Market Concentration & Monetary Policy Transmission to Mortgages Loans at the ZLB

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M6 Course: Applied Macroeconomics

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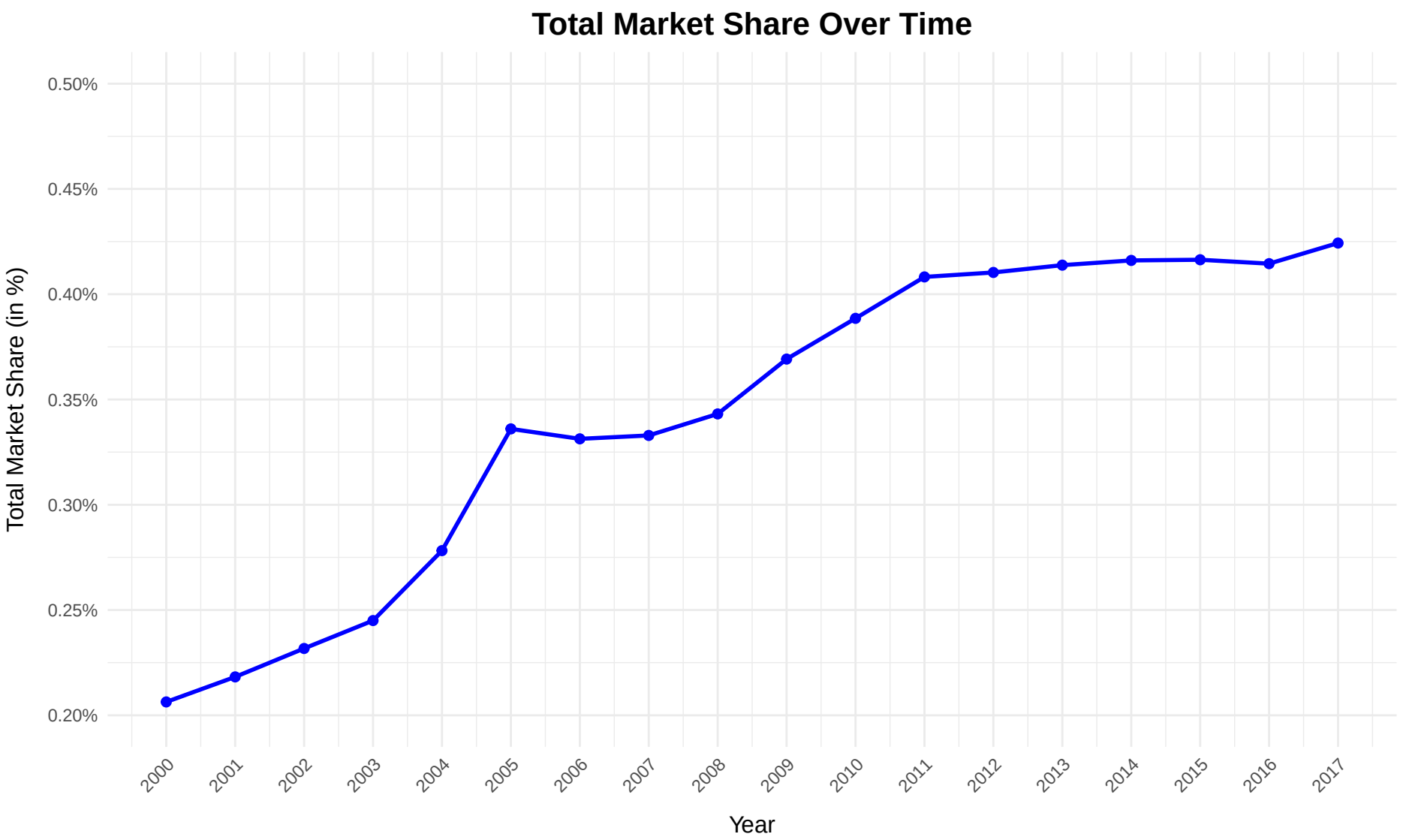
Motivation

- General Motivation :
  - Increasing market concentration in the U.S. banking sector since the 1990s
  - Long period of low interest rates in developed countries

Market Share of Top 5 Banks



Related Literature

- Related literature shows that market concentration is of great relevance for the monetary policy transmission:
  - Wang et al. (2022): Bank market power can result in a "reversal rate", where further rate cuts may decrease bank lending
  - Scharfstein & Sunderam (2016): Market power in local mortgage market leads to reduced pass-through of lower mortgage cost

Outline

Research Question

- How does market concentration in the U.S. banking sector affect the monetary policy transmission close to the zero lower bounds?
- How does it affect borrowers of mortgages in local markets?

