Regulating Household Leverage

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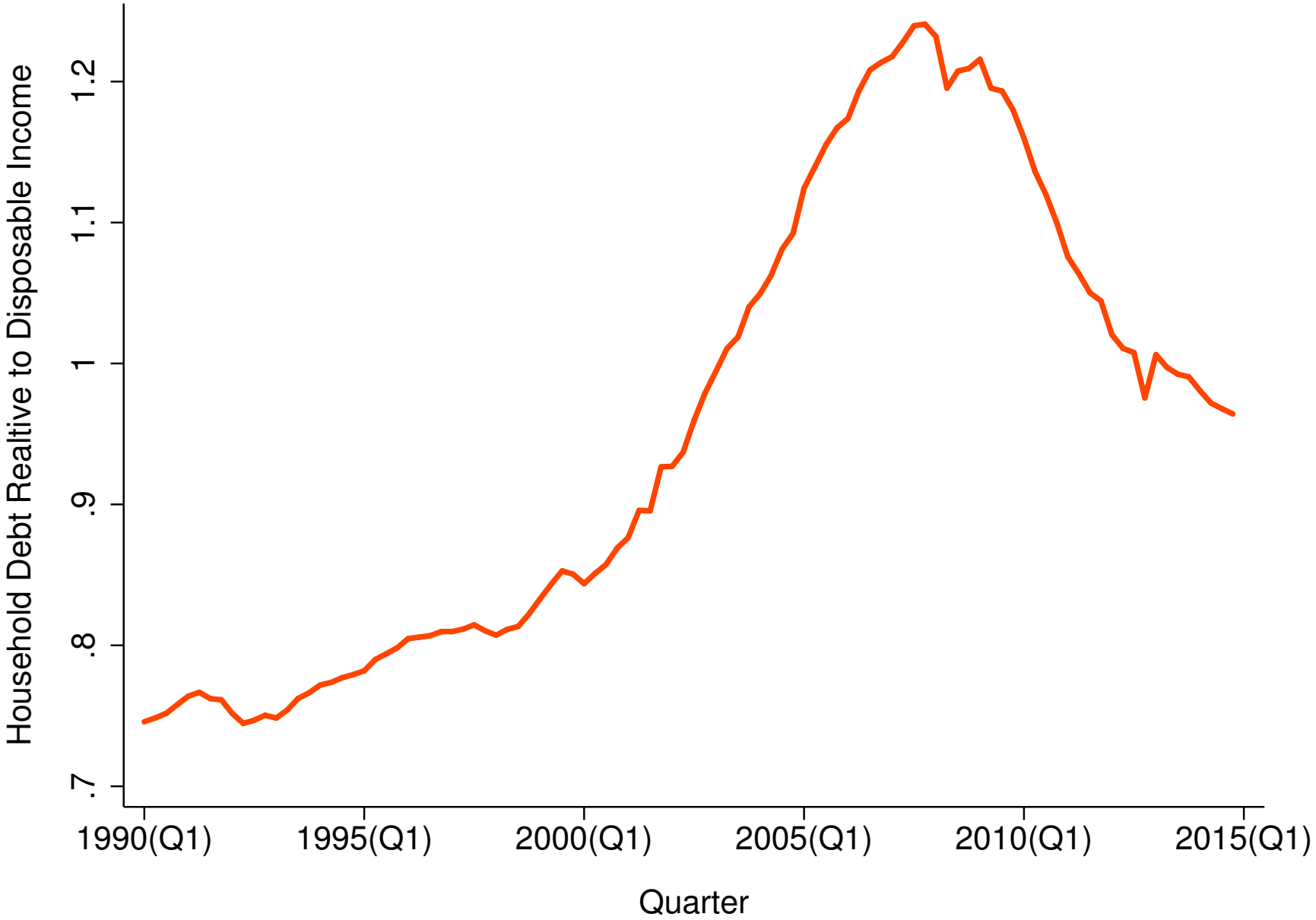
Household Leverage in the U.S. (1990–2015)



Household Leverage and the Great Recession

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  2. Forward-looking leverage curtailment
     - Macroprudential regulation
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     - Consumer financial protection
       [Campbell et al (2011), Agarwal et al (2015b), Campbell (2016)]

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     - Consumer financial protection
       [Campbell et al (2011), Agarwal et al (2015b), Campbell (2016)]
- **Relatively little empirical evidence on the impacts of #2**

This Paper

Use loan-level data to study the impact of a central U.S. policy intended to reduce household leverage in the mortgage market

The Ability-to-Repay/Qualified Mortgage Rule

- Dodd-Frank rule making high-leverage loans more costly to originate

Research Questions:

- How did this affect the price of credit?
- How did this affect the quantity of credit?
  - *Extensive margin*: Did it result in the loss of loans?
  - *Intensive margin*: Did it reduce household leverage at the loan level?
- What are the implications for mortgage market performance?

Preview of Results

- **Sharp but modest effect on prices**
  - Borrowers pay a 10-15bps premium for non-QM mortgages
    - $13,000–20,000 over 30 years for average affected loan
    - $1,700–2,600 if refinanced into QM after 5 years
- **Sizable effect on quantities**
  - About 2% of the affected market disappears completely
  - Another 2.7% take out less-leveraged loans
- **Minimal implications for performance**
  - In most extreme scenario, policy would only $\downarrow$ default rate by 0.2pp

Institutional Background and Data

Ability-to-Repay Rule (ATR)

- Mandated by Dodd-Frank and implemented by CFPB

  *"**A creditor shall not make a loan** that is a covered transaction **unless the creditor makes a reasonable good faith determination** at or before consummation **that the consumer will have a reasonable ability to repay the loan** according to its terms."*

- Consumer protection and macroprudential purpose

  *"During the years preceding the mortgage crisis, too many mortgages were made to consumers without regard to the consumers' ability to repay the loans. **Loose underwriting practices by some creditors** – including failure to verify consumers' income or debts and qualifying consumers for mortgages based on "teaser" interest rates after which monthly payments would jump to unaffordable levels – **contributed to a mortgage crisis that led to the nation's most serious recession since the Great Depression.**"*

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ATR and Qualified Mortgage (QM)

Compliance with ATR requires lenders to *either*

- Make "reasonable good faith" evaluation of 8 underwriting criteria
  - current/expected income
  - employment status
  - mortgage payment at maximum, fully-amortizing rate
  - payments on simultaneous loans on same property
  - taxes, insurance, HOA fees, etc
  - other debts, alimony, child support
  - debt-to-income ratio
  - credit history
- Originate **"Qualified Mortgages"**
  - Product features and underwriting standards set by the CFPB

ATR and Qualified Mortgage (QM)

Compliance with ATR requires lenders to *either*

- Make "reasonable good faith" evaluation of 8 underwriting criteria
  - No explicit limits on product features
- Originate **"Qualified Mortgages"**
  - Product features and underwriting standards set by the CFPB

Compliance with ATR provides legal protection

- Borrowers can bring lawsuits for violations of ATR
- Actual costs unclear, no suits have been brought
- If a loan is QM then the loan has ATR "safe harbor"

QM Standards

- QM product features and underwriting rules
  - No interest-only, balloon, or negative amortization
  - Term $\leq$ 30 years
  - Points and fees $\leq$ 3%
  - Verified income, assets, and debt
  - **Debt-to-income (DTI) ratio $\leq$ 43%**
- QM "Patch"
  - **GSE loans not required to meet DTI limit**
  - Implication: non-QM $\approx$ Jumbo loans with DTI $>$ 43 + other stuff
  - Expires in 2021 or when GSEs exit conservatorship

Research Questions

Has ATR/QM affected credit **prices**, **quantities**, or **performance**?

