

# Identifying a Suitable Control Group Based on Microeconomic Theory: The Case of Escrows in the Subprime Market

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# Motivation and Policy Application

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- Policy question: How do regulations that affect a firm's fixed costs affect consumers' access to products involved?
  - Tradeoff between consumer protection and availability and price of regulated products
- The Federal Reserve Board's Higher Priced Mortgage (Subprime) Escrows Rule
  - Escrows required on every subprime mortgage
    - Effective April 1, 2010
  - Subprime mortgages
    - Loans with APR at or above 1.5% + the Average Prime Offer Rate
    - Subprime less than 5% of residential mortgages
  - Comments about high cost of implementation and reduced access to credit
    - Implementation Cost of an Escrow System ~\$100,000

# Issues in Policy Evaluation of Regulation

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- Disentangling time-trends from policy effects
  - Lack of a control group or running variable for a discontinuity design
- Control groups in other markets require strong assumptions
- Variation in how binding the regulation is for different entities

# Preview of Findings

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- Effects of the FRB Escrow Rule
  - Did not affect aggregate access to credit
  - Decrease in metro portfolio subprime lending; no effect for overall metro subprime lending
    - No significant effect for rural areas

# Using Microeconomic Theory to Identify a Control Group

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- We have 3269 geographic markets (counties)
- Assume profit maximization
- Differing initial levels of compliance with regulation
  - Compliant at baseline → no implementation costs
  - Non-compliant at baseline
    - Implement compliance program
    - Exit if cost of implementing a compliance program is too high
      - Exits are observable
- Regulation affects consumers through the supply side
  - A market that experiences an exit may face decreased competition and increased price
  - Markets that do not experience an exit are *de facto* unaffected by regulation change
- Can be applied to other markets and policy changes

# Potential Concerns

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- Unobservable county characteristics that correlate with exits
  - Access to past, present, and future variables available to creditors
- No statistically significant effects
  - Does this method actually identify the effect of the regulation?
    - Finding holds up under different robustness checks
    - At minimum, identifies effect of a number of exits from a market on transaction volume

