-quarter. Hence, errors could arise if non-litigated units (bought at a time when the project did not have litigation) are classified as litigated. This measurement error could potentially create a downward bias in the absolute value of our estimated coefficient of interest.

We augment eq. (1) for every six-month period between 2015-2020 to test for parallel trends. For this we interacted *Litigation* × *Post* with each half-year period as shown in eq. (2) and plotted the coefficients.

$$ln\ Price_{ijt} = \rho\ \text{Litigation}_{ijy} + \mu\ \text{Post} + \sum_{t=2015h_1}^{2020h_2} (\beta_i\ \mathbf{1}(\text{Litigation=1}) \times 1(\text{Post})) + \mathbb{X}_i + \delta_j + \lambda_t + \epsilon_{ijt} \quad (2)$$

Finally, to examine the heterogeneous impact of RERA on litigated projects in different sub-markets we estimate eq. (1) separately for sub-markets. Based on the types of amenities provided by developers, we classify projects as luxury and non-luxury projects. We also plot coefficients for every half-year period before and after the reform separately for each sub-market.

To see whether there is a differential impact of the disclosure policy across income groups we augment eq. (1) and interact *Litigation* × *Post* with income quartiles. Based on our discussion in section 3, our hypothesis is that post mandatory disclosure, β will be highest (in absolute terms) for the lowest income quartile.

6 Results

6.1 Baseline results

Table 2 reports coefficient estimates for eq. (1). We find that the log of price per square foot of litigated units declined relative to non-litigated units after the reform.[20] The coefficient is -0.044 without controls (column 1) and -0.046 when including buyer and unit controls (column 2). After controlling for postcode-level time-trend, the estimated coefficient is -0.059 (column 3). The coefficient is significant in all specifications. In other words, mean per square foot price of litigated units was around 4 - 6% less than that of

[20]There is a growing literature highlighting considerable weaknesses in two-way fixed effects estimations in the presence of heterogeneous treatment timing and multiple time periods (Callaway and Sant'Anna, 2021; De Chaisemartin and d'Haultfoeuille, 2020; Goodman-Bacon, 2021; Roth et al., 2022). In our case, while projects face litigation in different years, the two time periods (pre- and post- reform) apply uniformly to all projects. In the pre-reform period, we compare litigated units for every time period with not-yet litigated (units that did not have litigation in that period but subsequently had litigation) and never-litigated units (units that never face litigation) in that time period and assume no difference in average prices between the two groups. Post May 2017, all units are uniformly exposed to the mandatory disclosure reform at the same time.

Table 2: **Effect of disclosure policy on log prices**

VARIABLES	(1)	(2)	(3)
	Dep var: log of price per sq ft		
Litigation	-0.025	-0.021	-0.028
	(0.034)	(0.032)	(0.037)
Post (RERA Introduction = 1)	-0.006	-0.012	-0.010
	(0.021)	(0.021)	(0.021)
Litigation x Post	-0.044**	-0.046**	-0.059***
	(0.020)	(0.019)	(0.018)
Constant	9.427***	9.410***	9.771***
	(0.020)	(0.026)	(0.049)
Observations	11,553	11,553	11,553
R-squared	0.724	0.754	0.776
Year x quarter FE	Yes	Yes	Yes
Project FE	Yes	Yes	Yes
Property controls	No	Yes	Yes
Buyer controls	No	Yes	Yes
Year x Post code	No	No	Yes

Note: Standard errors clustered at project level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the results of the introduction of RERA on price of litigated units. The dependent variable is the log of price per square foot in real terms. Column (1) reports coefficients with project and year-quarter fixed effects. Column (2) reports coefficients with project and year-quarter fixed effects, unit controls, which are completion status and area in square feet, and buyer controls - which include income, occupation, gender, and loan to value for the transaction. Column (3) reports coefficients with project and year-quarter fixed effects, unit controls, buyer controls and Year x Postcode trend.

non-litigated units post the reform.[21] The coefficient for litigation is not statistically significant, implying that buyers did not have information about a project's litigation status before 2017. Among the control variables, the coefficient for loan-to-value is positive and significant and the coefficient for unit area is negative and significant at the 1% level; for the latter the effect size is almost close to 0.[22,23]

In Figure 2, we show the estimated effect on price per square foot for each half-year period before and after the reform.[24] Prior to the reform, we fail to see a difference in the prices of litigated and non-litigated units. In the post-reform period, the estimated coefficient is negative and statistically significantly different from zero for most periods. Our pre-trends test provides suggestive evidence that the parallel trends assumption is