- **Prices**
  - Do lenders charge a premium for non-QM loans?
- **Quantities**
  - How does the DTI limit affect the allocation of credit?

    Intensive margin: shifts from high- to low-DTIs
    Extensive margin: loss of high-DTI loans
- **Performance**
  - Given DTI effects, what are the implications for mortgage default?

Data

- CoreLogic Loan-Level Market Analytics (LLMA) Data
  - Loan-level data covering $\approx$ 80% of all active first mortgages
  - Provided by majority of top-20 loan servicers
  - Origination characteristics (FICO, LTV, DTI, property type)
  - Contract terms (rate, term, product type)
  - Monthly performance information over the life of the loan
- Sample restrictions
  - Originated January, 2010 – December, 2015
  - Purchase loan
  - Conventional (non-FHA)
  - 30-year, fixed-rate
  - Owner-occupied
  - Non-missing: FICO, LTV, DTI, rate, appraisal, geography

Research Design and Results

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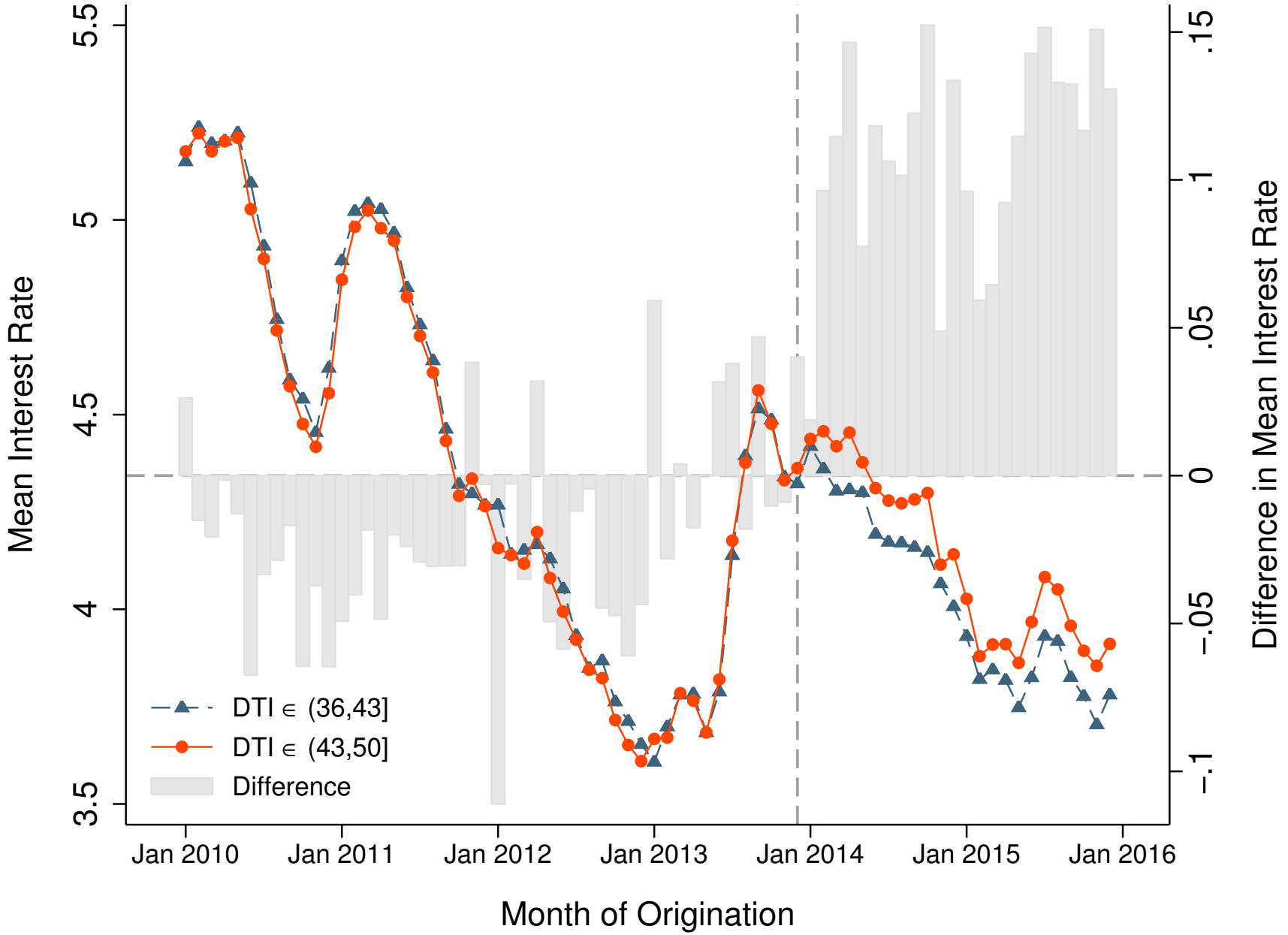
Mean Interest Rates by DTI and Month of Origination



Research Design: Difference in Differences

- Compare high/low DTI jumbo loans, pre/post QM

$$r_{it} = \alpha + \delta_t + X_{it}'\gamma + \beta_0 \cdot \mathbb{1}\left[DTI_i > 43\right] + \beta_1 \cdot \mathbb{1}\left[DTI_i > 43\right] \times Post_t + \epsilon_{it}$$

  - $\mathbb{1}\left[DTI_i > 43\right]$: dummy for whether DTI exceeds QM threshold
  - $Post_t$: dummy for whether month t is after QM implementation
  - X_{it}: loan/property characteristics
  - δ_t: month of origination FEs