Hypothesis

- Hypothesis: Higher market concentration leads to slower and lower pass-through of lower interest rates, due to absence of competition
- Why is the mortgage market of relevance?
  - Mortgage market represents an important part of the lending market
  - Central banks are interest on monetary policy transmission in this sector, due to its relevance (see Quantitive Easing)

Outline

Data

- Home Mortgage Disclosure Act
  - Source: Consumer Financial Protection Bureau
  - Information on all mortgage applications in the United States
  - Focus on originated application
- Summary of Deposits
  - Source: FDIC
  - Branch-level information on deposits in the United States
  - Focus on Commercial Banks and their mortgage-subdivisions
- U.S. Census Bureau & Quarterly Workforce Indicator
  - County Population
  - Earnings
  - Unemployment Rate

Outline

Methodology

- Difference-in-Difference Approach with panel data on county-year level, state fixed effects and weighted by county population:

$$y_{c,t+1} = \alpha + \delta \text{Post}_t + \gamma \text{Treatment}_c + \theta(\text{Post}_t \times \text{Treatment}_c) + \mathbf{X}'_{c,t}\beta + \lambda_s + \epsilon_{c,t}$$

- Explanation of Variables:
  - $y_{c,t+1}$: Log One-Year Ahead Mortgage Loan Amount
  - Post_t: Great Recession Indicator
  - Treatment_c: HHI Indicator
  - $\mathbf{X}_{c,t}$: log of Earnings, Unemployment Rate, and MSA Indicator
  - λ_s: State Fixed Effects
- Identification
  - Geographical Variation: Difference in HHI among counties
  - Time Variation: Great Recession

Outline

Main Results

- Main Results
  - No Anticipation: Average reduction of 7% in mortgage loan amount for higly-concentrated counties
  - 1 Year of Anticipation: Shows a even greater reduction in mortgage loan amount