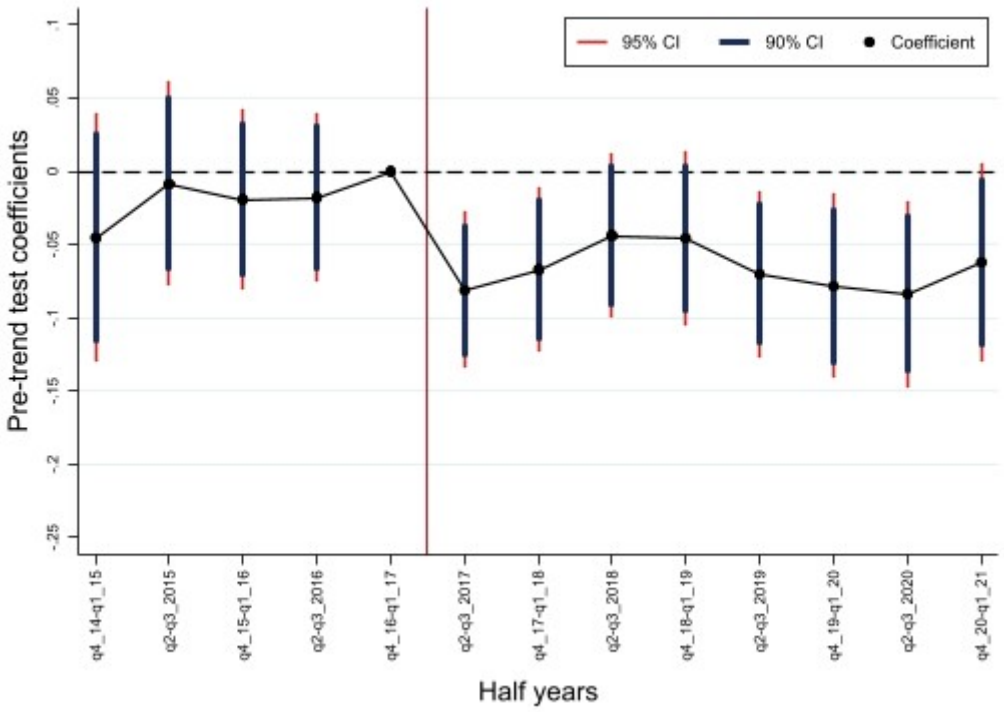
[21] Appendix figure A.2, which plots the conditional means of log of price per square foot for litigated and non-litigated units across years, shows that prices of litigated units fell while prices of non-litigated units rose after the reform.

[22] The results do not change if we drop the loan-to-value variable in the regression.

[23] Appendix figure A.4 shows the permutation test, where 1000 permutations of the baseline regression were run with projects being assigned as having litigation at random. The figure shows the distribution of the coefficients obtained in the permutations. The vertical line represents the coefficient estimate from column (2) in table 2. We find a small probability (p-value=0.01) of getting our result if we were to permute the litigated status at random.

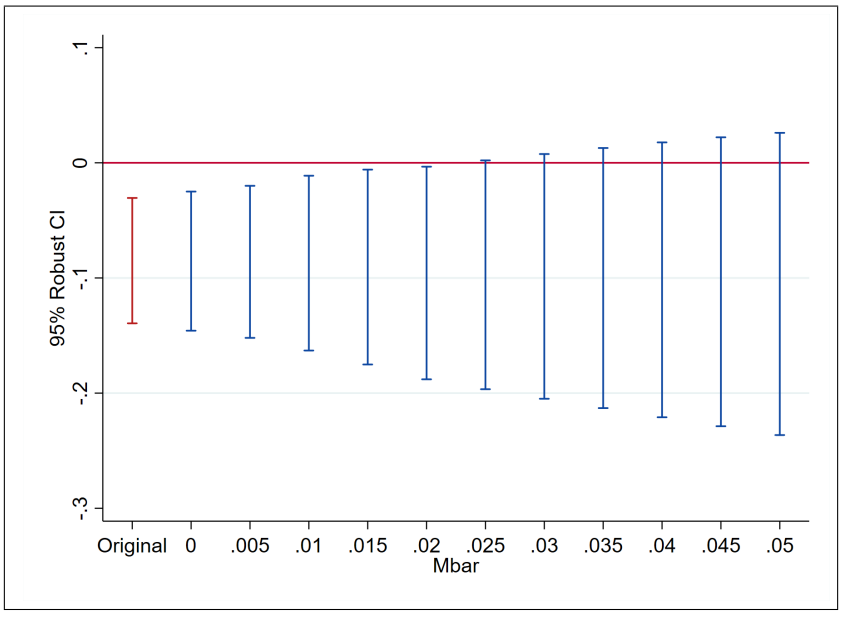
[24] The figure shows each coefficient for half-year periods before and after the mandatory disclosure policy. The two extreme half-years do not have data for quarters Q4-2014 and Q1-2021.

Figure 2: **Effect of disclosure policy on property prices bi-annually**



Note: The figure plots coefficients for each half-year period estimated by running eq. (2). The maroon vertical line represents the last pre-reform period before RERA.

Figure 3: **Sensitivity to Non-Parallel Trends**



Note: We make use of real estate projects that had transactions every year from 2015-2020. The maroon vertical line plots the confidence interval associated with the coefficient estimated in the first post-reform period.

not violated.

We employ methods introduced by Rambachan and Roth (2023) to test the sensitivity of our baseline estimate to the presence of alternate parallel trends assumptions. These methods involve estimating bounds within which the causal effect would still hold even if the parallel trends assumption was violated. In Figure 3, we show the breakdown value of Mbar, that is, the value of Mbar beyond which we would be unable to reject a null effect. In other words, for the result in the first time period after treatment to hold, the slope of the differential trend should be no higher than 0.02 percentage points across consecutive periods.

Prior to the reform, the average per square foot price of a litigated unit was Rs.16,630. Using our preferred estimate of 5%, the reform led to a fall in the per square foot price of such units by approximately Rs.832. The mean size of litigated units sold after the reform is 939 square feet. Hence, the price of a litigated unit of average size fell by approximately Rs.781,200 after the reform.

6.2 Results by type of sub-market

The results in Table 3 show estimated coefficients for different housing sub-markets. For non-luxury projects (columns 1-2), the reform led to a decline in average prices of litigated units by around 5%.