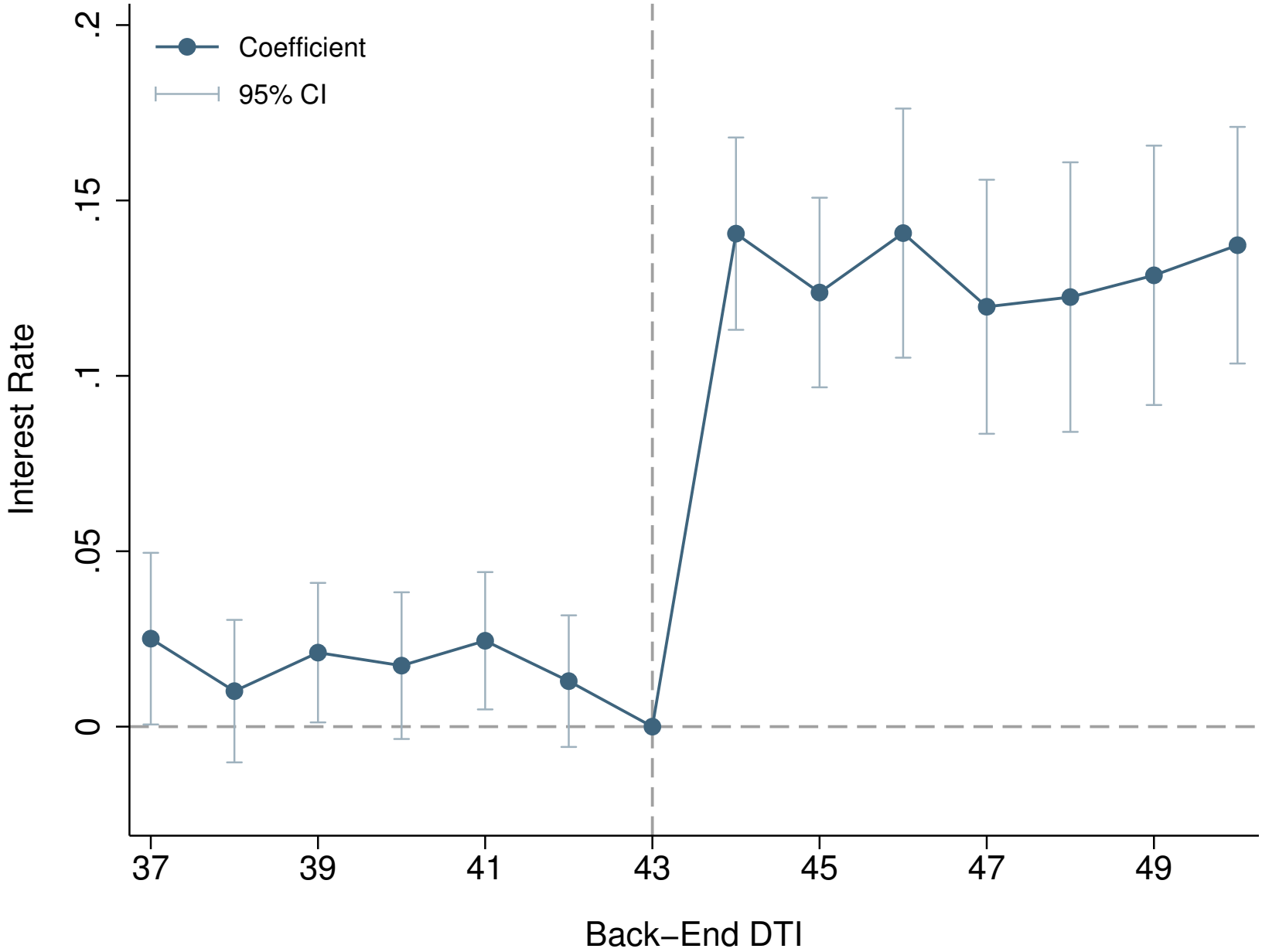
- Identifying assumption: parallel trends above and below cutoff

- Sample restriction: jumbo loans with DTI $\in (36, 50]$
  - Results robust to triple difference using conforming loans

The Effect of Non-QM Status on Interest Rates

	(1)	(2)	(3)	(4)
DTI $>$ 43	-0.018***	-0.017***	-0.004	-0.004
	(0.005)	(0.004)	(0.004)	(0.004)
DTI $>$ 43 $\times$ Post	0.131***	0.141***	0.119***	0.113***
	(0.007)	(0.008)	(0.007)	(0.007)
Month FEs	X	X	X	X
County FEs		X	X	X
FICO $\times$ LTV Bin FEs			X	X
Property Type FEs				X
Implied %Δ	2.9%	3.2%	2.7%	2.5%
R-Squared	0.70	0.72	0.75	0.75
Number of Observations	62,748	62,748	62,748	62,748

The Effect of Non-QM Status on Interest Rates by DTI



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    Premium $\approx$ ***10–15bps*** $\rightarrow$ ***$13–20,000 over 30 years***