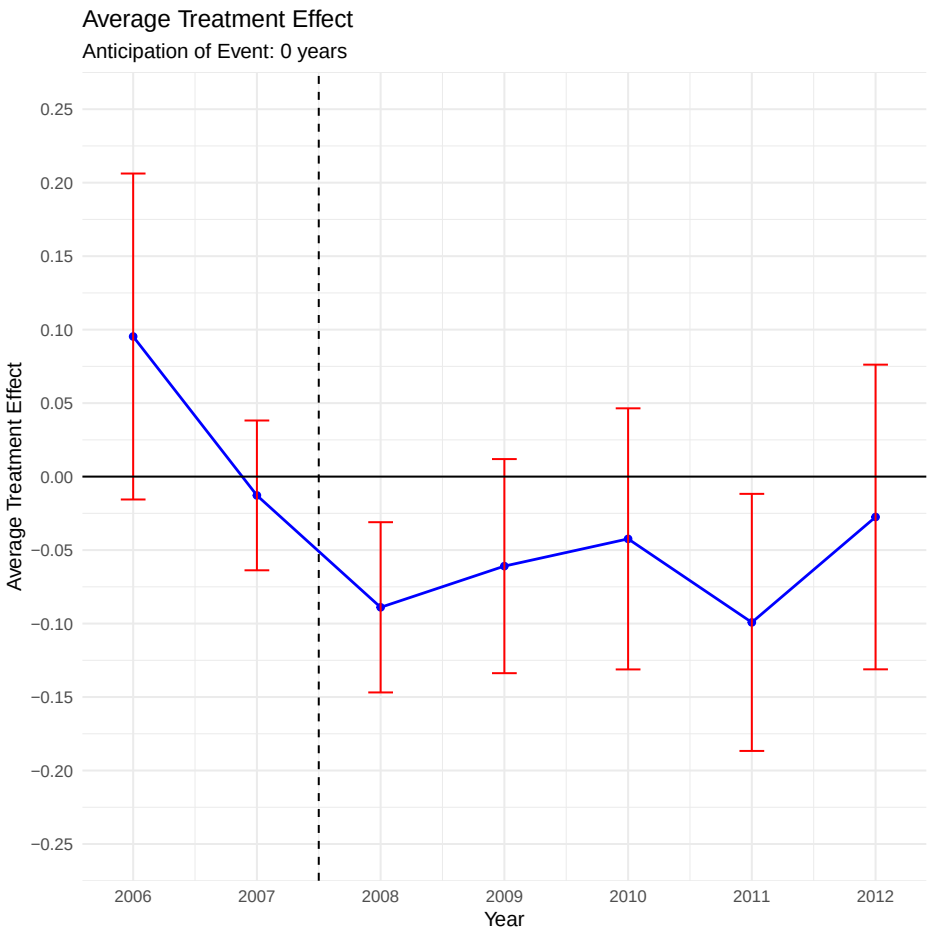
Main Result - Table

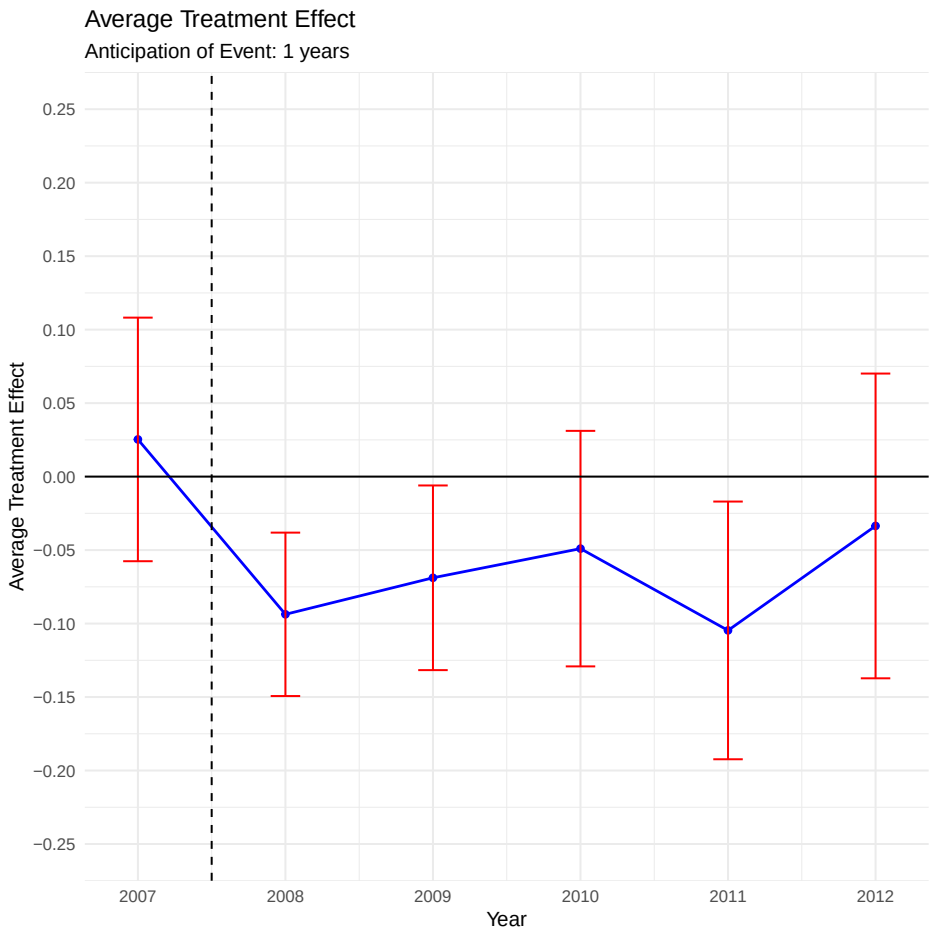
	Dependent Variable: Log One-Year Ahead Mortgage Loan Amount					
	Anticipation: 0 Years			Anticipation: 1 Year		
	(1)	(2)	(3)	(4)	(5)	(6)
Dummy: Market Concentration	−1.484***	−1.382***	−1.298***	−1.480***	−1.378***	−1.294***
	(0.110)	(0.118)	(0.124)	(0.106)	(0.114)	(0.120)
Dummy: Great Recession	0.054**	0.032	0.016	0.026	−0.017	−0.028
	(0.025)	(0.070)	(0.062)	(0.027)	(0.073)	(0.064)
Unemployment Rate		−0.013	−0.002		−0.015	−0.003
		(0.023)	(0.020)		(0.024)	(0.021)
Log Earnings		1.378***	1.106***		1.360***	1.092***
		(0.162)	(0.159)		(0.164)	(0.162)
Dummy: MSA			1.139***			1.127***
			(0.096)			(0.096)
DiD Estimator	−0.050	−0.077**	−0.070**	−0.051*	−0.084***	−0.077***
	(0.031)	(0.032)	(0.032)	(0.028)	(0.028)	(0.028)
State FE:	True	True	True	True	True	True
Clustered SE on State-Level:	True	True	True	True	True	True
Observations	11,456	11,456	11,456	14,320	14,320	14,320
Adjusted R^2	0.495	0.526	0.575	0.500	0.530	0.578
Note:						*p<0.1; **p<0.05; ***p<0.01

