Does Regulating Developers Democratize Credit and Homeownership?

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Motivation

- Real estate developers play a critical role in urbanization and economic development
  - US: 70% of all housing units were built by the top 100 developers in 2023
  - UK: 47% of all homes were built by the top 10 developers in 2015
  - India: 22% of all housing units sold in 2021 Q2 to Q4 were built by top 8 listed developers

And carry huge risk

- Large capital requirement and reliance on debt
  - debt takes 30% and 4% of GDP in HK SAR and China Mainland (Chiu, Illes and Upper, 2018)
- Weak monitoring exacerbates the risk of home purchase
  - Weak monitoring of pre-sale market
  - Low protection of homebuyer rights
    - 1,500 stalled projects in the last 5 years in China
    - 412,000 stalled residential units as of mid-2023 in India
  - Worse in downturns
    - Hit market confidence
    - Mortgage default, and lower credit supply
    - Slow down recovery

This paper

- How does the credit market and housing market respond to improved **developer accountability**?
  - Does better monitoring of developers improve credit access?
  - If so, for whom?
  - How does housing market respond?

Mortgage Boycott in India 2019

No EMI till status gets clear: Amrapali buyers

Sharmila Bhowmick / TNN / Mar 4, 2019, 02:07 IST

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Buyers have been demanding for an EMI holiday for a long time

NOIDA: Thousands of homebuyers on Sunday threatened to stop paying bank instalments of multiple Amrapali projects they have invested in, until they get a clear delivery roadmap of their properties.

Financial Distress and Stalled Projects

BBC

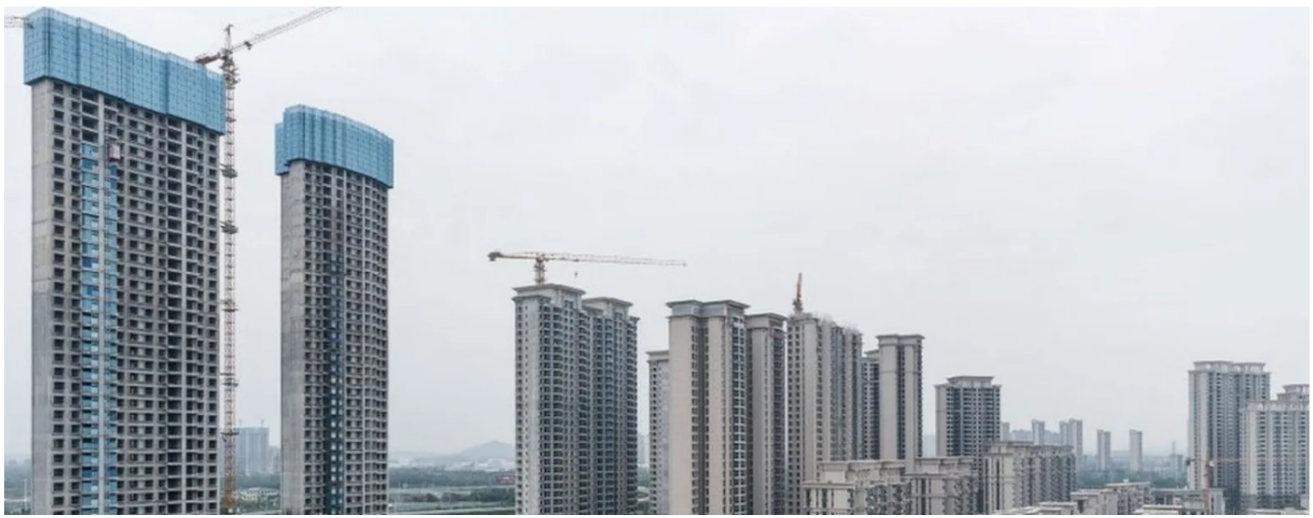
Home News Sport Business Innovation Culture Travel Earth Video Live

Evergrande: Anxious Chinese home buyers reel from crisis

29 September 2023

Share

By Yan Chen & Frances Mao, in Hong Kong and Singapore



In September 2021, Evergrande failed to repay more than $100 million to offshore lenders. At that time it was estimated that the firm had more than 1.5 million unfinished homes. The default brought to light a real estate crisis in China which is

Main Findings

- Staggered implementation of RERA in India states
- Houses are delivered with shorter delays
- Increase in mortgage origination,
  - especially to the under-served groups, such as
  - new borrowers, low income borrowers, small cities
- Houses are smaller, with lower price psft
- More affordable housing are supplied
- $\Rightarrow$ Transparency Improves housing affordability

Contribution: Gov intervention and the housing market

- Tax policies: tax credit, interest rate deduction, property tax exemptions
- Financial assistance: price subsidies, low-interest rate loans
- Price control: rent control, purchase restrictions
- Limited attention to regulations to the developers

Primary contribution: Close monitoring of developers improve homeownership and increase lending

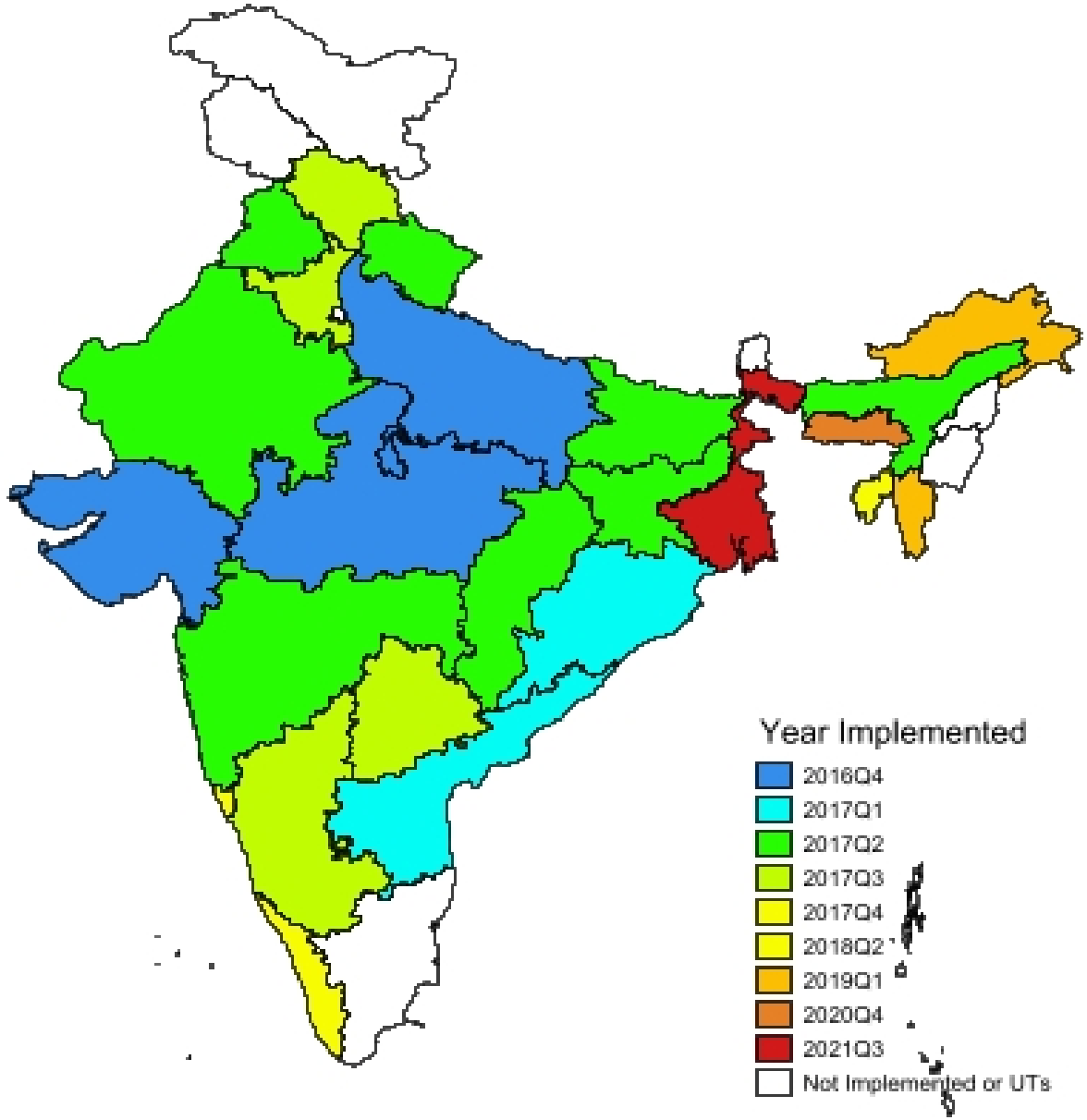
Contribution (cont'd)