We see no impact of the reform on prices in luxury housing projects (columns 3-4). Interestingly, we find that the coefficient for the litigation dummy, represented as ρ in eq. (1), is negative and significant; litigated units in the pre-reform period had approximately 10% lower price on average relative to non-litigated units. This is not the case for units in non-luxury projects; the litigation dummy is positive but not significant in the pre-reform period for non-luxury projects.

In Figure 4, we show the coefficients for $Litigation \times Post$ for each half-year period before and after the introduction of RERA for both luxury and non-luxury projects. The coefficient in the post-reform periods is positive and significant for some periods for non-luxury housing projects.

Testing for the sensitivity of this result to a possible violation in the parallel trends assumption, we see in Appendix figure A.3 that the slope of the differential trend should be no higher than 0.01 percentage points across consecutive periods for our result with respect to non-luxury housing to hold.

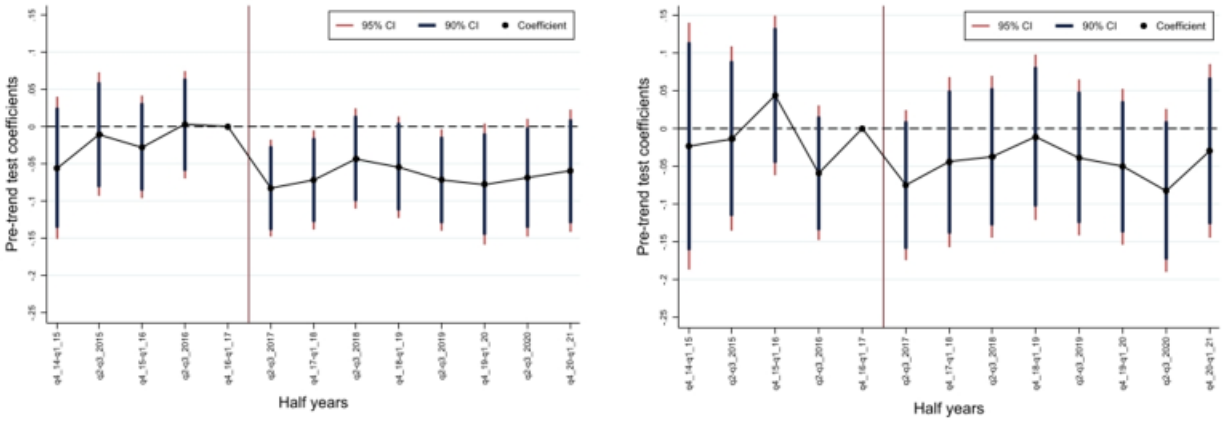
There are two possible reasons why the reform seems to have no effect on prices for litigated units in luxury projects. First, before buying a unit in a luxury project, buyers, likely belonging to high-income groups, would have the means to gather information about any legal disputes the project may be involved in. Another channel of information on luxury projects is through greater media coverage. Disputes or issues facing prominent

Table 3: **Effect of disclosure policy on property prices by sub-markets**

VARIABLES	(1)	(2)	(3)	(4)
	Dep var: log of price per sq ft			
	Non-luxury projects		Luxury projects	
Litigation	0.016	0.013	-0.107***	-0.093***
	(0.038)	(0.036)	(0.031)	(0.032)
Post (RERA Introduction = 1)	0.001	0.003	-0.030	-0.046
	(0.025)	(0.024)	(0.040)	(0.041)
Litigation x Post	-0.053**	-0.049**	-0.022	-0.026
	(0.023)	(0.022)	(0.039)	(0.037)
Constant	9.418***	9.439***	9.903***	9.861***
	(0.023)	(0.033)	(0.046)	(0.051)
Observations	8,104	8,104	3,427	3,427
R-squared	0.731	0.763	0.695	0.730
Year x quarter FE	Yes	Yes	Yes	Yes
Project FE	Yes	Yes	Yes	Yes
Property controls	No	Yes	No	Yes
Buyer controls	No	Yes	No	Yes

Note: Standard errors clustered at project level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the impact of RERA on price of litigated units by type of project. The dependent variable is the log of price per square foot in real terms. Columns (1) and (2) show the impact for non-luxury projects (classified based on types of amenities provided) and columns (3) and (4) show the impact for luxury projects. Columns (1) and (3) report coefficients with real estate project and year-quarter fixed effects and no controls. Columns (2) and (4) report coefficients with real estate project and year-quarter fixed effects, unit controls like completion status and area in square feet, and buyer controls - which include income, occupation, gender, and loan to value for the transaction.

Figure 4: **Effect of disclosure policy on property prices by project type**



a. Non luxury projects

b. Luxury projects

Note: The figure plots coefficients for each half-year period before and after the introduction of RERA estimated by running eq. (2). The maroon vertical line represents the last pre-reform period before RERA.

luxury real estate projects are more likely to be covered by news media, thus helping disseminate crucial information to potential buyers. The finding that litigated units in the pre-reform period have lower prices on average in the luxury sub-market seems to suggest both these channels may exist.