Main Results - ATE

- Main Results
  - No Anticipation: Average reduction of 7% in mortgage loan amount for higly-concentrated counties
  - 1 Year of Anticipation: Shows a even greater reduction in mortgage loan amount
- ATE - Callaway & Sant'Anna (2021)
  - No Anticipation: Effect is driven by first period
  - 1 Year Anticipation: Effect is driven by the first two periods
  - Effect is visible 3 year after monetary policy shock

Main Result - ATE





Main Results - Placebo Test

- Main Results
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- ATE - Callaway & Sant'Anna (2021)
  - No Anticipation: Effect is driven by first period
  - 1 Year Anticipation: Effect is driven by the first two periods
  - Effect is visible 3 year after monetary policy shock
- Placebo Test
  - No significant effect in the period before the Great Recession
  - Hence, Parallel Trend Assumption is likely to hold

Main Result - Placebo Test

	Dependent Variable: Log One-Year Ahead Mortgage Loan Amount					
	Anticipation: 0 Years			Anticipation: 1 Year		
	(1)	(2)	(3)	(4)	(5)	(6)
Dummy: Market Concentration	−1.538***	−1.387***	−1.305***	−1.554***	−1.405***	−1.321***
	(0.109)	(0.113)	(0.121)	(0.114)	(0.120)	(0.129)
Dummy: Placebo Treatment 2004	0.265***	0.109***	0.147***	−0.043	−0.215***	−0.175***
	(0.020)	(0.037)	(0.035)	(0.030)	(0.043)	(0.042)
Unemployment Rate		−0.047	−0.021		−0.047	−0.020
		(0.051)	(0.044)		(0.049)	(0.043)
Log Earnings		1.808***	1.542***		1.794***	1.511***
		(0.235)	(0.238)		(0.253)	(0.260)
Dummy: MSA			1.084***			1.102***
			(0.095)			(0.095)
DiD Estimator	0.037	0.017	0.017	0.045	0.023	0.024
	(0.029)	(0.032)	(0.031)	(0.036)	(0.037)	(0.037)
State FE:	True	True	True	True	True	True
Clustered SE on State-Level:	True	True	True	True	True	True
Observations	11,456	11,456	11,456	14,320	14,320	14,320
Adjusted R^2	0.490	0.533	0.570	0.485	0.526	0.564
Note:						*p<0.1; **p<0.05; ***p<0.01

Outline

Conclusion

- Key Results of Research Project:
  - Counties with greater banking market concentration experienced a decrease in mortgages at the zero lower bound
  - Effect is driven by the first two periods after the monetary policy shock
  - Robust with respect to Placebo Tests
- Implications:
  - Central banks have to take into account the slower pass-through of their monetary policy at the zero lower bound
  - This does not mean that monetary policy is not effective at the zero lower bound as often stated in monetary economics theory

Outline

References

Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics, 225*(2), 200–230.