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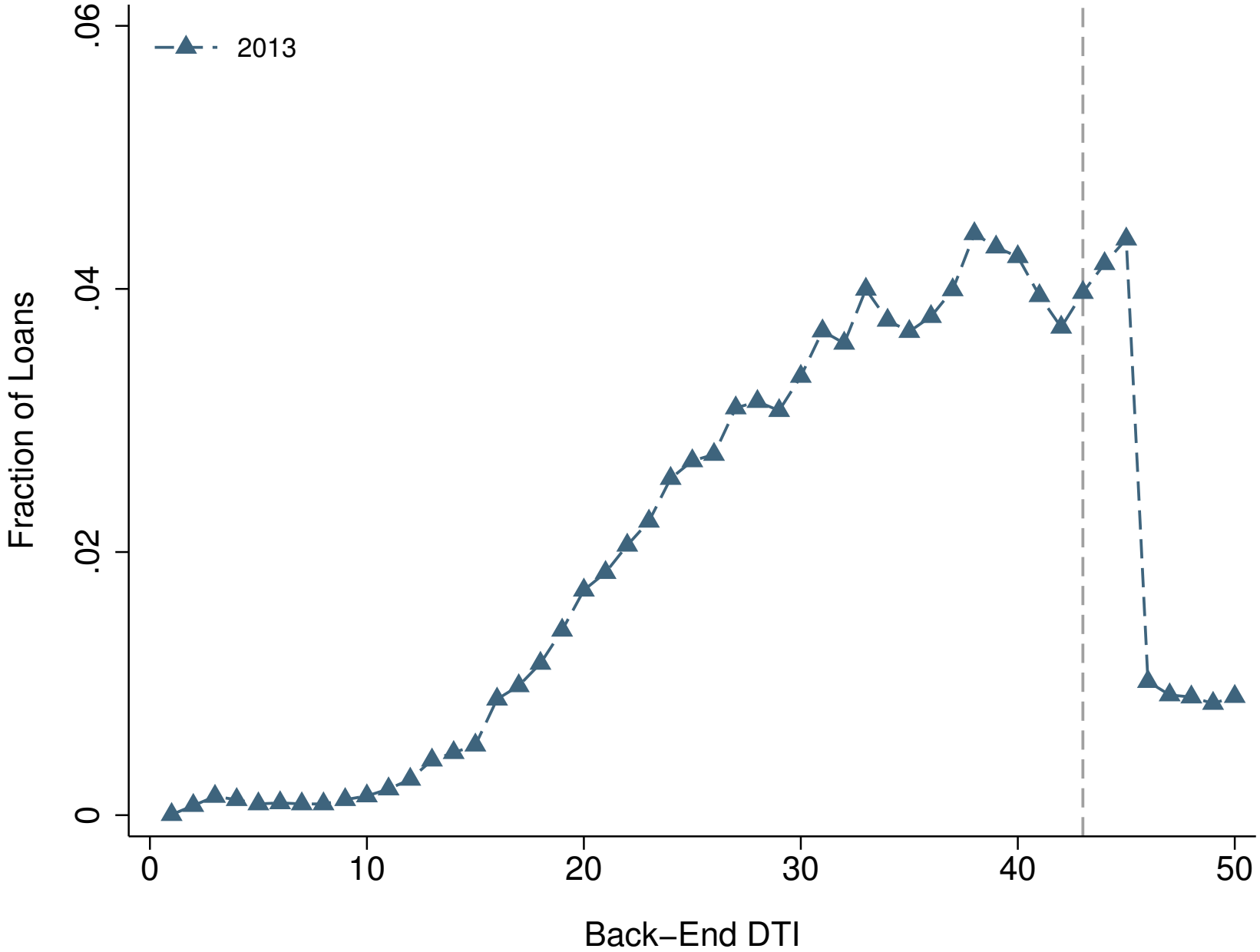
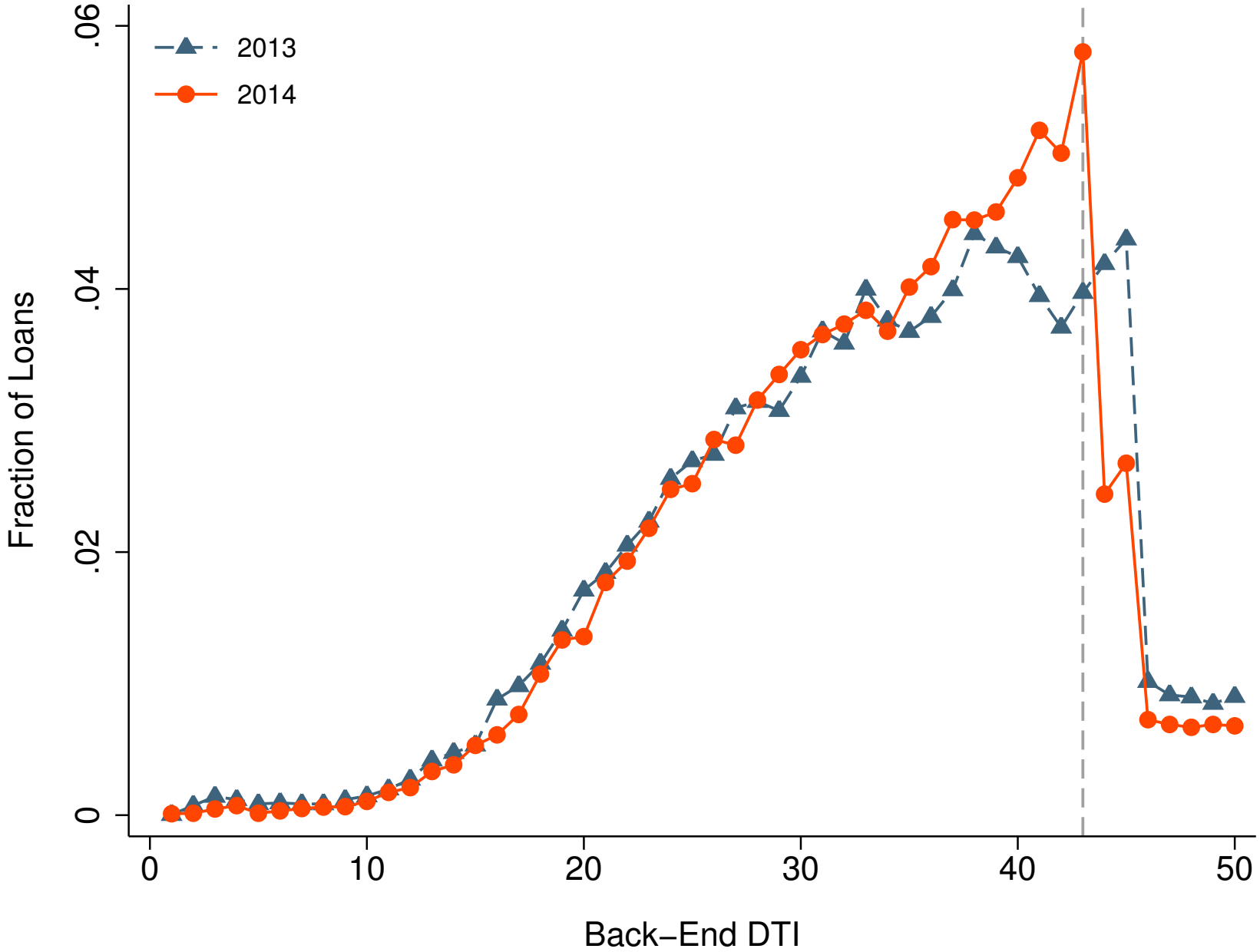
Fraction of Loans by DTI (2013)



Fraction of Loans by DTI (2013–2014)



Constructing the Counterfactual DTI Distribution

- Need to estimate number of jumbo loans at each DTI absent QM:

$$\hat{n}_{jd}^{post}$$

- Information available to construct this estimate
  - Post-QM empirical distribution of jumbo and conforming loans:

$$n_{jd}^{post}, n_{cd}^{post}$$

  - Pre-QM empirical distribution of jumbo and conforming loans:

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- **Our approach**: assume QM does not affect conforming market and, that in absence of QM, jumbo market would have behaved similarly

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- **Assumption 1**: Conforming market unaffected ($\hat{n}_{cd}^{post} = n_{cd}^{post}$)
- **Assumption 2**: Total jumbo volume only affected at high-DTIs

$$\sum_{i=0}^{\underline{d}} \hat{n}_{ji}^{post} = \sum_{i=0}^{\underline{d}} n_{ji}^{post} \triangleq N_{j\underline{d}}^{post}$$

- **Assumption 3**: Parallel trends in ratios

$$\frac{\hat{n}_{jd}^{post}}{N_{j\underline{d}}^{post}} = \frac{n_{jd}^{pre}}{N_{j\underline{d}}^{pre}} + \left(\frac{n_{cd}^{post}}{N_{c\underline{d}}^{post}} - \frac{n_{cd}^{pre}}{N_{c\underline{d}}^{pre}} \right) \triangleq \hat{\pi}_{jd}^{post}$$