- Collateral quality, information asymmetry, and credit
  - Relationship lending, creditor protection, vertical integration between banks and property developers
  - **This paper**: Monitoring the developers could improve collateral quality and facilitate higher mtg origination
- Homeownership democratization
  - Market frictions hinder homeownership: discrimination, search frictions, political distortions, distorted perceptions
  - **This paper**: More transparency from the developers' side could improve homeownership, especially for the under-served groups

RERA and Its Enaction

- Real Estate (Regulation and Development) Act (RERA)
  - Pass by the federal gov: March 2016
  - Gradual state-level implementation: from Oct. 2016 till now
- Aims to promote **transparency** in the real estate sector, especially **pre-sale** residential market
- Some key measures includes:
  - Establishing state-level authority
  - Register all projects (size above a certain threshold) with state RERA before selling
  - Depositing of sale proceeds into an **escrow account**
  - Mandated and regularly disclosure of project information
  - **Strict timeline** for project completion: Penalty
  - Developers are liable for any defects in the projects

Staggered Implementation by States



India Housing Market

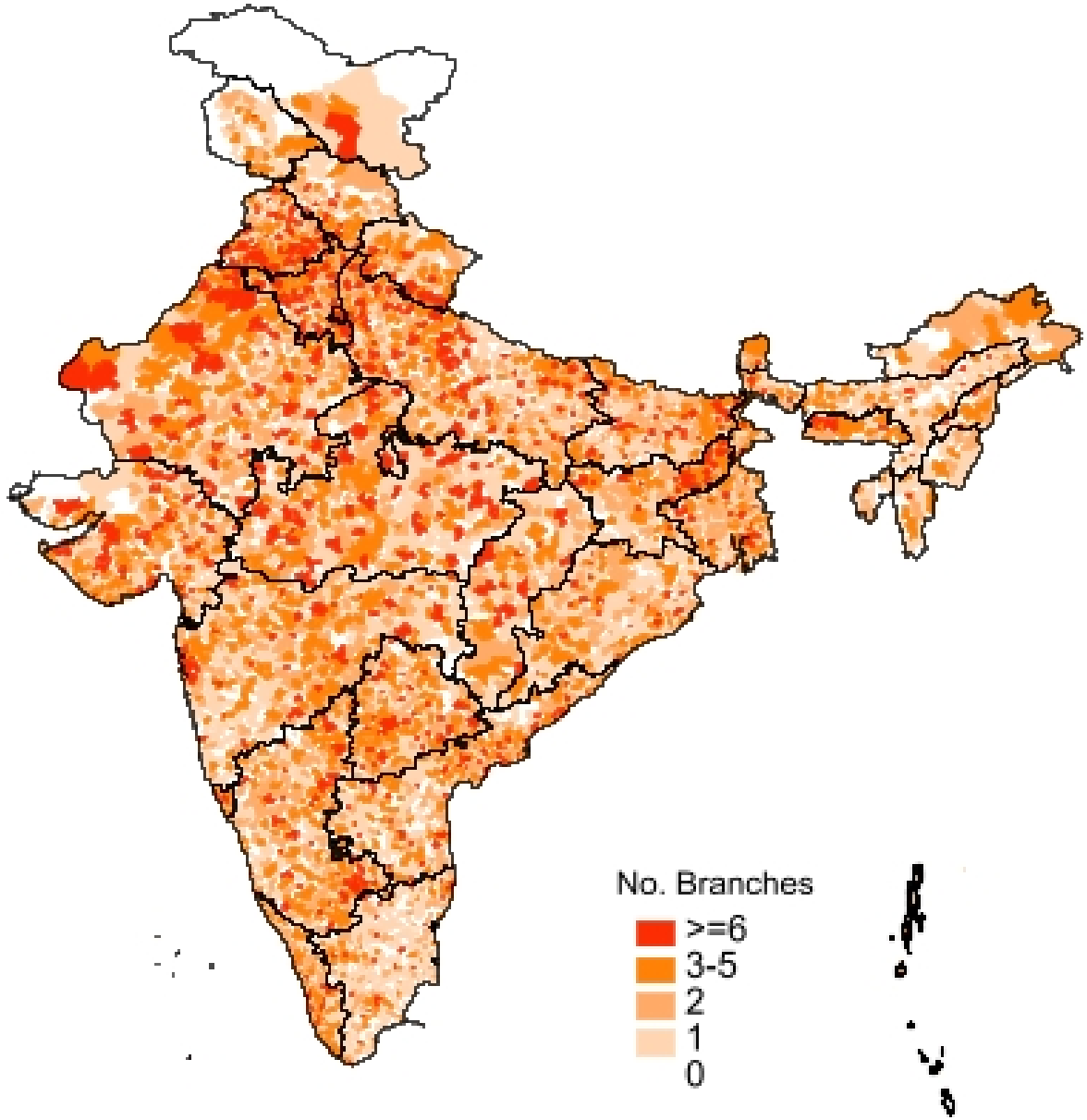
- Stable increase in urbanization rate:
  - 1 pp increase from 2015 to 2019
  - 34 mil more urban population
- Real estate sector grow rapidly:
  - Share in GVA from 13% in 2015 to 15.3% in 2019
- RE developers play a critical role:
  - Top 8 listed RE developers accounted for 22% of all units sold from 2021 Q2-Q4
- Mortgage is critical for housing finance
  - Share of housing loan in total loan increase from 10% to 13% 2015 to 2019 (RBI 2023)

India Housing Price Index

Data

- Mortgage Transaction
  - All branches of a state-owned bank, 2015-2019
  - Information of borrowers, branch, collateral, loan term, loan performances
- Residential Project Information
  - 12 cities of 9 states, 2010 to 2020
  - Project size: determines RERA registration status
  - Delay of delivery
  - Location, developer identity, avg unit size, avg price