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Scharfstein, D., & Sunderam, A. (2016). Market power in mortgage lending and the transmission of monetary policy. *Working Paper*, Harvard Business School. Retrieved from https://www.hbs.edu/ris/Publication

Wang, Y., Whited, T. M., Wu, Y., & Xiao, K. (2022). Bank market power and monetary policy transmission: Evidence from a structural estimation. *Journal of Finance, 77*(4), 2093–2141. https://doi.org/10.1111/jofi.13159

Outline

Robustness Check: Top 5 Banks

- Concern:
  - Economic theory suggests that large banks have different cost structures, risk profiles and access to capital compared to smaller banks
  - Additionally, large banks can take advantage of economics of scale in counties with larger populations
- Solution:
  - Top 5 Banks Dummy: 1 if at least one of the 5 biggest banks in the U.S. is active in the county
  - This allows to control for large banks in a county-year level panel dataset

Robustness Check: Top 5 Banks Dummy

- Main Results with Top 5 Banks Dummy
  - No Anticipation: The magnitude of the effect becomes smaller and is only significant to the 10%-level
  - 1 Year Anticipation: The magnitude of the effect becomes smaller but is still significant to the 5%-level
- ATE with Top 5 Banks Dummy
  - No Anticipation: The ATE have become smaller in magnitude and the main results are still driven by the first year
  - 1 Year Anticipation: The ATE have become smaller in magnitude and the main results are still driven by the first two years

Robustness Check: Large Banks

	Dependent Variable: Log One-Year Ahead Mortgage Loan Amount					
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	(0.110)	(0.105)	(0.103)	(0.106)	(0.100)	(0.099)
Dummy: Great Recession	0.054**	0.036	0.021	0.026	−0.010	−0.022
	(0.025)	(0.069)	(0.061)	(0.027)	(0.072)	(0.064)
Unemployment Rate		−0.017	−0.006		−0.018	−0.007
		(0.023)	(0.020)		(0.024)	(0.021)
Log Earnings		1.174***	0.939***		1.152***	0.922***
		(0.149)	(0.140)		(0.149)	(0.142)
Dummy: Top 5 Bank		1.014***	0.927***		1.017***	0.930***
		(0.122)	(0.126)		(0.124)	(0.129)
Dummy: MSA			1.055***			1.043***
			(0.096)			(0.095)
DiD Estimator	−0.050	−0.065*	−0.060*	−0.051*	−0.074**	−0.068**
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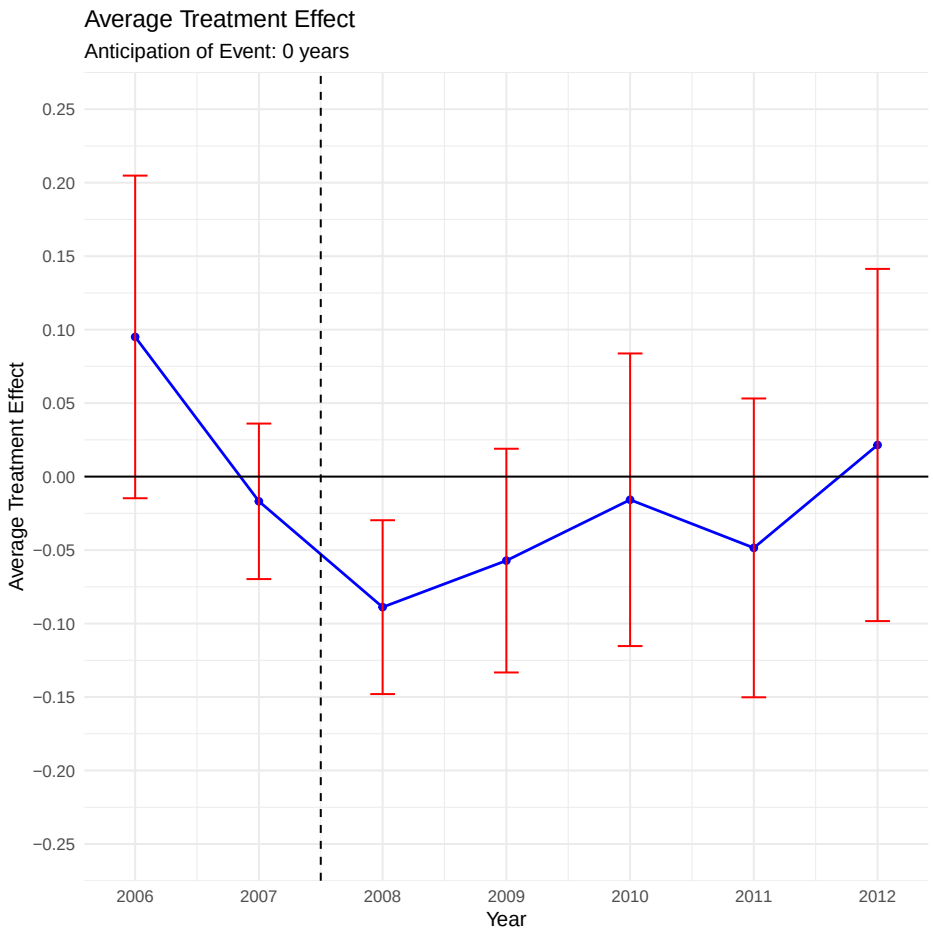