Table 4: **Heterogeneous effect by homeowner income**

VARIABLES	(1)	(2)	(3)
	Dep var: log of price per sq ft		
Litigation x Post			
x Income Q1 (poorest)	-0.109***	-0.087***	-0.107***
	(0.022)	(0.022)	(0.021)
x Income Q2	-0.048**	-0.053**	-0.069***
	(0.022)	(0.021)	(0.020)
x Income Q3	-0.040*	-0.050**	-0.062***
	(0.023)	(0.021)	(0.020)
x Income Q4 (richest)	-0.008	-0.011	-0.019
	(0.022)	(0.020)	(0.019)
Constant	9.430***	9.421***	9.404***
	(0.020)	(0.027)	(0.034)
Observations	11,553	11,553	11,553
R-squared	0.726	0.755	0.777
Year x quarter FE	Yes	Yes	Yes
Project FE	Yes	Yes	Yes
Property controls	No	Yes	Yes
Buyer controls	No	Yes	Yes
Year x Post code	No	No	Yes

Note: Standard errors clustered at project level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the results of the introduction of RERA on price of litigated units for each income quartile of the homebuyer. The dependent variable is the log of price per square foot in real terms. Column (1) reports coefficients with real estate project and year-quarter fixed effects and without any controls. Column (2) reports coefficients with real estate project and quarter-year fixed effects, unit controls, which are completion status and area in square feet, and buyer controls - which include occupation, gender, and loan to value for the transaction. Column (3) reports coefficients with real estate project and year-quarter fixed effects, unit controls, buyer controls and Year x Postcode trend.

6.3 Heterogeneous effects of homeowner income

We can expect the impact of RERA on prices of litigated units to differ based on the income strata of buyers. The rationale is similar to the one that explains why there may be a heterogeneous impact of disclosure on prices across luxury and non-luxury projects. Low-income homebuyers may lack the means to access information about the quality of the housing project before such information became publicly available due to RERA.

Our results, shown in table 4 and appendix figure A.5, confirm that such heterogeneity exists. We report the effect of RERA on prices of litigated units for each income quartile group of homebuyers without unit and buyer controls in column (1). Column (2) shows the estimates after including the controls and column (3) additionally includes Year x Postcode time trend. The impact of the reform declines (in terms of the absolute value of the coefficient and level of significance) as we move from the lowest income quartile to the highest income quartile.

In all three columns, the coefficients are the largest for the lowest income quartile group and also significant at 1%. Prices of litigated units purchased by buyers belonging to the lowest income quartile fell by 9-11%. For homebuyers in the highest income quartile, we fail to see an impact of RERA on prices of litigated units.

7 Robustness checks

7.1 Testing for violations of SUTVA

Stable Unit Treatment Value Assumption (SUTVA), which is a key condition for our identification to be causal, entails that litigated units have no spillover effects on the outcomes of non-litigated units. This could be violated if information about litigation against a project by a developer causes reputation loss that spills over to other projects built by her. Our sample includes projects with and without litigation built by the same developer. Thus, our coefficient estimates could underestimate the true effect of RERA. To address this we drop units in non-litigated projects built by a developer who had other litigated projects. A total of 381 units in 35 projects built by 18 developers who had other projects facing legal disputes were dropped.

The results in Table 5 show that in the full sample (columns 1 and 2) and in the sample of non-luxury projects (columns 3 and 4), coefficient estimates are slightly higher (in absolute terms) than the estimates in table 2 and table 3 respectively. On average, RERA led to a 5.1-6.2% decline in prices of litigated units.

7.2 Matching procedures

The presence of unobserved covariates (such as neighborhood-specific factors) that impact selection into litigation and prices differently in the pre- and post-disclosure period could bias our results. As a robustness test, we matched litigated units and non-litigated units in the pre-disclosure period on distance. Here, we restricted the sample to the pre-disclosure period and identified all non-litigated units within 500 meters distance of a litigated unit. We run estimate the effect of RERA for this matched sample using eq. (1). We also estimate the effect of RERA after weighting each observation with the propensity score

Table 5: **SUTVA: Results without non-litigated projects by developers who had litigated projects**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Dep var: log of price per sq ft					
	All		Non luxury		Luxury	
Litigation	-0.026	-0.022	0.018	0.015	-0.107***	-0.093***
	(0.035)	(0.033)	(0.039)	(0.037)	(0.031)	(0.032)
Post (RERA Introduction = 1)	-0.003	-0.008	0.005	0.009	-0.031	-0.047
	(0.022)	(0.022)	(0.026)	(0.025)	(0.042)	(0.042)
Litigation x Post	-0.051**	-0.053***	-0.062***	-0.058**	-0.021	-0.025
	(0.021)	(0.019)	(0.024)	(0.022)	(0.040)	(0.038)
Constant	9.420***	9.403***	9.410***	9.430***	9.902***	9.859***
	(0.021)	(0.027)	(0.025)	(0.035)	(0.048)	(0.054)
Observations	11,172	11,172	7,790	7,790	3,360	3,360
R-squared	0.721	0.751	0.727	0.760	0.695	0.730
Year x quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Project FE	Yes	Yes	Yes	Yes	Yes	Yes
Property controls	No	Yes	No	Yes	No	Yes
Buyer controls	No	Yes	No	Yes	No	Yes

Note: Standard errors clustered at project level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the results of the introduction of RERA on price of litigated units. The dependent variable is the log of price per square foot in real terms. Columns (1) and (2) report the estimates for the full sample, columns (3) and (4) report the results for the sample of non-luxury projects and columns (5) and (6) report the results for luxury projects. Columns (1), (3) and (5) report coefficients with real estate project and year-quarter fixed effects and without any controls. Columns (2), (4) and (6) report coefficients with real estate project and year-quarter fixed effects, unit controls, which are completion status and area in square feet, and buyer controls - which include income, occupation, gender, and loan to value for the transaction.

weights estimated for a matched sample using project size in the pre-disclosure period .