Geographical Distribution of Branches (pincode-level)



Empirical Strategy

Effect on Mortgages

$$Y_{bpq} = \beta \cdot Post_{p(b)q} + \alpha_{b,p} + \alpha_{b,q} + \varepsilon_{bpq} \quad (1)$$

- b: branch
- p: pincode of collateral
- q: year-quarter of mortgage origination
- $Post_{p(b)q}$ =1 if the pincode p is in the treated state in q
- $\alpha_{b,p}$: branch by pincode
- $\alpha_{b,q}$: branch by year-quarter
- Y:
  - Dummy of receiving a loan, dollar and volume of loans
  - Number of borrowers, new borrowers, and repeat borrowers
  - Loan characteristics: LTV, interest rate (loan-level)

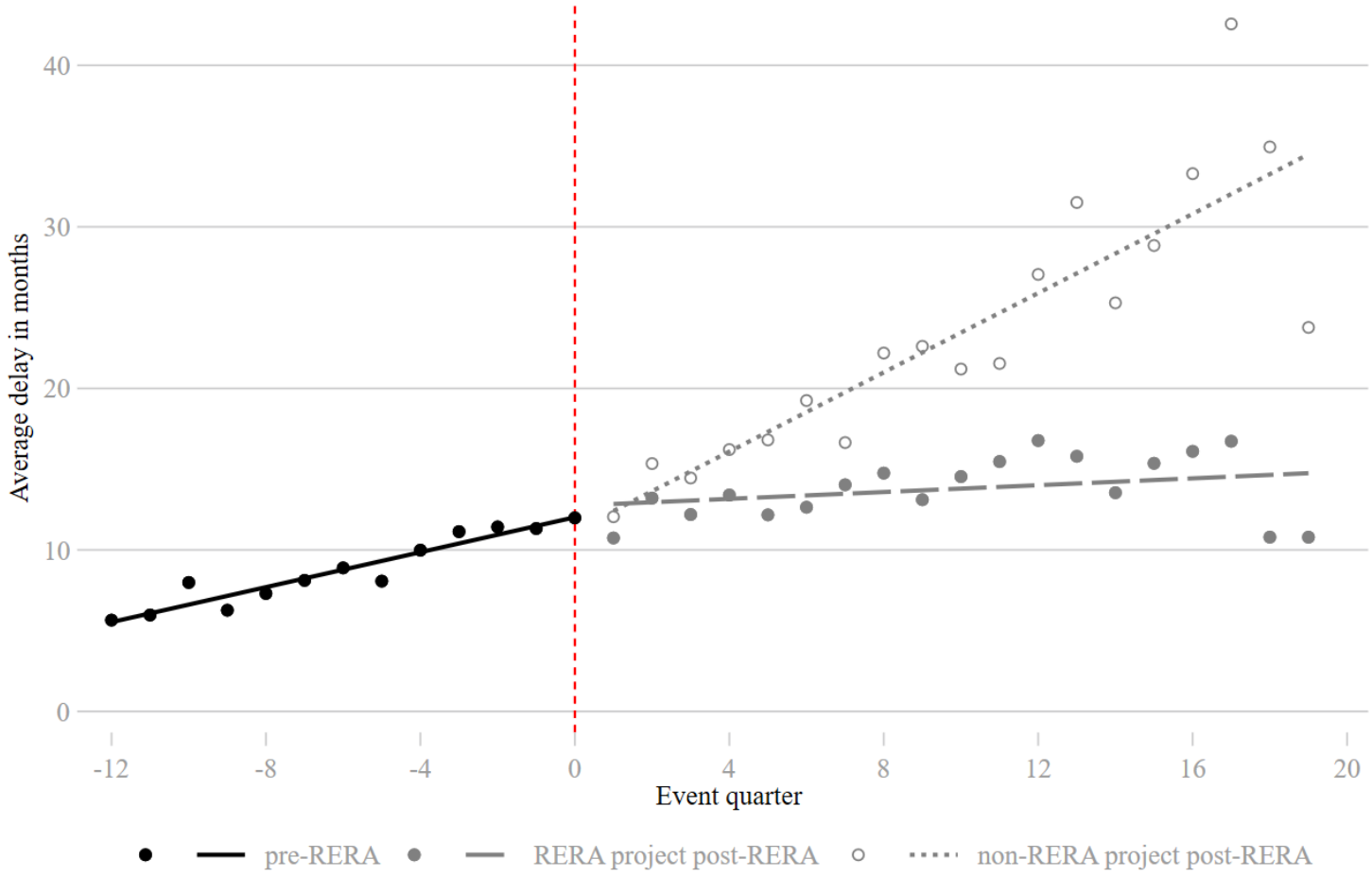
Empirical Strategy

Effect on Housing Market

$$Y_{ijq} = \beta \cdot Post_{ijq} + \alpha_j + \alpha_q + \varepsilon_{ijq} \quad (2)$$

- i: project
- j: city
- q: year-quarter of project launch
- $Post_{ijq}$ =1 if the project i is launched after the state implement RERA
- α_j α_q: city FE, quarter FE
- Y: Project charateristics
  - Delay of delivery: months from planned delivery to actual delivery
  - Average unit size, price psf

Direct Effect on Delivery Delay



Projects with the number of units below a certain threshold may not be registered under RERA

Direct Effect on Delivery Delay

dynamic

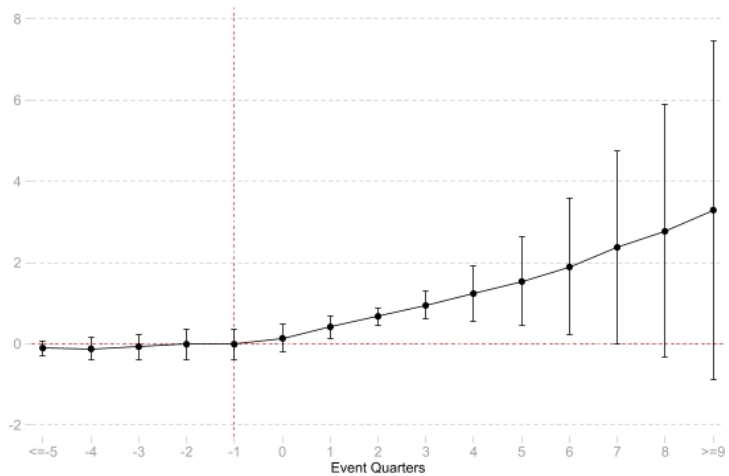
	(1)	(2)
Dep. Var.	Delay (Months)	
Post	1.015	
	(0.895)	
Post*Non-RERA		3.667***
		(0.919)
Post*RERA		-5.088***
		(0.969)
Observations	13,357	13,357
City FE	Yes	Yes
Year-month FE	Yes	Yes