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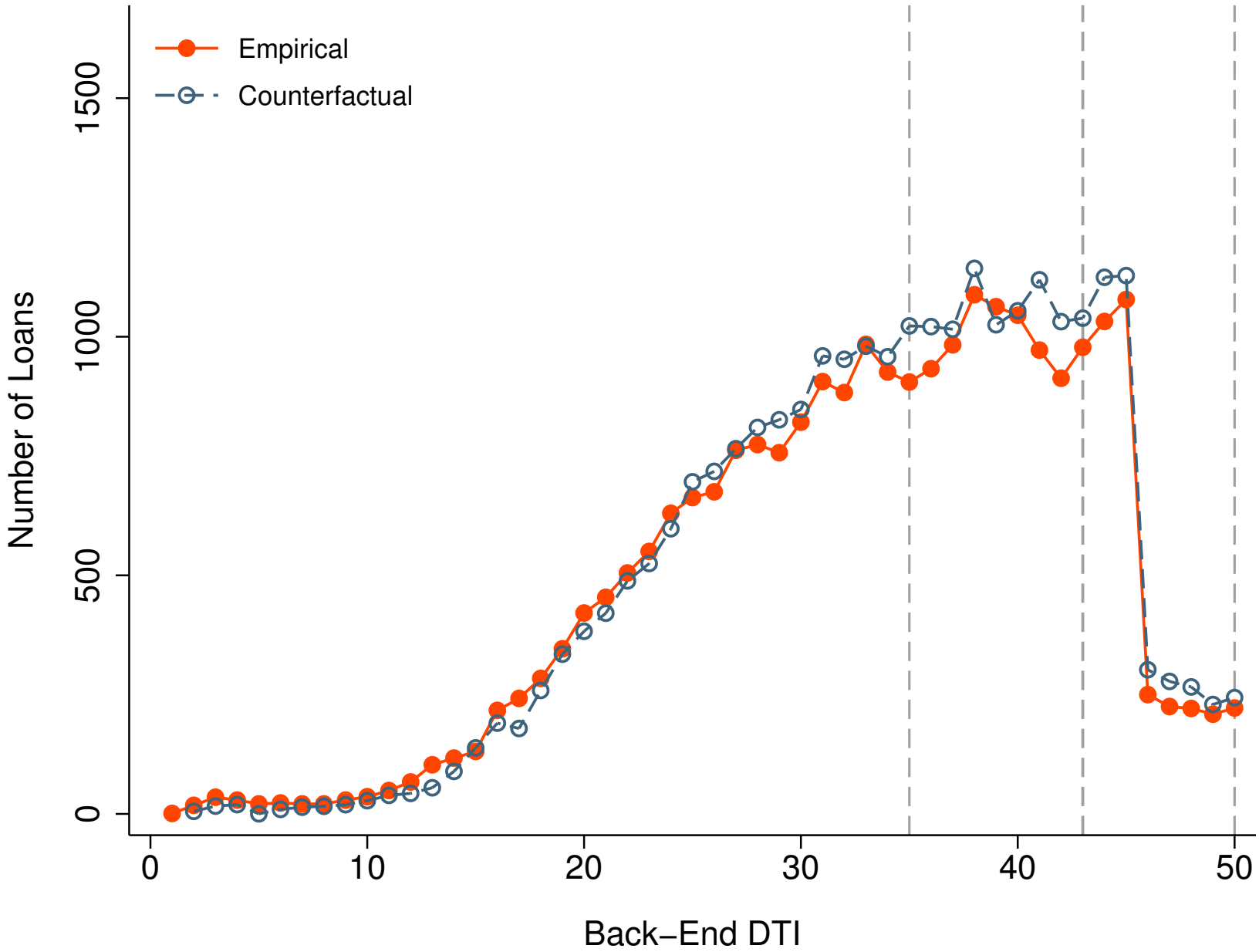
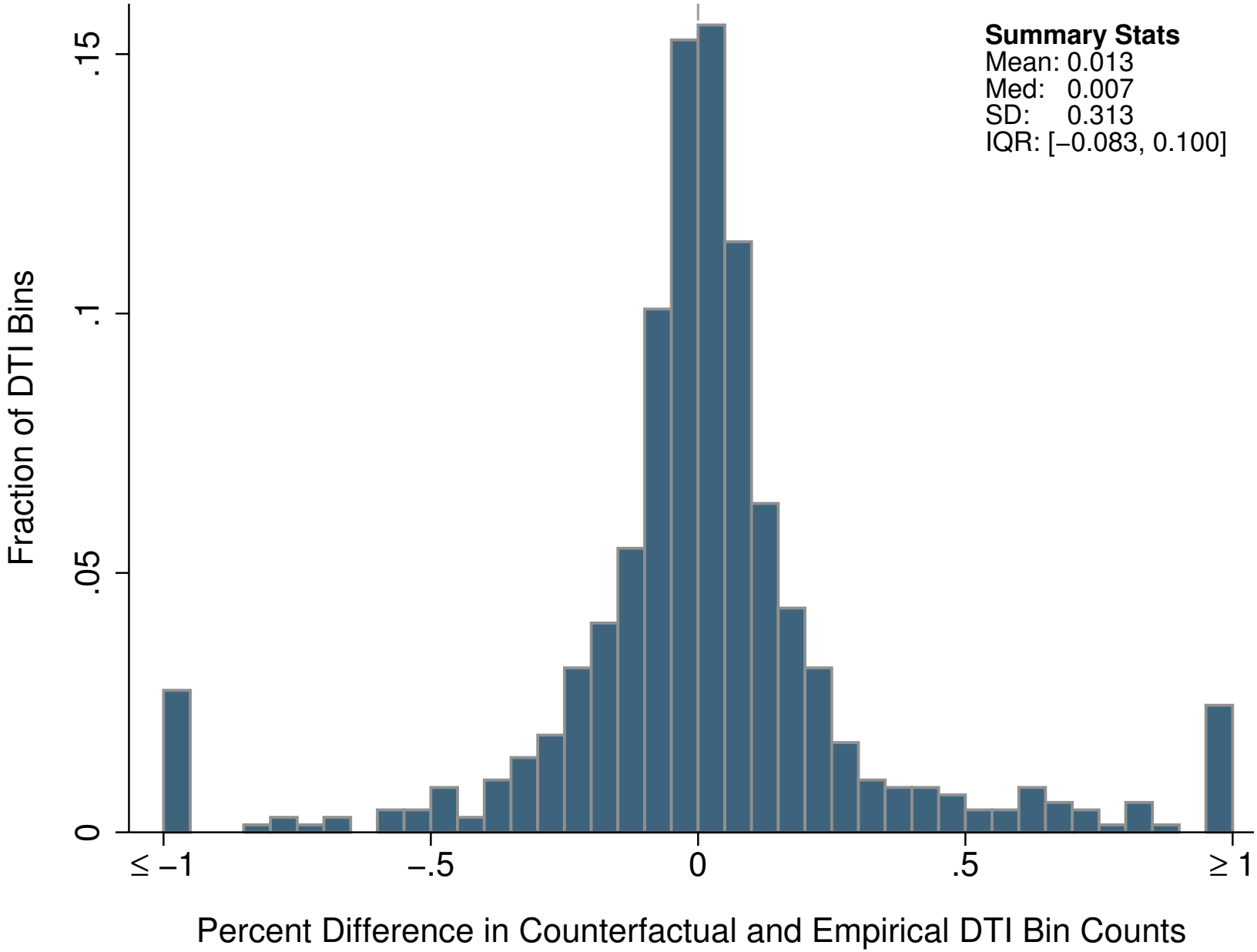
Proof of Concept: Placebo Policy Year 2013



Distribution of Counterfactual Errors: 2000-2013



Estimating Intensive and Extensive Margin Effects

- **Intensive margin response (bunching)**

$$\hat{B} = \left| \sum_{i=\underline{d}}^{43} \left(\hat{n}_{ji}^{post} - n_{ji}^{post} \right) \right|$$