Our results are reported in table 6. Columns (1) and (2) show coefficient estimates for using matching on distance for all projects and non-luxury projects respectively. The coefficient is negative and significant throughout and is between 10-11% . Using propensity score weights, we find that disclosure reform led to around 4-6% decline in property prices (columns 3-4).

7.3 Heterogeneous effects by severity of litigation

It may be the case that the severity of litigation systematically differs across different sub-markets. For instance, non-luxury projects may be more likely to face more severe litigation relative to luxury projects. In such a case, the heterogeneous impact of the reform across housing sub-markets will be on account of differences in the severity of litigation rather than differences in access to information for homeowners across the sub-markets as claimed in section 6.2. To address this, we distinguish between units facing severe and less-severe litigation in the luxury and non-luxury sub-markets and compare the impact of the reform across sub-markets separately by severity of litigation. For this,

Table 6: **Matching procedures**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Dep var: log of price per sq ft					
	Matched on distance (500 mts)			PSM (Size)		
	All	Non luxury	Luxury	All	Non luxury	Luxury
Litigation	0.088***	0.297***	0.292**	-0.015	-0.004	-0.005
	(0.024)	(0.024)	(0.086)	(0.040)	(0.082)	(0.040)
Post (RERA Introduction = 1)	0.032	0.058*	-0.166**	-0.018	0.004	-0.012
	(0.032)	(0.035)	(0.057)	(0.030)	(0.027)	(0.069)
Litigation x Post	-0.106***	-0.117***	-0.127	-0.040*	-0.059**	-0.018
	(0.028)	(0.029)	(0.073)	(0.021)	(0.027)	(0.048)
Constant	9.738***	9.697***	9.426***	9.781***	9.516***	9.770***
	(0.048)	(0.049)	(0.106)	(0.057)	(0.048)	(0.063)
Observations	4,082	2,401	291	5,280	3,381	2,129
R-squared	0.682	0.709	0.682	0.750	0.772	0.705
Year x quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Project FE	Yes	Yes	Yes	Yes	Yes	Yes
Property controls	Yes	Yes	Yes	Yes	Yes	Yes
Buyer controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered at project level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the results of the introduction of RERA on price of litigated units after matching on distance and propensity score matching on project size. The dependent variable is the log of price per square foot in real terms. Columns (1), (2) and (3) report coefficients for matching on distance for all projects, non-luxury projects, and luxury projects respectively. Columns (4), (5) and (6) report the results after propensity score matching on size for all, non-luxury, and luxury projects respectively. All columns report coefficients with real estate project and year-quarter effects, unit controls, and buyer controls.

we classify units in projects with at least one legal dispute being heard in an upper court to be affected by severe litigation whereas units in projects with cases being heard only in the lower court are considered to be affected by less severe litigation. Using eq. (1), we estimate the impact of the reform on prices of units having litigation in upper courts and units having litigation in lower courts separately. The results are reported in table 7. The reform led to a 5% fall in price of units facing a severe form of litigation but had no effect on the prices of units facing less severe litigation. Comparing luxury and non-luxury markets, we see that the reform affected prices of units facing severe litigation in the non-luxury sub-market (column 5) whereas the reform had no impact on prices of units facing severe litigation in the luxury sub-market (column 3).

8 Conclusion

Weak property rights and contract enforcement together with asymmetry of information between buyers and sellers impedes the efficient functioning of markets in developing countries. Low state capacity precludes direct regulation and cross-cutting reforms that strengthen property rights, enforce standards and provide speedy redressal. In this context, mandatory disclosure laws that rely on direct disclosures by sellers, that do not burden sellers with additional compliance costs, and that provide information about quality

Table 7: **Heterogeneous effect by type of court**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Dep var: log of price per sq ft					
	All		Non Luxury		Luxury	
	Upper	Lower	Upper	Lower	Upper	Lower
Litigation	-0.031	0.023	0.004	0.045	-0.101***	-0.053
	(0.040)	(0.042)	(0.046)	(0.054)	(0.035)	(0.058)
Post (RERA Introduction = 1)	-0.021	-0.024	-0.007	-0.011	-0.050	-0.060
	(0.023)	(0.025)	(0.025)	(0.027)	(0.045)	(0.058)
Litigation x Post	-0.052**	-0.036	-0.050**	-0.046	-0.037	0.002
	(0.021)	(0.026)	(0.026)	(0.033)	(0.040)	(0.040)
Constant	9.397***	9.440***	9.427***	9.490***	9.865***	9.517***
	(0.027)	(0.040)	(0.037)	(0.039)	(0.052)	(0.062)
Observations	9,806	7,739	6,836	5,907	2,948	1,816
R-squared	0.755	0.741	0.764	0.760	0.729	0.698
Year x quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Project FE	Yes	Yes	Yes	Yes	Yes	Yes
Property controls	Yes	Yes	Yes	Yes	Yes	Yes
Buyer controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered at project level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the impact of RERA on price of litigated units by type of court for all units, luxury units and non luxury units. The dependent variable is the log of price per square foot in real terms. Columns (1), (3), and (5) show the impact for cases in upper courts and columns (2), (4) and (6) show the impact for cases in lower courts. All columns report coefficients with real estate project and year-quarter fixed effects, unit controls like completion status and area in square feet, and buyer controls - which include income, occupation, gender, and loan to value for the transaction.

to buyers in a manner that is easy to understand and access may be a useful alternative. Using the case of a mandatory disclosure reform in India's urban housing market, this paper shows that such disclosure laws may have important, efficiency-enhancing effects.