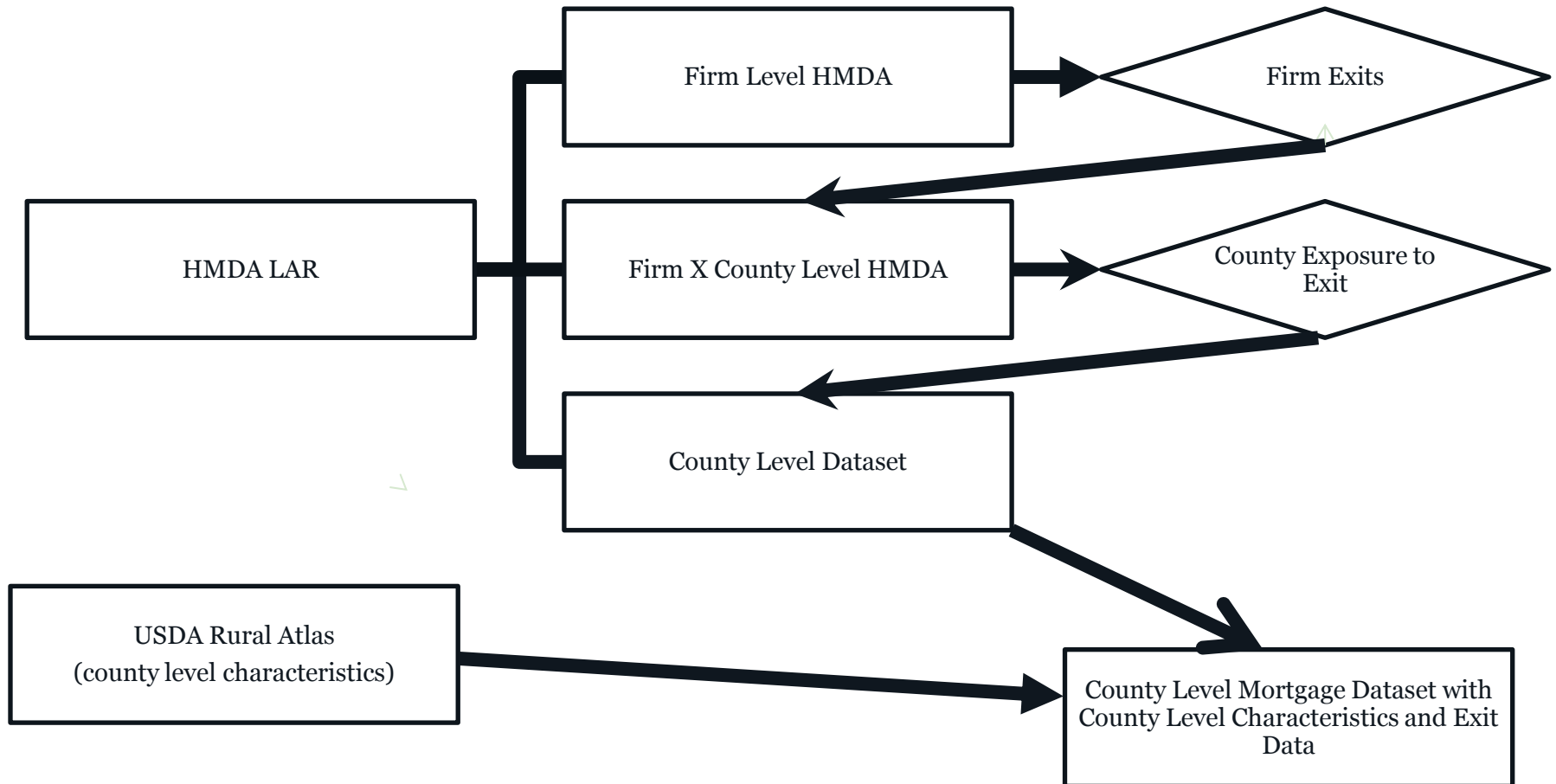
# Data

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- HMDA
  - Loan Level Files
  - Firm-level Panel Data
- USDA Rural Atlas
- Exit Definition
  - Do not directly observe whether firm is equipped to provide escrow accounts
  - Firms counted as active in subprime market if they make at least 1 subprime loan in the sample period prior to April 1, 2010
  - Firms counted as “exiting” if they originated subprime mortgages before April 1, 2010 and do not originate subprime mortgages after April 1, 2010
  - Counties are exposed to an exit if a firm originating subprime mortgages in the county prior to April 1, 2010 stopped originating subprime mortgages

# Dataset Construction Process

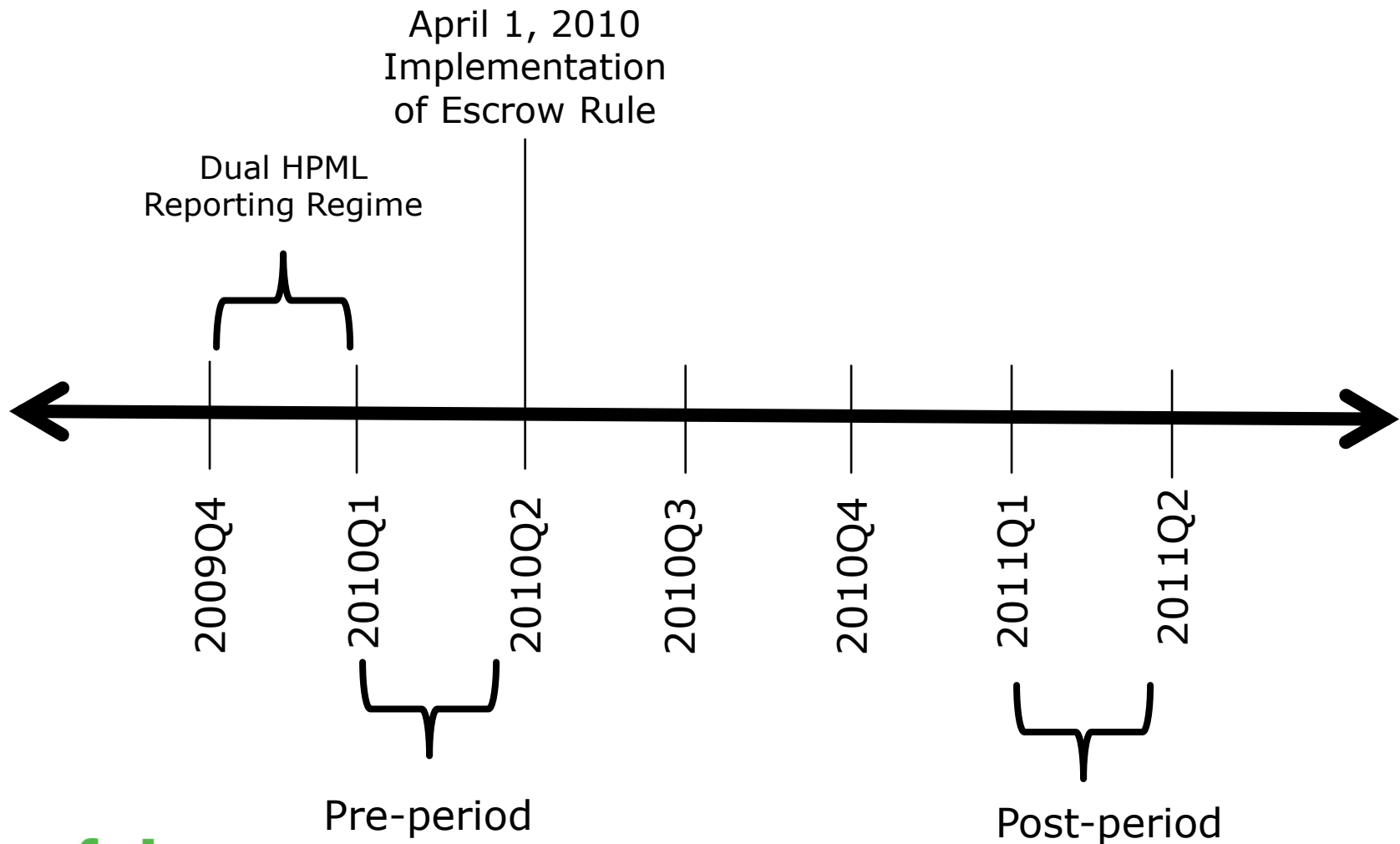
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# Timeline