$\Rightarrow$ Fewer delays, and lower uncertainty with home purchase

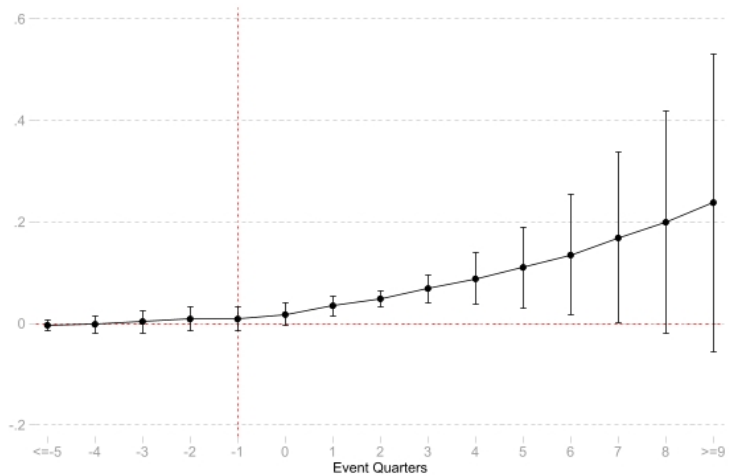
Mortgage Origination: Overall Lending Effect

	(1)	(2)	(3)	(4)
Dep. Var.	Binary loan = 1	Amount of Loan	Number of Loan	Average Loan Size
Post	0.008***	0.152***	0.038***	-0.092
	(0.001)	(0.023)	(0.006)	(0.079)
Observations	3,003,748	3,003,748	3,003,748	281,399
R-squared	0.375	0.387	0.434	0.638
Branch*Pin FE	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes

Overall Lending Effect: Evolutionary Effect



Amount of Loan Disbursal

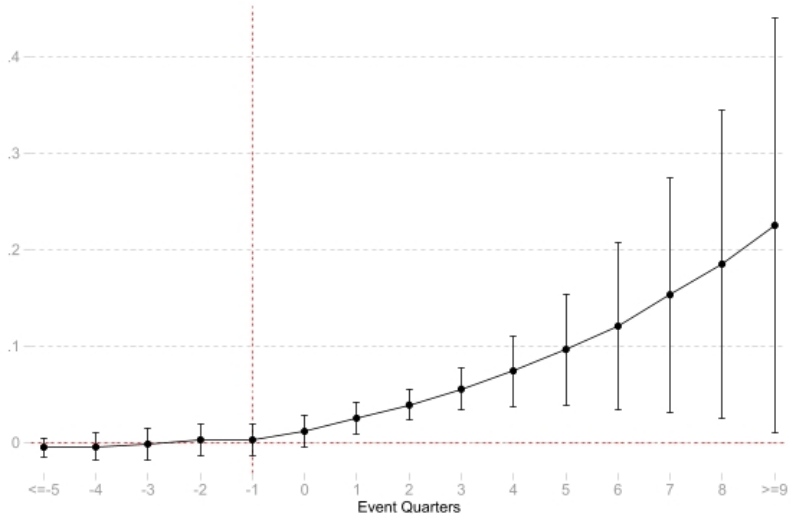


Number of Loan Disbursal

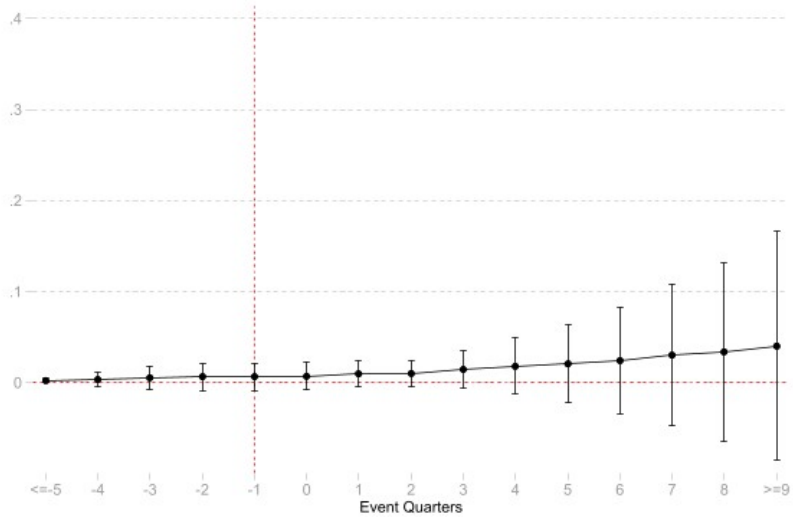
New Borrowers and Geographical Coverage

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 Pincodes
Post	0.024***	0.009	0.088***	0.062*	0.061*
	(0.003)	(0.001)	(0.020)	(0.035)	(0.003)
Observations	3,003,748	3,003,748	3,003,748	3,003,746	836,247
R-squared	0.528	0.466	0.376	0.364	0.768
Branch*Pin FE	Yes	Yes	Yes	Yes	No
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes
Branch*State FE	No	No	No	No	Yes

New Borrowers: Evolutionary Effect



No. New Borrowers



No. Existing Borrowers

Heterogeneity: Geographic Disparity

Dep. Var.	(1) Binary loan = 1	(2) Amount of Loan	(3) Number of Loan	(4) Number of New Borrowers
Post	0.008***	0.157***	0.039***	0.024***
	(0.002)	(0.036)	(0.010)	(0.008)
Post*Tier 2	0.002	0.032	0.012	0.009
	(0.004)	(0.087)	(0.026)	(0.023)
Post*Tier 1	-0.006**	-0.129**	-0.037**	-0.020
	(0.002)	(0.049)	(0.015)	(0.012)
Observations	3,003,748	3,003,748	3,003,748	3,003,748
R-squared	0.375	0.387	0.434	0.416
Branch*Pin FE	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes

Loan Term

Dep. Var.	(1) LTV (%)	(2) Interest Rate (%)
Post	3.959*	0.058
	(2.072)	(0.066)
Observations	902,997	962,763
R-squared	0.355	0.510
Branch*pin FE	Yes	Yes
Branch*YQ FE	Yes	Yes

Group Specific Heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)
Group by	New Borrowers		Female		Low Income	
Dep. Var.	LTV	Interest Rate	LTV	Interest Rate	LTV	Interest Rate
Post*Group	3.050***	-0.041*	0.189	-0.039**	0.499**	-0.077***
	(0.416)	(0.022)	(0.315)	(0.014)	(0.214)	(0.016)
Observations	872,438	931,369	871,027	928,713	441,778	475,505
R-squared	0.378	0.528	0.462	0.524	0.407	0.536
Branch*pin FE	Yes	Yes	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes
State * Group FE	Yes	Yes	Yes	Yes	Yes	Yes
State* YQ FE	Yes	Yes	Yes	Yes	Yes	Yes

Default

	(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***	-0.258***	-0.067***	-0.019***
	(0.003)	(0.054)	(0.013)	(0.006)
Observations	963,320	961,112	961,112	281,399
R-squared	0.278	0.276	0.326	0.539
Branch*Pin FE	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes
SE Cluster	State	State	State	State

Robustness Tests

- Sample of border district border
- Balance test of early vs later adopters balance
- Placebo tests with random timing of implementation placbo
- Bias of staggered DID
  - Callaway&Sant' Anna (2021) cs2021
  - Sun & Abraham (2021)'s interaction weighted estimator sa2021
- Bias of log1plus (Cohn Liu and Wardlaw 2022): Poisson poisson
- Different data structure: Branch*state*year-quarter state
- Adding controls: state-year level and borrower-level borrower
- Interest rate spread as DV irspread