We examine the impact of a policy reform that mandated public disclosure of litigation status of real estate projects on house prices. Using unit-level data on prices and litigation status of real estate projects, we find that the reform led to a 5-6% decline in per square foot prices of litigated units relative to non-litigated units.

We find that public disclosure in the housing market in India resolves information asymmetry primarily in the low-income and non-luxury housing sub-market. Another interesting finding is that in the pre-reform period, litigated units in luxury projects had lower prices on average relative to non-litigated units. Thus, buyers in the luxury housing sub-market had better access to information prior to the reform. This could be driven by two channels. First, buyers of luxury units had the means and resources to invest in collecting accurate information. Second, they had access to better information through media, which is more likely to report disputes facing prominent luxury real estate projects.

Thus, by showing that the law reduces market inefficiencies, and inequality in access to information, our results provide support for the efficacy of mandatory disclosure laws

in developing countries.

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Appendix

Table A.1: **Variable descriptions and datasets**

Variable	Description	Dataset	Obs
	Housing unit level attributes		
Unit price	Price in Indian rupees, as reported by the buyer on the Approval Date for units transacted between 2015-2020	Bank mortgage dataset	11,553
Area in sq ft	Total built-up area of the unit in square feet.	Bank mortgage dataset	11,553
Unit price per sq ft	Property price/Property area in sq ft	Calculated by authors	11,553
Price per sq ft in real terms	Unit price per sq ft converted from nominal to real terms using Maharashtra urban consumer price index	Calculated by authors	11,553
Log price per sq ft in real terms	Log of unit price per square foot in real terms	Calculated by authors	11,553
Project completion	Units are either 'completed' or 'under construction', depending on their stage of completion on the Approval Date. Determined by physical visits and evaluation by the bank.	Bank mortgage dataset	11,553
Project postcode	The postal code of the area in which the property is located.	Bank mortgage dataset	11,553
	Loan attributes		
Loan amount	Total loan amount in Indian Rupees	Bank mortgage dataset	11,553
Loan to value ratio	Ratio of value of loan to the unit price	Bank mortgage dataset	11,553
Approval date	The date (dd-mm-yyyy) on which the loan is approved by the bank.	Bank mortgage dataset	11,553
	Buyer attributes		
Annual income	Buyer's annual income in Indian rupees	Bank mortgage dataset	11,553
Real income	Buyer's annual income in Indian rupees converted from nominal to real terms using the Maharashtra urban consumer price index	Calculated by authors	11,553
Occupation	Buyer's occupation	Bank mortgage dataset	11,553
Gender	Buyer's gender (male/female)	Bank mortgage dataset	11,553
	Project level attributes		
Litigation	Whether project is under litigation -yes/no	Maharashtra RERA	2,953
Upper/Lower court	Name of court where a dispute is being heard	Maharashtra RERA	2,953
Amenity	List of amenities self-reported by developers	Maharashtra RERA	2,953
Developer	Name of the real estate developer of the project	Maharashtra RERA	2,953

Table A.2: **Summary statistics: Type of court**

	Mean	Std dev
Upper courts		
Unit price per sq. ft. (INR)	16573	6602
Log of price per sq. ft.	9.65	0.35
Unit area (sq. ft.)	930	570
Buyer's annual income (INR million)	4.37	16.25
Loan to value ratio	0.59	0.20
Obs	3,814	
Lower courts		
Unit price per sq. ft. (INR)	14639	6385
Log of price per sq. ft.	9.51	0.4
Unit area (sq. ft.)	782	482
Buyer's annual income (INR million)	2.97	11.65
Loan to value ratio	0.60	0.20
Obs	8,104	

Note: Data spans years 2015 to 2020. Unit price and buyer's income are in real terms. Loan to value ratio is the ratio of the total loan amount and the value of the property. Units with at least one dispute in the upper courts (Bombay High Court and Supreme Court of India) are classified as facing severe litigation. Units with all disputes only in the lower courts are classified as facing less severe litigation.

Table A.3: Share of units with litigation pre- and post-reform

	Pre-reform	Post-reform
Share of litigated units (%)	45.2	49.1
Share of units with a case in upper courts (%)	31.8	33.4
Share of units with cases in lower courts (%)	13.4	15.7

Note: The table presents the share of transacted units by litigation status and severity of litigation in the pre- and post- reform period. Units with at least one dispute in the upper courts (Bombay High Court and Supreme Court of India) are classified as facing severe litigation. The second row presents the share of total units facing litigation in the upper courts. Units with all disputes only in the lower courts are classified as facing less severe litigation.