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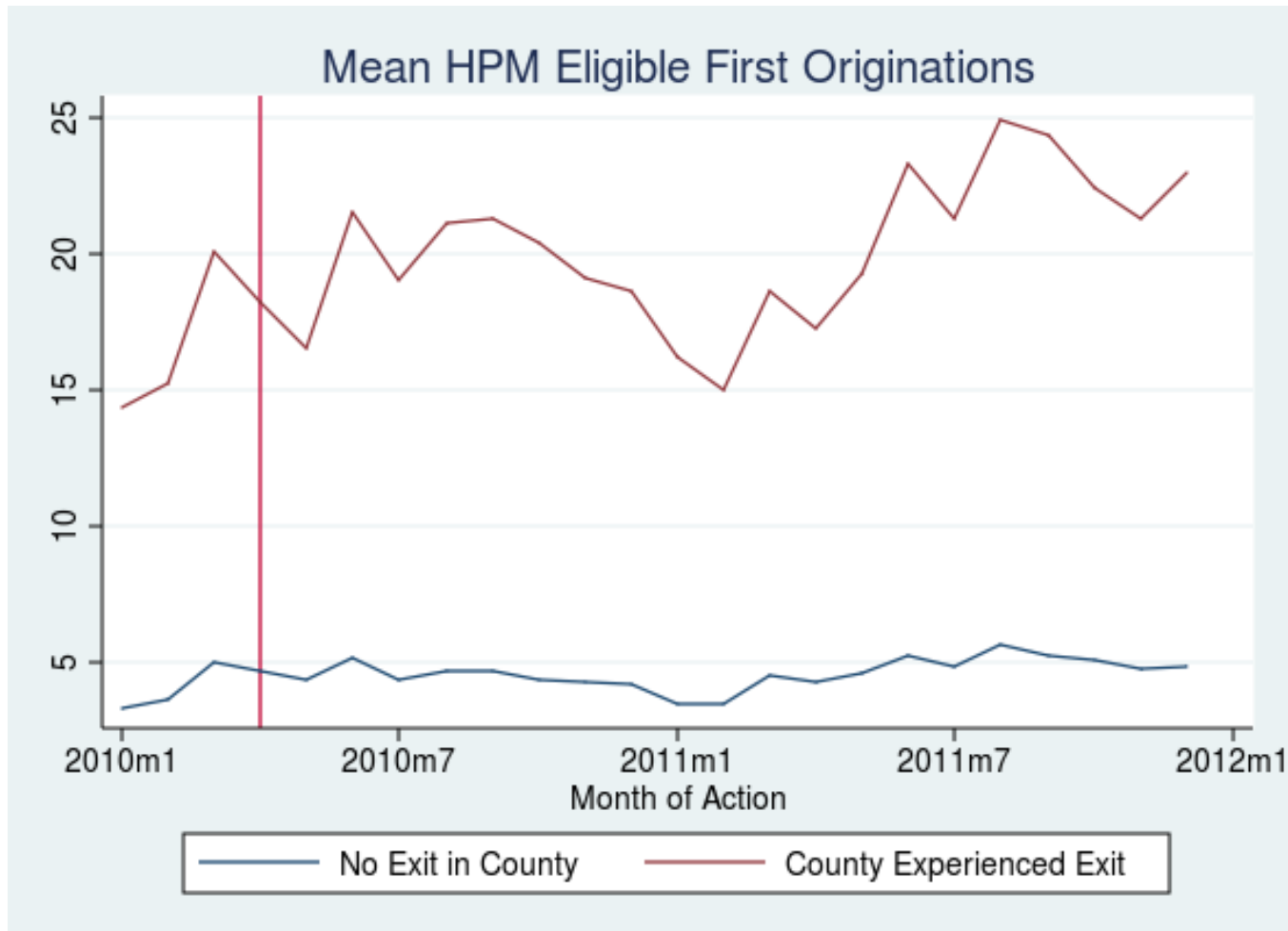