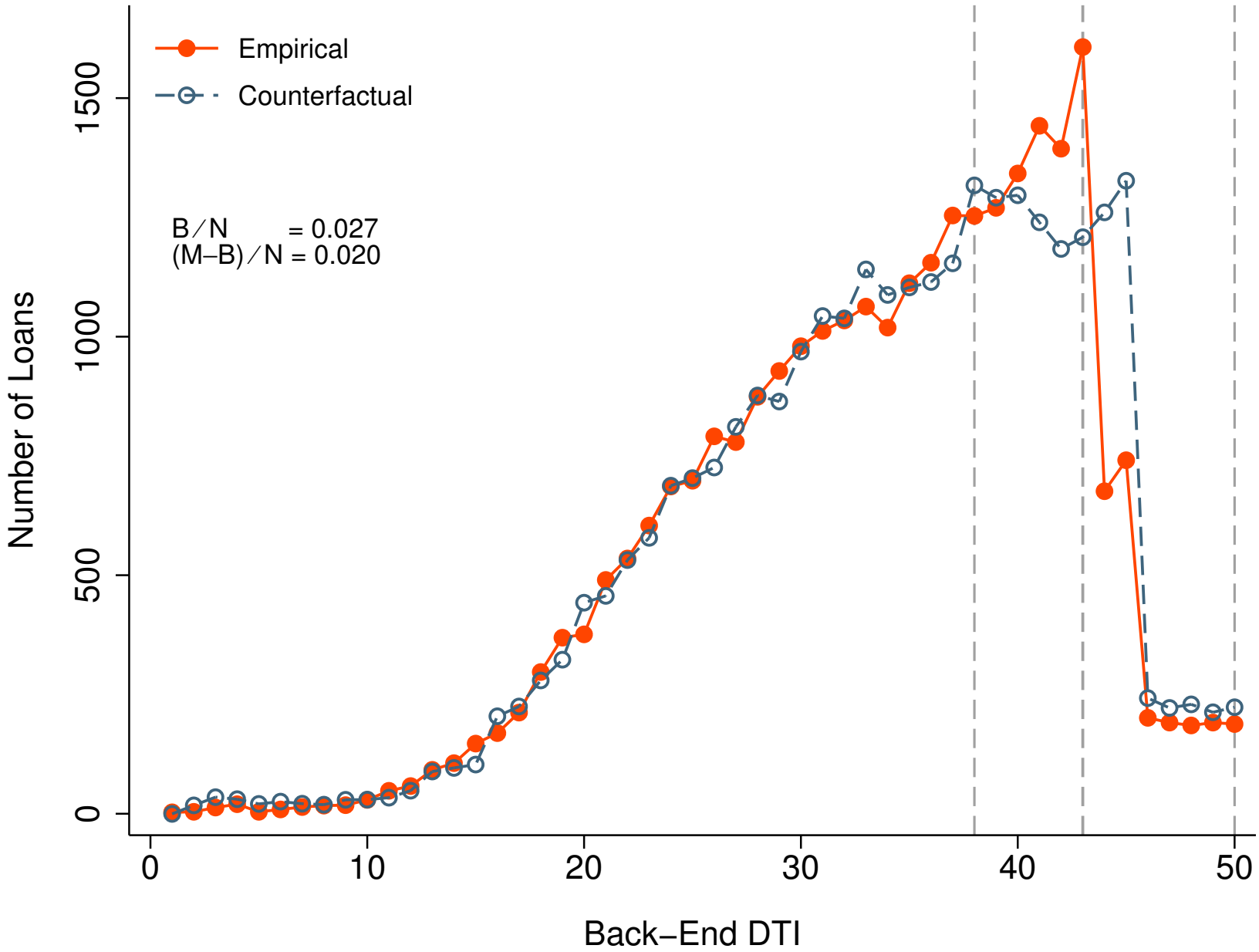
- **Missing mass**

$$\hat{M} = \sum_{i=44}^{50} \left(\hat{n}_{ji}^{post} - n_{ji}^{post} \right)$$

- **Extensive margin response**

$$\hat{M} - \hat{B}$$

The Effect of QM on Quantity of Credit



The Effect of QM on the Quantity of Credit: Robustness

	Preferred	Alternative Specifications		
	(1)	(2)	(3)	(4)
	$\overline{d} = 38$	$\overline{d} = 30$	$\overline{d} = 35$	$\overline{d} = 40$
$\hat{B}/\hat{N}_j^{post}$	0.027***	0.025**	0.035***	0.030***
	(0.006)	(0.011)	(0.007)	(0.004)
$(\hat{M} - \hat{B})/\hat{N}_j^{post}$	0.020***	0.024**	0.012	0.018***
	(0.007)	(0.011)	(0.008)	(0.005)
Bootstrap Replications	100	100	100	100
Number of Observations	418,105	418,105	418,105	418,105

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Would QM Have Helped to Avoid the Mortgage Crisis?