Figure A.1: **Litigation details published on RERA website**

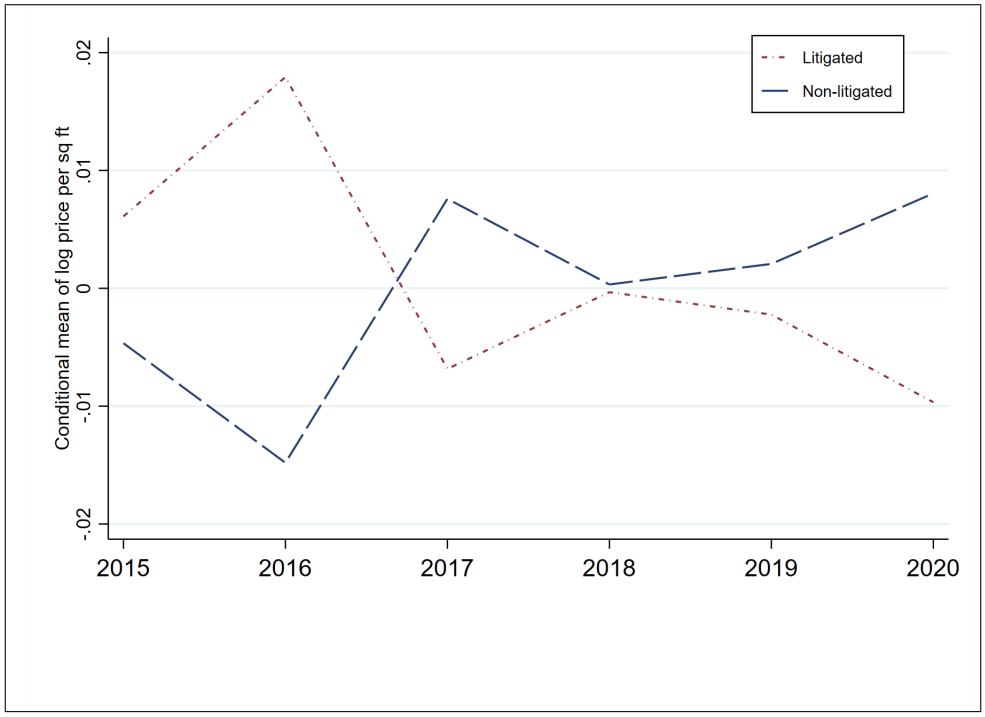
Project

Project Name (Mention as per Sanctioned Plan)	Shri Sai Vishram CHSL	Project Status	On-Going Project
Proposed Date of Completion	31/12/2019	Revised Proposed Date of Completion	31/12/2019
Extended Date of Completion	30/12/2022		
Litigations related to the project ?	Yes	Project Type	Residential
Are there any Promoter(Land Owner/ Investor) (as defined by MahaRERA Order) in the project ?	No		
File/reference no. of planning authority			
Plot Bearing No / CTS no / Survey Number/Final Plot no.	772/A, Survey No.138, Village Eksar, Taluka Borivali, Mumbai 400068	Boundaries East	Gokul CHS Ltd
Boundaries West	60 Feet wide road	Boundaries North	Kandarpada Gaothan
Boundaries South	Sai Niketan CHS Ltd	State/UT	MAHARASHTRA
Division	Konkan	District	Mumbai Suburban

Litigations Details

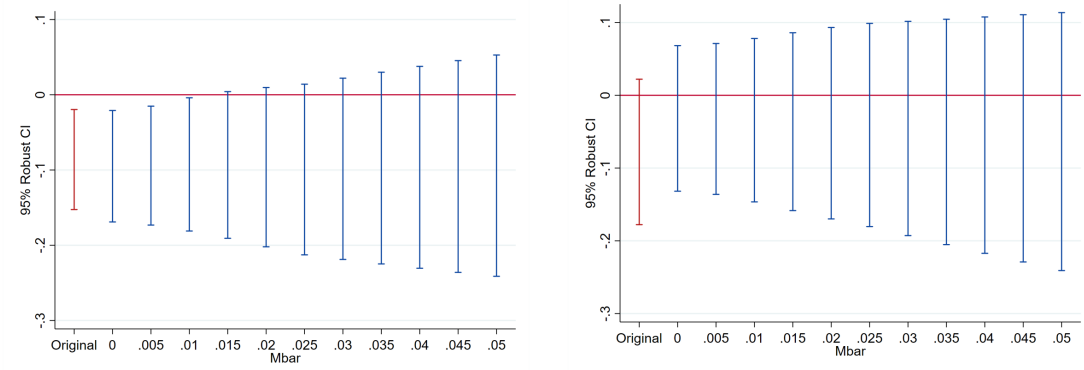
Project Name	Court Name	Case Number	Case Type	Preventive/Injunction/Interim Order is Passed?	Petition Name	Other Petition Details	Year	Present Status	Documents
Palais Royale	Supreme Court of India	TP 1595	Civil	No	Other	Transfer Petition	2017	Pending	NA
Palais Royale	Bombay High Court	PIL 50	Civil	No	Suit	NA	2017	Pending	NA
Palais Royale	Bombay High Court	Commercial Summary Suit 462	Civil	No	Suit	NA	2017	Pending	NA
Palais Royale	National Company Law Tribunal	1472	Civil	No	Suit	NA	2017	Pending	NA
Palais Royale	National Company Law Tribunal	1519	Civil	No	Suit	NA	2017	Pending	NA
Palais Royale	Bombay High Court	CP/594	Civil	No	Suit	NA	2015	Pending	NA
Palais Royale	Bombay High Court	CP/1066	Civil	No	Suit	NA	2015	Pending	NA
Palais	Bombay High	CP/1039-2015	Civil	Yes	Suit	NA	2015	Pending	View

Figure A.2: **Conditional Mean of log real price per square foot**



Note: Computed using data on prices of litigated and non-litigated units.