Housing Market: Responses in Project Characteristics

Dep. Var.	(1) Ln (size)	(2) Ln(price\sqft)	(3) Score
Panel A Overall effect			
Post	-0.082***	-0.064**	0.224**
	(0.028)	(0.025)	(0.107)
Panel B Effect by RERA-registration status			
Post*Non-RERA	-0.061**	-0.086***	-0.023
	(0.028)	(0.025)	(0.110)
Post*RERA	-0.130***	-0.013	0.791***
	(0.030)	(0.026)	(0.114)
Observations	13,357	13,357	13,357
City FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes

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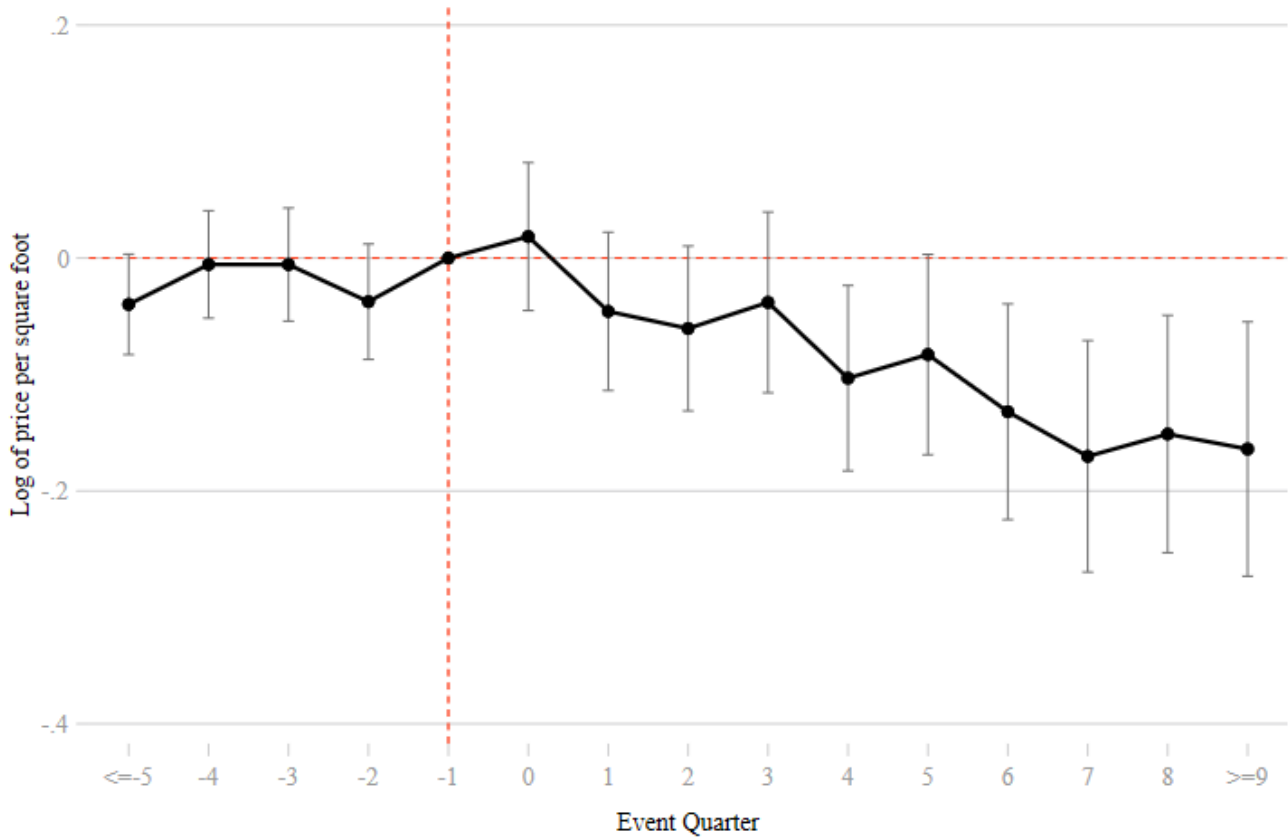
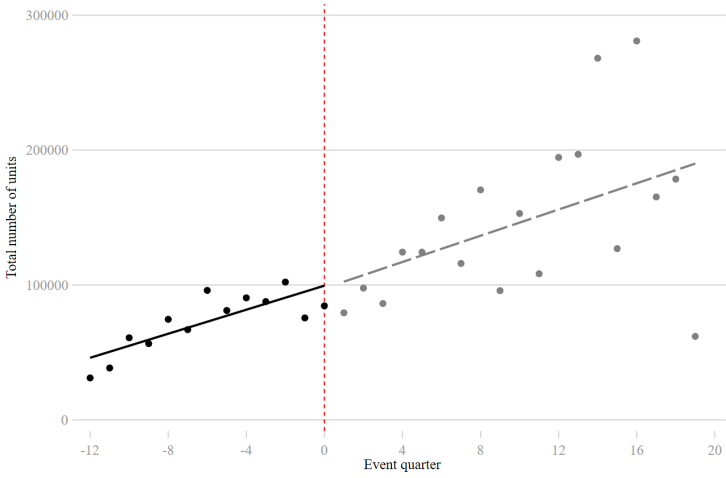
Evolutionary Effect on Price



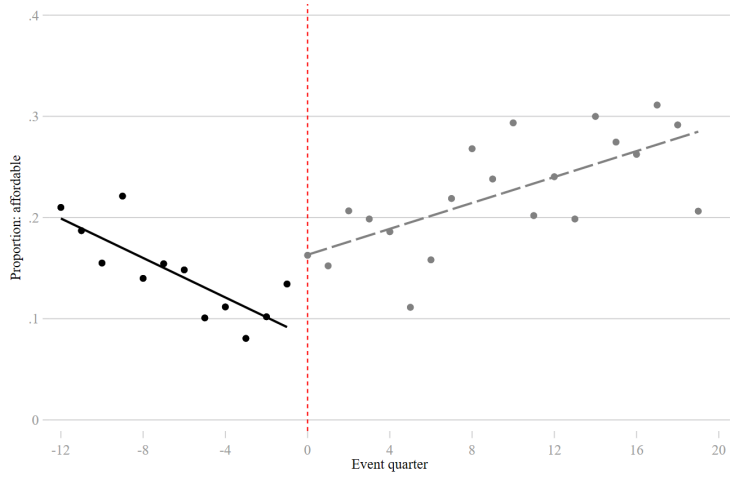
Changes in Housing Characteristics by Segment

Dep. Var.	(1) Ln (size)	(2) Ln(price\sqft)	(3) Score	(4) Delay
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

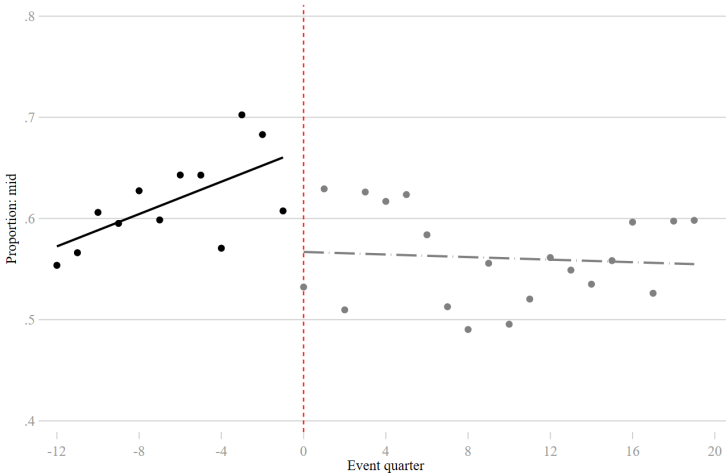
Proportion of Housing Sold in Three Segments