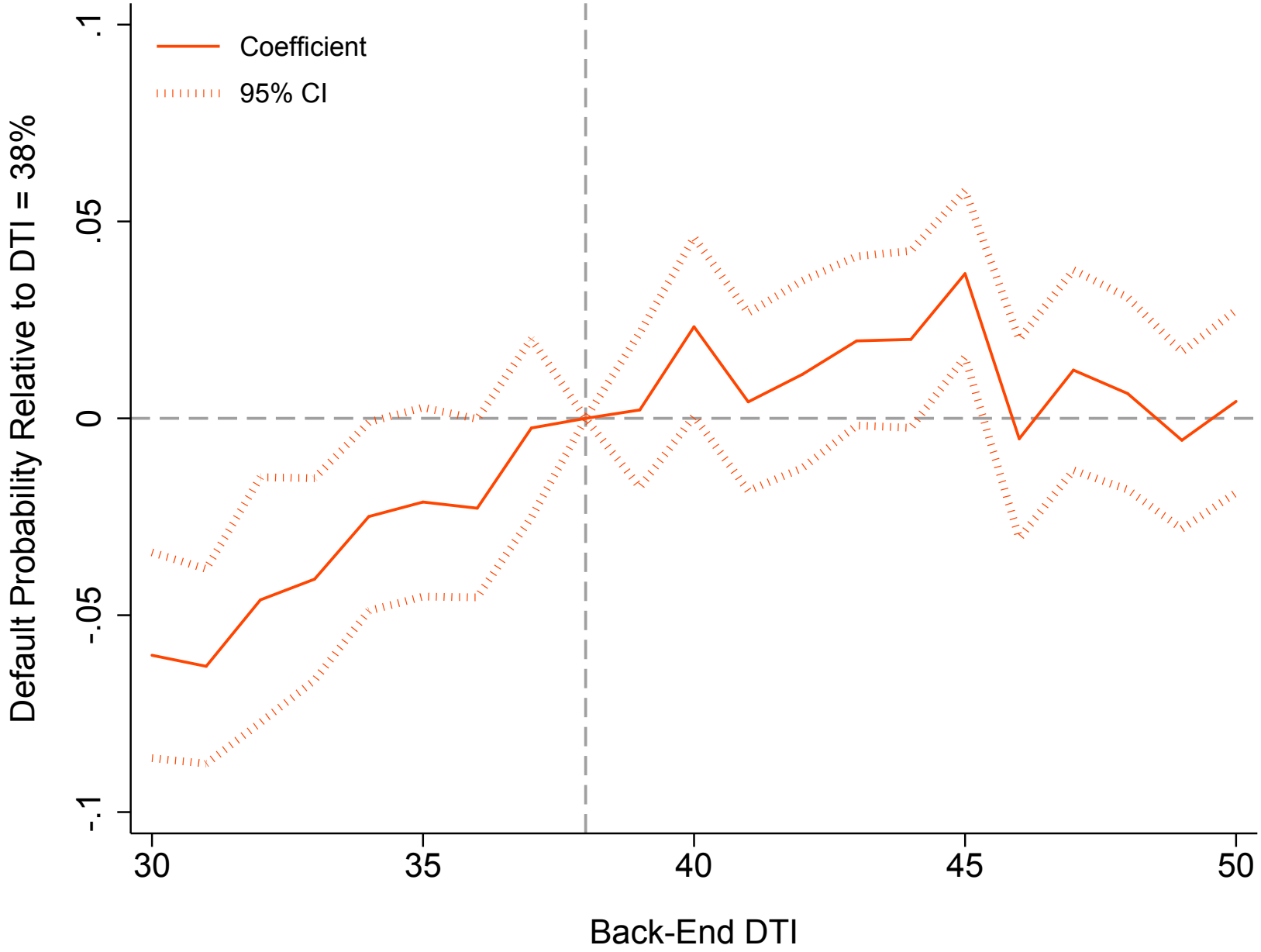
Answering this requires knowing

- How QM would have affected distribution of DTIs during the crisis
  - Extrapolate our estimates to crisis-era distribution
- The relationship between DTI and mortgage performance
  - Estimate historical relationship using performance data
  - Origination cohorts 2005–2008
  - Basic estimating equation:

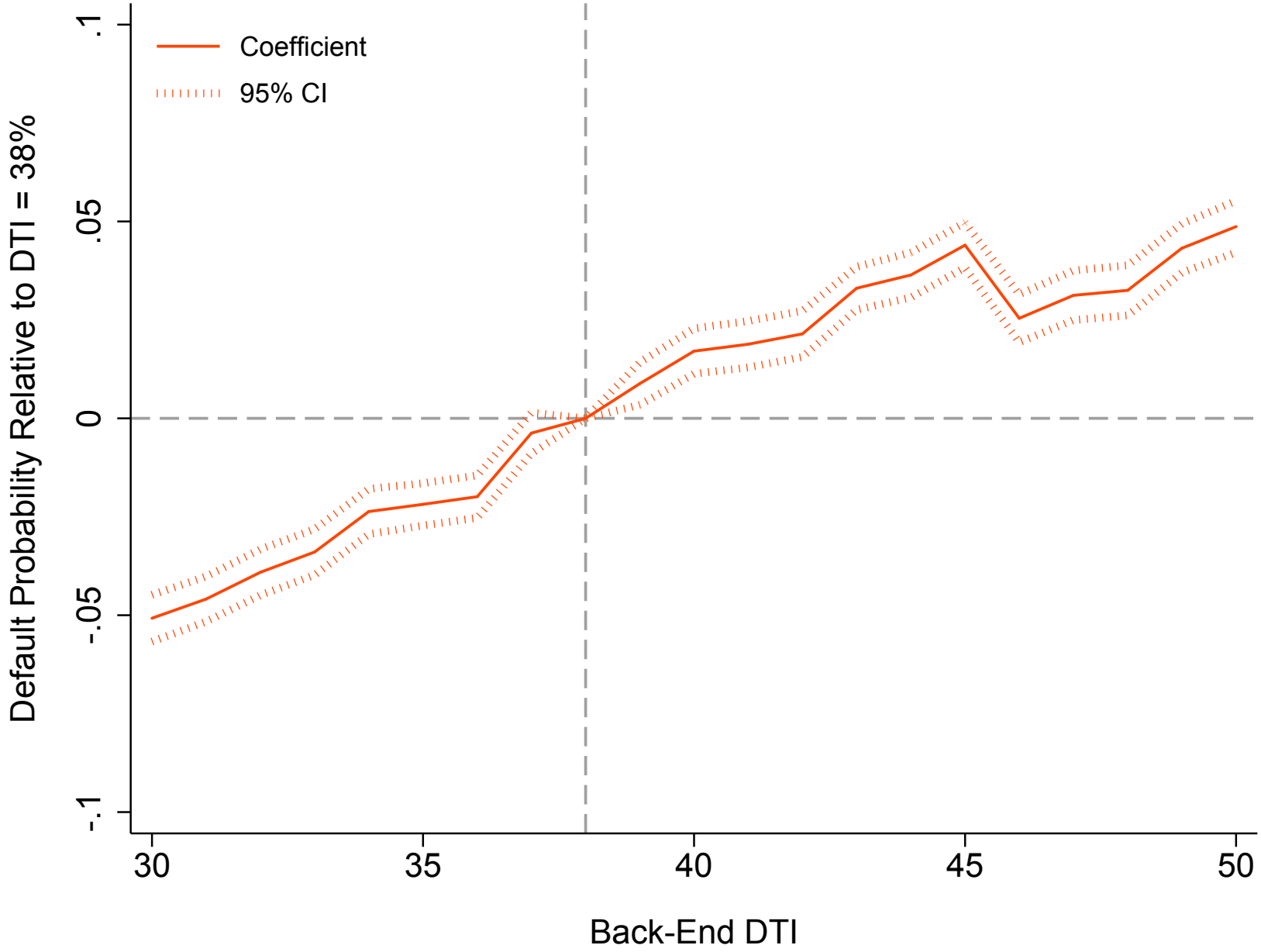
$$d_{it} = \alpha_c + \delta_t + \beta_d \cdot \mathbb{1}\left[DTI_i = d\right] + X_i'\gamma + \epsilon_{it}$$

  - Estimate for jumbos only and pooling jumbos + conforming

DTI and Five-year Default Rate: Jumbo Only



DTI and Five-year Default Rate: Jumbo + Conforming



Estimating Implied Effect of QM on Aggregate Default Rate

- Assume policy applied to entire market
- Group loans into DTI bins consistent with bunching analysis
  - High: $DTI > 43$
  - Med: $DTI \in (38, 43]$
  - Low: $DTI \leq 38$
- Estimate relative 1–5 year default rates by cohort