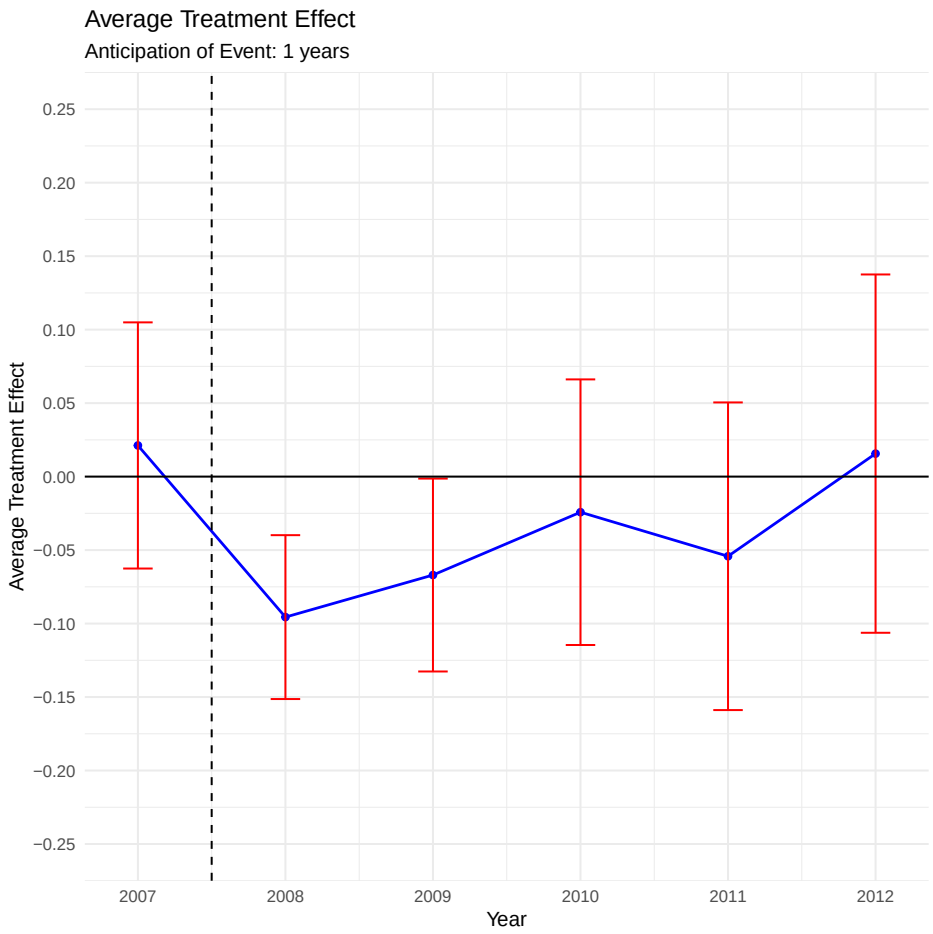

Assignment Method

- How are counties divided into treatment and control group based on deposit amounts of banks?
- Procedure:
  1. Calculate the mean HHI for each county for the year 2004 to 2007 based on deposit amounts of banks
  2. Cut-off: Median of HHI on county-level
  3. Treated group: Counties with a HHI greater than the median
  4. Control group: Counties with a HHI lower than the median
- Why the median?
- The median is a neutral cut-off for dividing counties into treated and control group and does not lead to artificially enlarged effects

Notes on Alternative Assignment Method

- Alternative Assignment Methods:
  - Option 1: Mean of HHI
  - Option 2: Market Definition for a highly concentrated market
  - Option 3: 70th quartile of HHI
- Clustering of banking institutions provides little gains for more homogeneous groups for comparison as the dataset is constructed on county-level