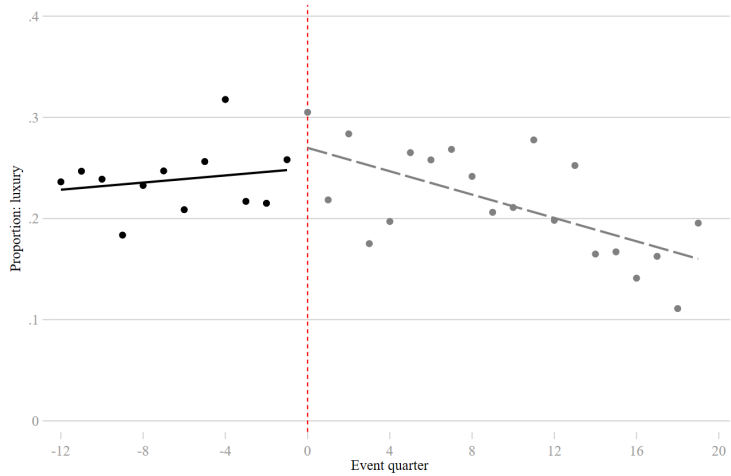
Total Number of Units Sold



% Affordable Sector



% Mid-Tier Sector



% Luxury Sector

Conclusions

- RERA significantly improve the transparency of housing market:
  - Faster delivery of new homes and lower uncertainty
- This improves **housing affordability**
  - More mortgage origination, especially to the borrowers in higher need of credit
  - Homes become more affordable: smaller units are sold at lower unit price
- $\rightarrow$ Monitoring the developers could improve homeownership by resolving the uncertainty and information asymmetry of new home purchase

Appendix

Empirical Strategy

Endogeneity Issues

- Granular fixed effects:
  - $\alpha_{b,q}$: Branch*year-quarter, control for time-varying lending behavior of a branch
  - $\alpha_{b,p}$: Branch*pincode, control for the lending preference of a branch to a pincode
- Border sample: the districts along the state borders border
- T-test for state-level economic performances balance

Sum Stat

back

Variables	(1) N	(2) Mean	(3) Std. Dev.	(4) Median
		Panel A Branch×Pin level		
Loan Amount	3,003,748	712,824.60	3,267,085.30	0.00
Loan Number	3,003,748	0.36	1.57	0.00
No. of Borrowers	3,003,748	0.35	1.52	0.00
No. of New Borrowers	3,003,748	0.26	1.26	0.00
Loan Size	474,621	2,114,940.24	1,338,693.37	1,800,000.00
Prob. of Getting Loan	3,003,748	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

Summary Statistics - Mortgage

back

Variables	(1) N	(2) Mean	(3) Std. Dev.	(4) Median
		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
LTV	910,014	56.26	23.50	59.34
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
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

Summary Statistics - Housing

back

Variables	(1) N	(2) Mean	(3) Std. Dev.	(4) Median
		Panel D Project level		
Delay in Months	13,357	14.41	17.59	8.00
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
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

Random Timing of RERA Implementation

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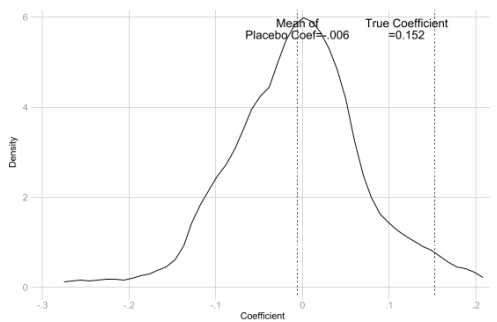
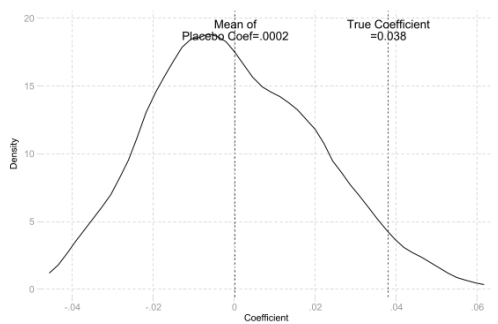
Binary loan = 1