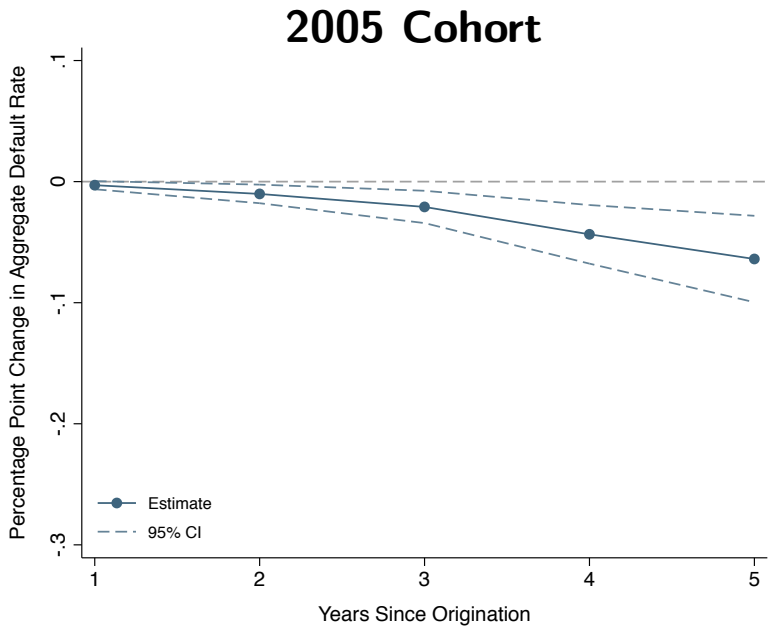
$$d_{it} = \alpha_c + \delta_t + \beta_L \cdot \mathbb{1}\left[DTI_i \leq 38\right] + \beta_H \cdot \mathbb{1}\left[DTI_i > 43\right] + XI_i\gamma + \epsilon_{it}$$

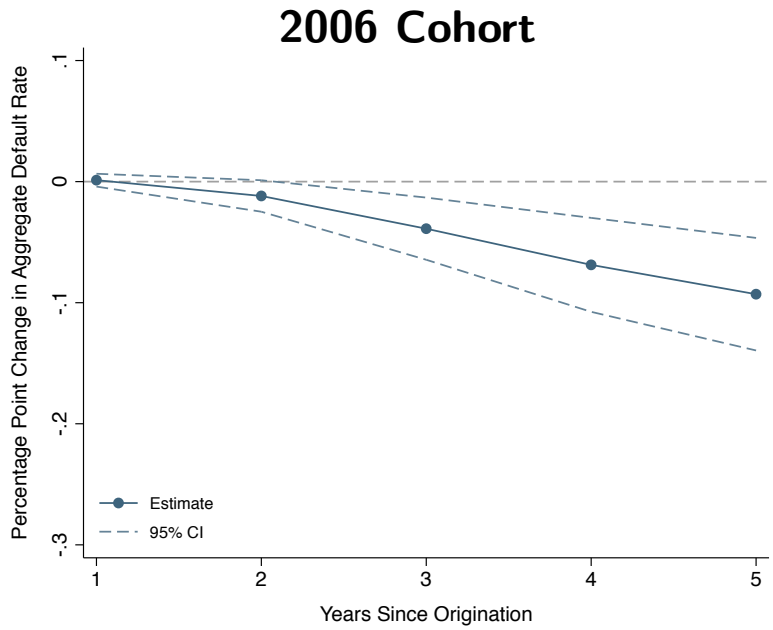
- Implied reduction in cohort-level default rate

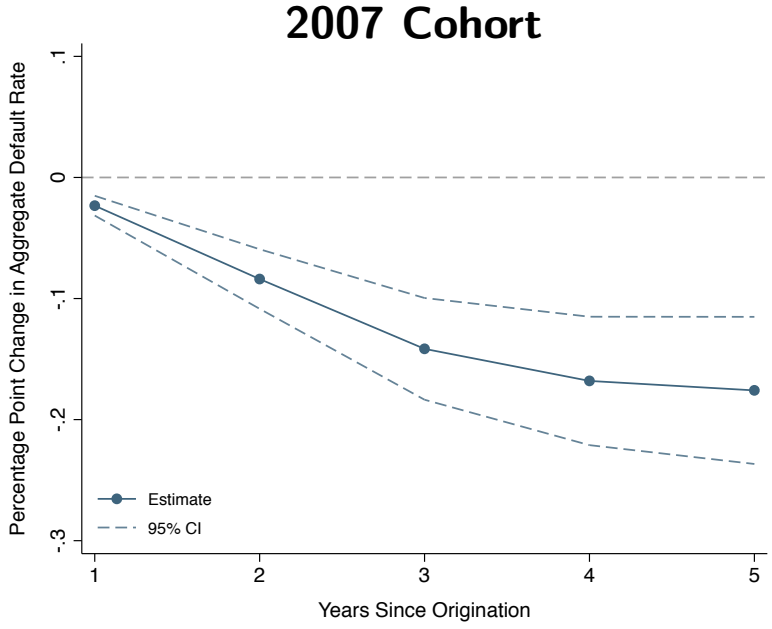
$$\Delta DefaultRate = (\beta_H - \beta_L)(\hat{\delta}_H - \delta_H) - \beta_L(\hat{\delta}_M - \delta_M),$$

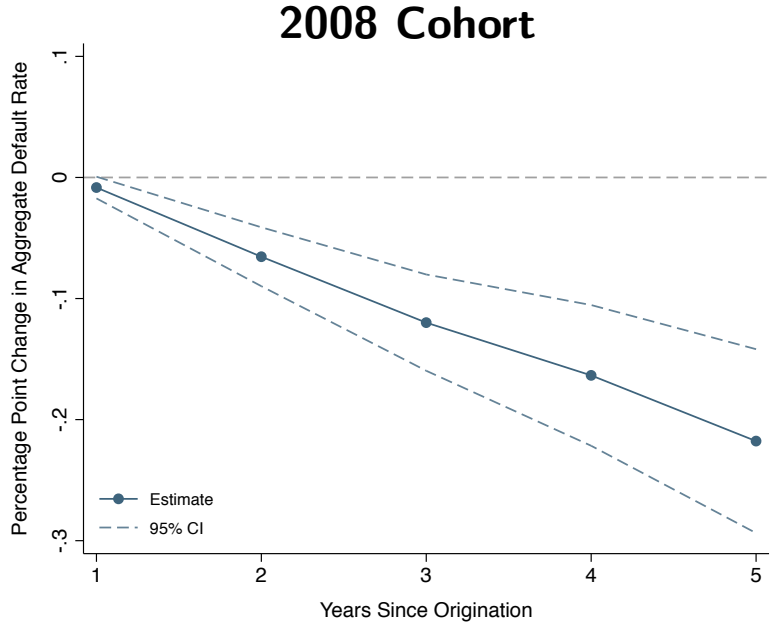
where $\hat{\delta}_i, \delta_i$ denote share of loans in bin i with and without QM

Counterfactual Effect of QM on Cohort Default Rates









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    $\downarrow$ **default rate on worst-performing cohort by only 0.2pp**

Conclusion

Bottom Line

- Prices and quantities respond sharply
- Only moderate performance improvements in extreme scenarios
- Suggests that regulating household leverage is costly

Possible Next Steps

- Decompose shift in DTI distribution
  - Reductions in loan size?
  - Higher borrower incomes?
- Understand how different kinds of lenders are responding
  - Which lenders charge a premium?
  - Which lenders drop out of non-QM market?

Thanks!