Figure A.3: **Sensitivity to Non-Parallel Trends for Non Luxury and Luxury Projects**

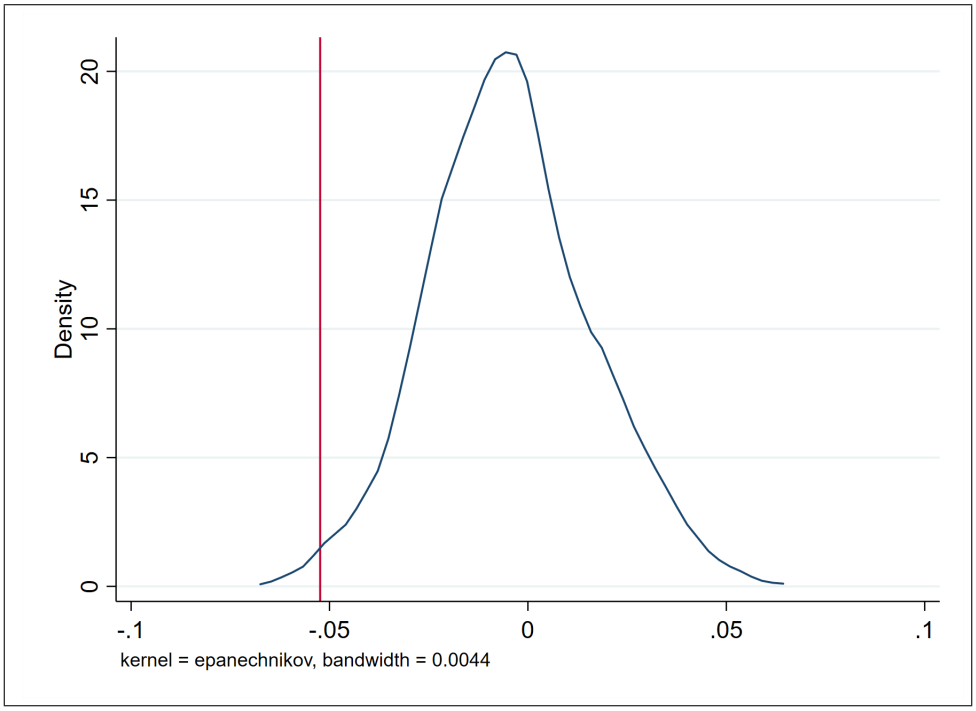


a. Non luxury projects

b. Luxury projects

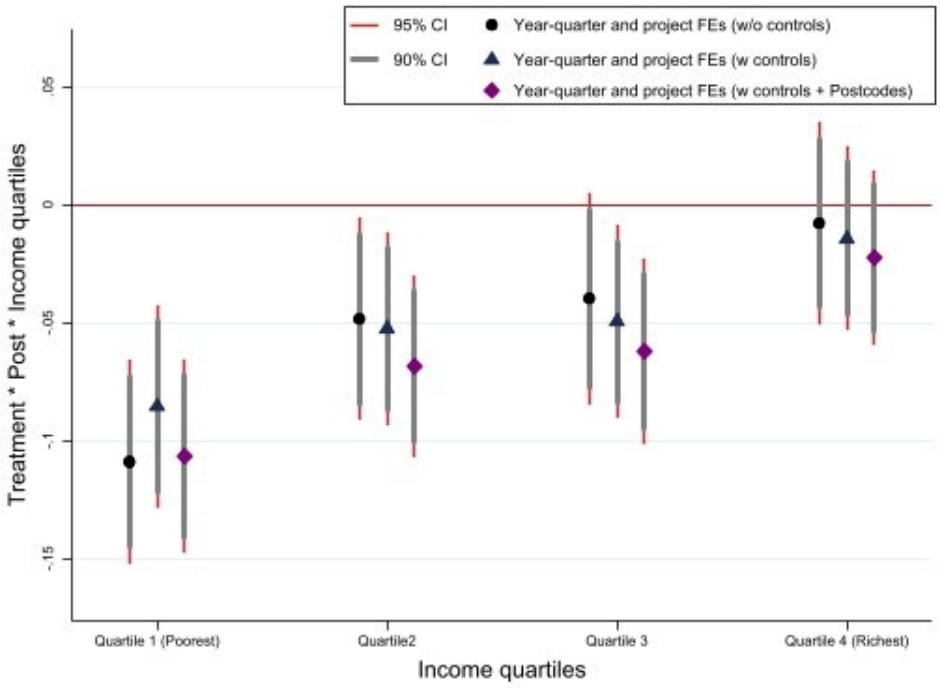
Note: We make use of real estate projects that had transactions every year from 2015-2020. The maroon vertical line plots the confidence interval associated with the coefficient estimated in the first post-reform period.

Figure A.4: **Permutation distribution**



Note: Authors' creation using housing data from real estate regulatory authority and unit price data from the private bank. We make use of real estate projects that had transactions every year from 2015-2020. The maroon vertical line indicates the start of the reform period. The reform mandates developers to provide information about their real estate projects to buyers on a government run website.

Figure A.5: **Effect of disclosure policy on property prices by income quartiles**



Note: Standard errors clustered at project level in parentheses. The figure shows the results of the introduction of RERA on price of litigated units for each income quartile of the homebuyer. The regression results are reported in table 4. The dependent variable is the log of price per square foot in real terms. We run three specifications. The first specification reports coefficients with real estate project and year-quarter fixed effects and without any controls. The second specification reports coefficients with real estate project and year-quarter fixed effects, unit controls, which are completion status and area in square feet, and buyer controls - which include occupation, gender, and loan to value for the transaction. The third specification reports coefficients with real estate project and year-quarter fixed effects, unit controls, buyer controls and Year x Postcode trend.