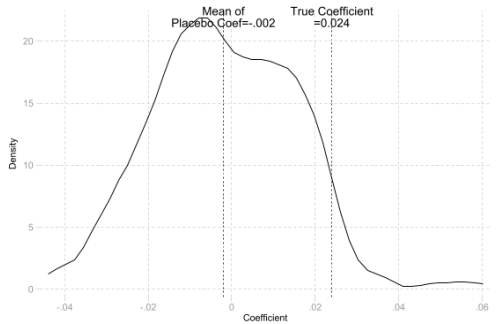


Amount of Loan

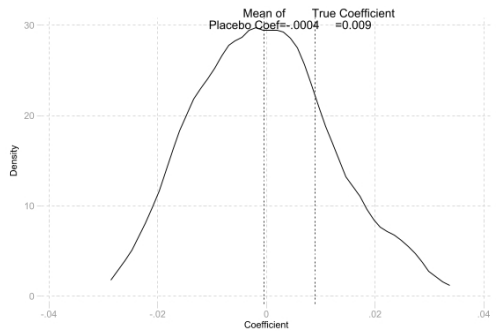
Num Loan



Num Borrower



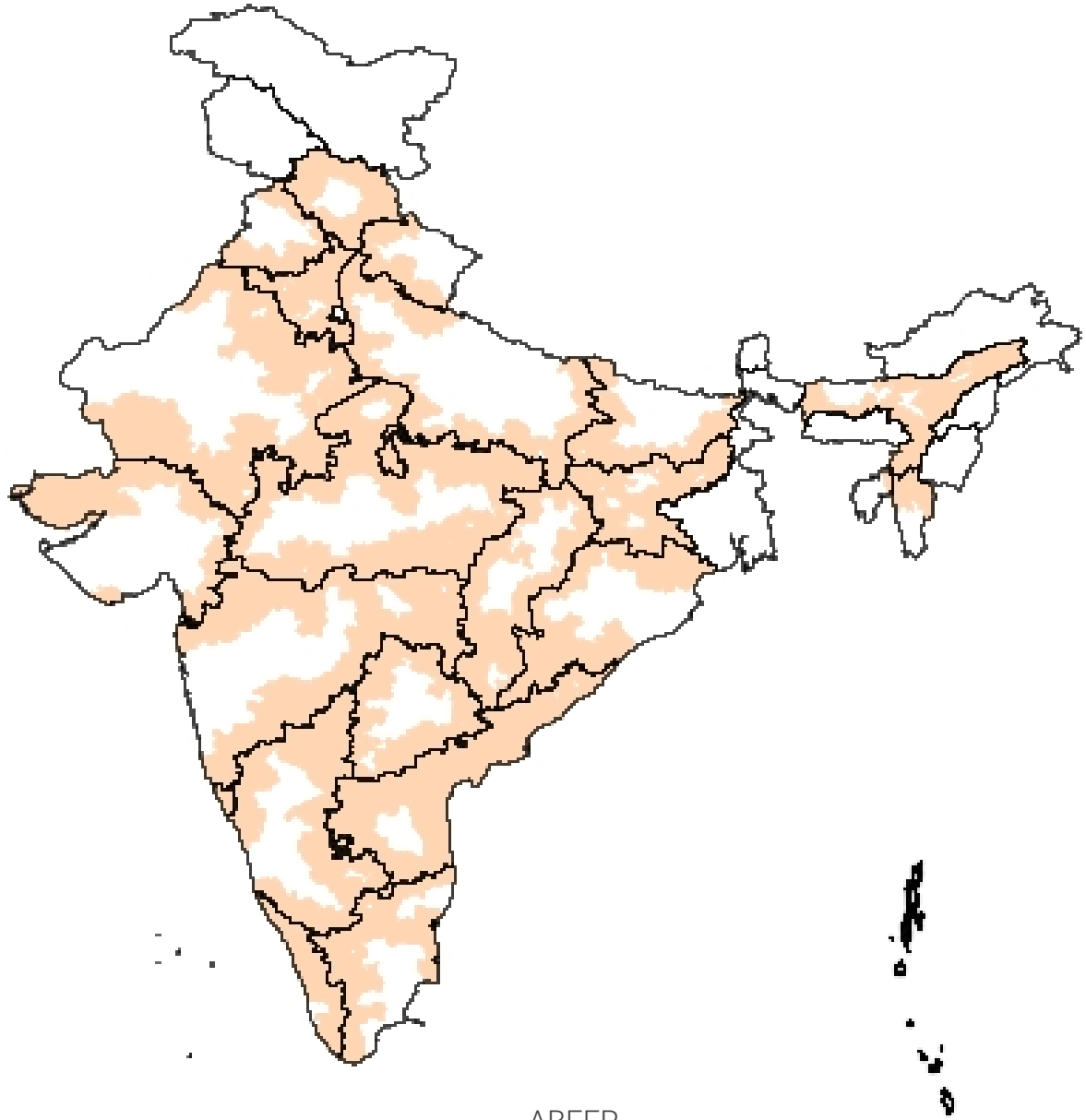
Num New



Num Existing

Border Sample

robust endogeneity



Evolutionary Effect on Delay in Delivery

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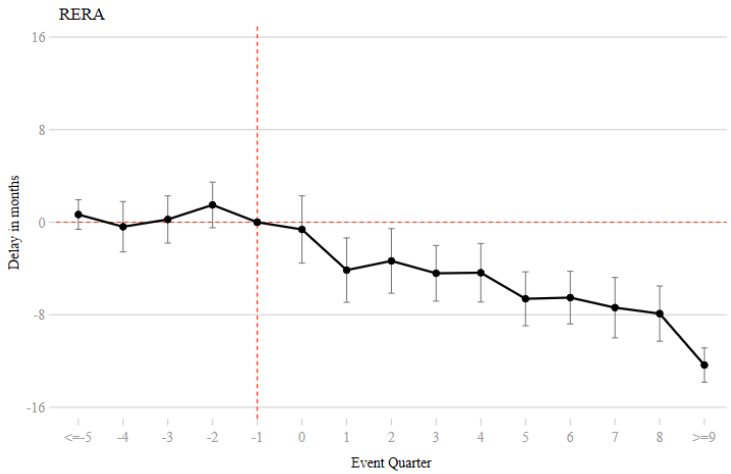
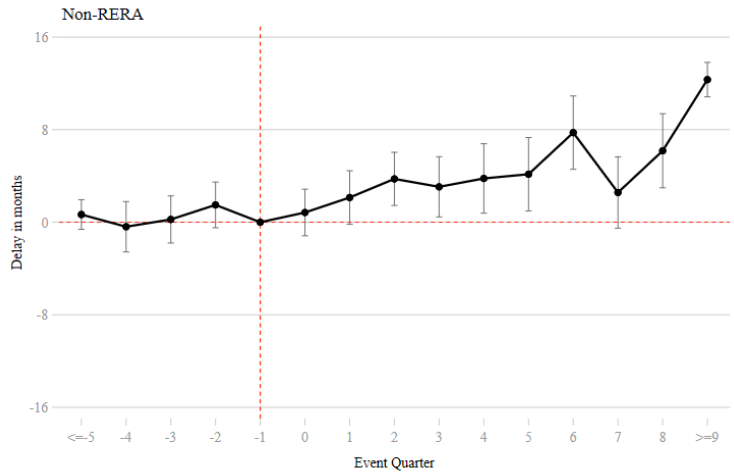


RERA



Non-RERA

Border Sample

	(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	0.008***	0.153***	0.039***	0.039***	0.024***	0.016
	(0.002)	(0.031)	(0.008)	(0.008)	(0.007)	(0.010)
Observations	1,597,159	1,597,159	1,597,159	1,597,159	1,597,159	1,597,159
R-squared	0.400	0.412	0.458	0.459	0.439	0.408
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

robust endogeneity

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***	0.141***	0.010***	0.010***	0.007***	0.003**
	(0.003)	(0.049)	(0.003)	(0.003)	(0.003)	(0.001)
Observations	1,897,104	1,897,104	1,897,104	1,897,104	1,897,104	1,897,104
R-squared	0.412	0.426	0.593	0.597	0.564	0.476
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

back

Callaway & Sant' Anna (2021)

	(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
ATT	0.020***	0.303***	0.026***	0.026***	0.016***	0.015***
	(0.007)	(0.107)	(0.007)	(0.007)	(0.005)	(0.004)
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

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Poisson

	(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
treat	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

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Branch-State-Quarter

	(1)	(2)	(3)	(4)	(5)	(6)	(5)	(6)
Dep. Var.	Binary loan $=1$		Amount of Loan		Number of Loan		Average Loan Size	
Post	0.022***	0.022***	0.423***	0.423***	0.108**	0.108**	-0.023	0.001
	(0.005)	(0.005)	(0.091)	(0.091)	(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

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State Economic Performances

Dep. Var.	(1)	(2)	(3) Post = 1	(4)	(5)
ln(GDP per Capita)	-0.564				-0.548
	(0.627)				(0.593)
ln(GVA Construction)		0.481			0.421
		(0.349)			(0.278)
ln(CPI_HP Index)			0.036		0.041
			(0.073)		(0.076)
ln(Credit Scheduled Commercial Bank)				-0.512	-0.313
				(0.316)	(0.270)
Observations	196	196	196	196	196
R-squared	0.791	0.795	0.790	0.797	0.802
Year FE	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes

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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***	0.126***	0.030***	0.030***	0.018*	0.005
	(0.002)	(0.039)	(0.010)	(0.010)	(0.009)	(0.008)
Observations	3,003,748	3,003,748	3,003,748	3,003,748	3,003,748	3,003,748
R-squared	0.375	0.387	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