# Empirical Strategies

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- Non-exiting counties as a control group
  - Difference-in-Difference
    - Negative binomial
  - Propensity score matching
  - Synthetic control groups

# Mean Subprime Loan Counts



# Effect of the FRB Escrow Rule on County-Level Loan Counts

	(1)	(2)
	OLS	NBRM
All Subprime	0.273 (0.645)	0.0123 (0.0370)
R <sup>2</sup> /Chi <sup>2</sup>	0.674	3584
N	18,828	18,828
Portfolio Subprime	-1.663*** (0.508)	-0.0791* (0.0447)
R <sup>2</sup> /Chi <sup>2</sup>	0.370	2736
N	18,792	18,792

\* p<0.1, \*\* p<0.05, \*\*\*p<0.01.

Standard errors in parentheses. Standard errors are clustered at the county-level.

HMDA merged with USDA Rural Atlas.

Sample restricted to 2010Q1 and 2011Q1.

All models include controls for race, education, urban influence codes, median household income, average household size, total population, proportion of population age 65 and older, and proportion of owner occupied households.

# Conclusions and Future Work

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- Implementation of the FRB Escrow Rule did not restrict access to credit
- Future Work
  - Application of technique to define control groups using microeconomic theory in program evaluation
    - Validation of technique in an application where data supports other identification strategies
    - CFPB Escrow Rule

# Appendix



# County-Level Means

Variable	All Counties	Exiting Counties	Non-Exiting Counties
Count of Counties	3,269	246	3,023
Number of HPM Eligible Firsts	4.97	16.53	4.02
Number of Eligible Firsts	134.72	654.42	92.43
Total Population, 2010	191,103	478,772	167,678
Total Number of Households	70,928	175,241	62,433
Average household Size, 2007-2011	2.53	2.59	2.53
Median household income, 2011	43,979	50,084	43,487
Percent of Owner Occupied Housing, 2007-2011	72.99	69.12	73.31
Percent of population 65 or older, 2010	15.80	13.93	15.95
Race, 2010			
White	76.37	67.27	77.11
African-American	8.57	12.02	8.29
Asian	1.15	2.90	1.01
Native American	1.79	0.68	1.88
Hispanic	10.49	15.29	10.10
Multiple Race	2.02	2.44	1.98
Education, Adults 25 and Over			
No High School	16.71	15.55	16.80
High School Only	35.02	30.84	35.36
Some College	28.90	28.12	28.97
College or Higher	19.37	25.49	18.87
Metro Area (UIC Codes 1,2)	35.42%	75.61%	32.15%

# Effect of the FRB Escrow Rule on Firm-Level Loan Counts

	(1)	(2)
	OLS	NBRM
Eligible Firsts	-13.85**	-0.0344
	(5.469)	(0.0443)
R2/Chi2	76,167	76,167
N	6024	6024
Purchase Eligible Firsts	-2.305**	-0.0385
	(1.153)	(0.0438)
N	76,167	76,167
R2/Chi2	0.906	2580

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Standard errors in parentheses. Standard errors are clustered at the firm-level.

HMDA restricted to 2010Q1 and 2011Q1.

Log asset, regulator, and pre-Policy Change HPML and eligible first count controls.



# Metro vs. Non-Metro Areas

	In a Metro Area		Not in a Metro Area	
	(1) HPM	(2) Eligible Firsts	(3) HPM	(4) Eligible Firsts
All Loans	-0.131	0.00321	0.151	0.0397
	(0.106)	(0.00884)	(0.0928)	(0.0353)
N	6,540	6,540	12,288	12,288
Chi-Squared	534.8	2658	1733	4213
Portfolio Loans	-0.157***	0.0191	0.164	-0.0334
	(0.0494)	(0.0202)	(0.104)	(0.0521)
N	6,540	6,540	12,252	12,252
Chi-Squared	539.5	2637	1652	3270

\* p<0.1, \*\* p<0.05, \*\*\*p<0.01.

Standard errors in parentheses. Standard errors are clustered at the county-level.

HMDA restricted to 2010Q1 and 2011Q1.

Log asset, regulator, and pre-Policy Change HPML and eligible first count controls.

# Synthetic Control