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Borrower Level Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Group by	All		New Borrowers		Female		Income	
Dep. Var.	LTV	Interest Rate	LTV	Interest Rate	LTV	Interest Rate	LTV	Interest Rate
Post	7.474**	-0.158						
	(2.667)	(0.104)						
Post*Group			2.965***	-0.037***	0.013	-0.045***	0.474**	-0.075***
			(0.276)	(0.013)	(0.346)	(0.010)	(0.191)	(0.017)
ln(income)	0.156***	-0.033***	0.156***	-0.033***	0.158***	-0.033***		
	(0.052)	(0.003)	(0.026)	(0.001)	(0.052)	(0.001)		
Female	0.762**	-0.010	0.744***	-0.010**			0.773**	-0.012
	(0.298)	(0.021)	(0.094)	(0.005)			(0.298)	(0.021)
New Borrower	21.741***	0.033**			21.738***	0.033***	21.748***	0.032*
	(0.729)	(0.016)			(0.728)	(0.006)	(0.730)	(0.016)
Age	-0.294***	-0.002	-0.293***	-0.002***	-0.294***	-0.001***	-0.294***	-0.002
	(0.020)	(0.001)	(0.005)	(0.000)	(0.019)	(0.000)	(0.020)	(0.001)
Govt Staff	1.620***	-0.287***	1.622***	-0.286***	1.630***	-0.284***	1.594***	-0.282***
	(0.239)	(0.029)	(0.098)	(0.006)	(0.233)	(0.006)	(0.238)	(0.029)
Observations	441,583	475,312	441,339	475,007	441,339	475,007	441,339	475,007
R-squared	0.502	0.543	0.504	0.543	0.502	0.543	0.502	0.543
Branch*pin FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State * Group FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
State* YQ FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes

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Interest Rate Spread

	(1)	(2)	(3)	(4)
Group by	All	New Borrowers	Female	Income
Dep. Var.		Interest Spread		
Post	0.064			
	(0.064)			
Post*Group		-0.041*	-0.039**	-0.078***
		(0.022)	(0.014)	(0.016)
Observations	963,214	963,214	963,214	475,810
R-squared	0.541	0.542	0.542	0.575
Branch*pin FE	Yes	Yes	Yes	Yes
Branch*YQ FE	Yes	Yes	Yes	Yes
State * Group FE	No	Yes	Yes	Yes
State* YQ FE	No	Yes	Yes	Yes

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Evolutionary Effect on Project Scores

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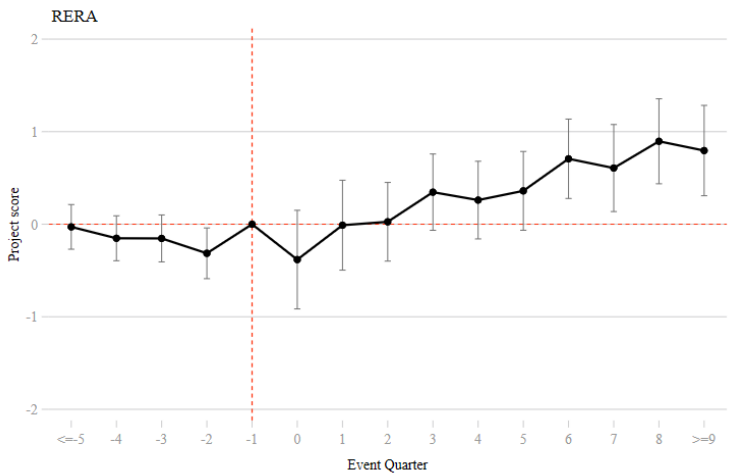
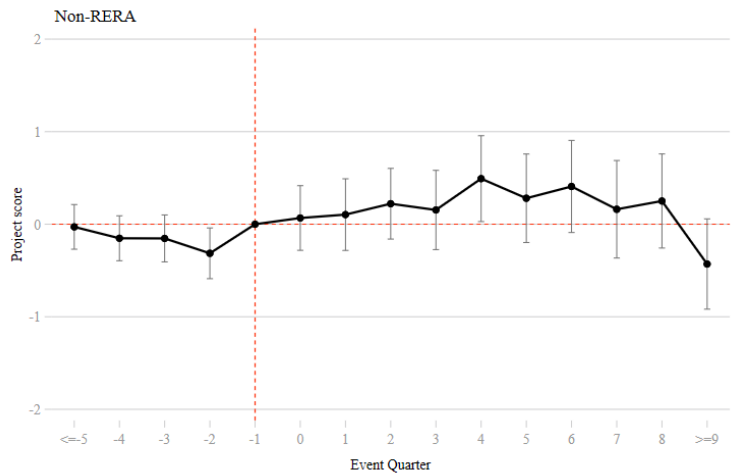


RERA



Non-RERA

Evolutionary Effect on Price psf by RERA-registration

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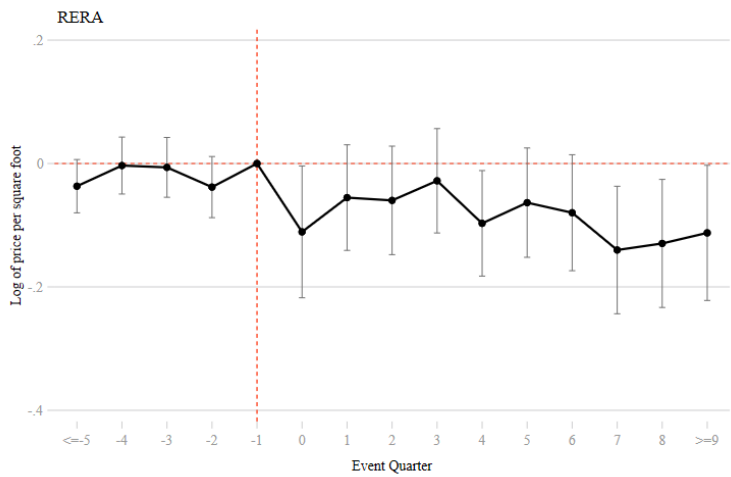

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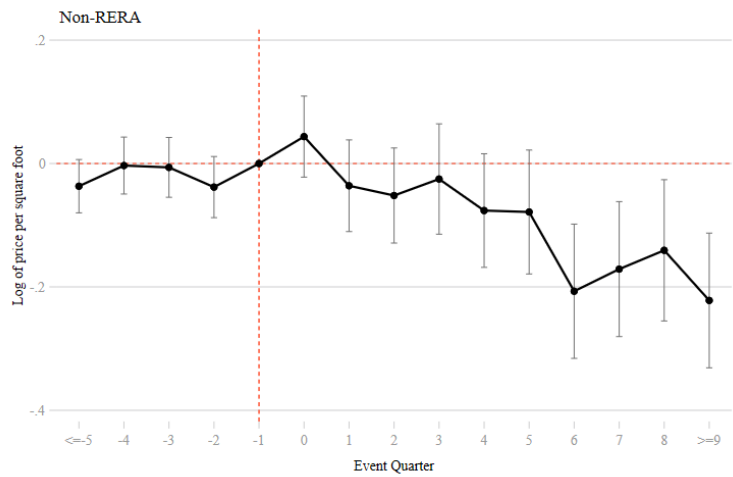

Non-RERA