



# Mortgage Performance and Home Sales for Damaged Homes Following Hurricane Harvey

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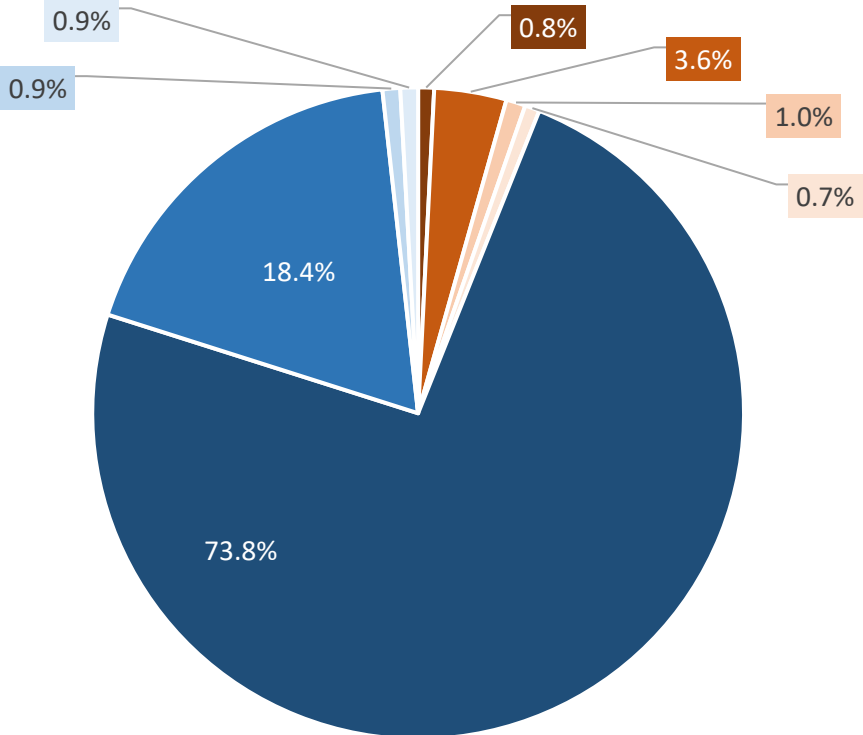
# Background

- Understanding the impact of major flooding events on loan performance and housing markets is critical to assessing current and future flood risk
- We build on the work of Kousky et al. (2020) that analyzed the impact of damages and being in a special flood hazard area (SFHA) on loan performance by using property-level insurance and claim information
- Question: How did the flood damages impact loan performance and sales following Hurricane Harvey?

# Approach

- Data
  - Loan performance data for loans on Fannie Mae book in Harvey-affected zip codes in the first two years following Harvey
  - FEMA National Flood Insurance Program (NFIP) Flood Insurance data on policies in place in Harvey-affected zip codes, plus associated claims
  - Sale transaction information for properties in Harvey-affected zip codes from 2016-2019
- Understand the role of damages – as proxied by insurance claim
- Methodology
  - Logistic regressions of loan performance measures
  - Hedonic regression for transaction price
  - OLS regression for time on market and property condition at sale

# Share of Loans by SFHA, Insurance Policy, and Claim Status

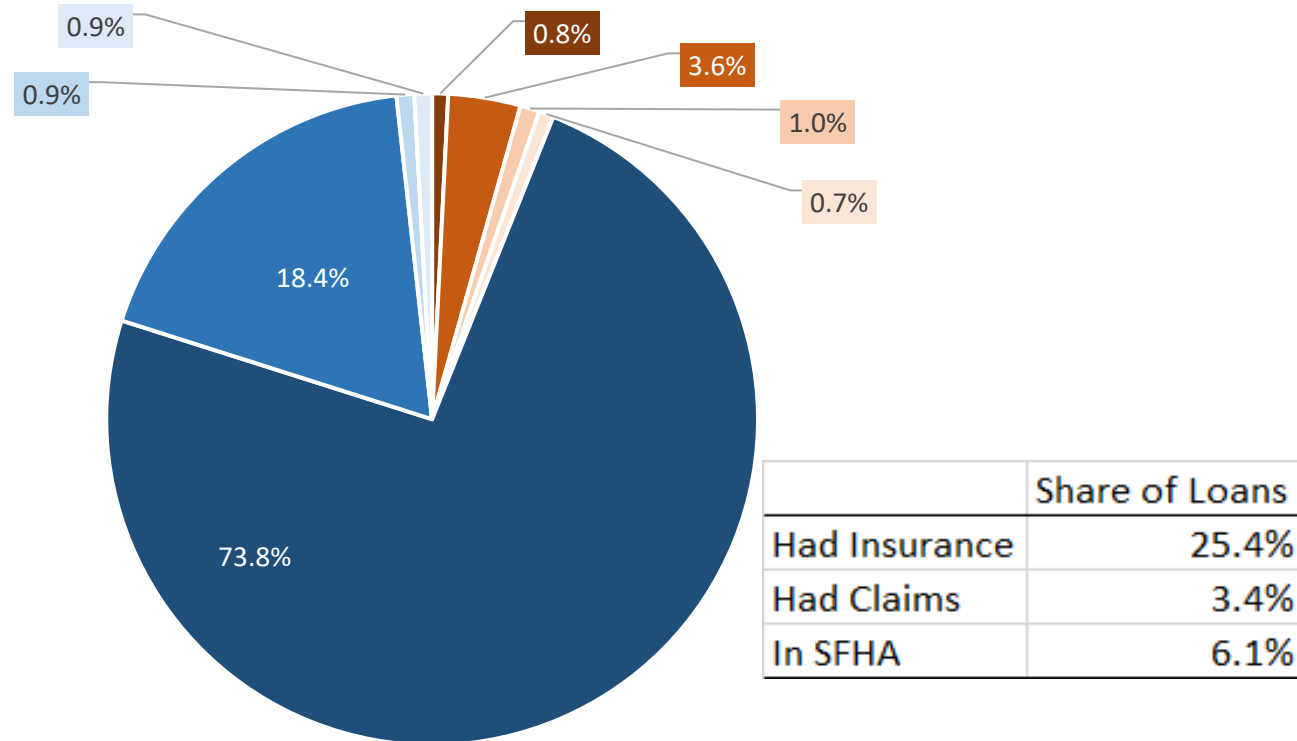


Sample Size: 71,939 loans

- In SFHA, No Policy
- In SFHA, No Claim
- In SFHA, Small Claim
- In SFHA, Large Claim
- Out SFHA, No Policy
- Out SFHA, No Claim
- Out SFHA, Small Claim
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4 Note: A claim is defined as large if it is above the sample median amount of around \$125,000, small if at or below the median.

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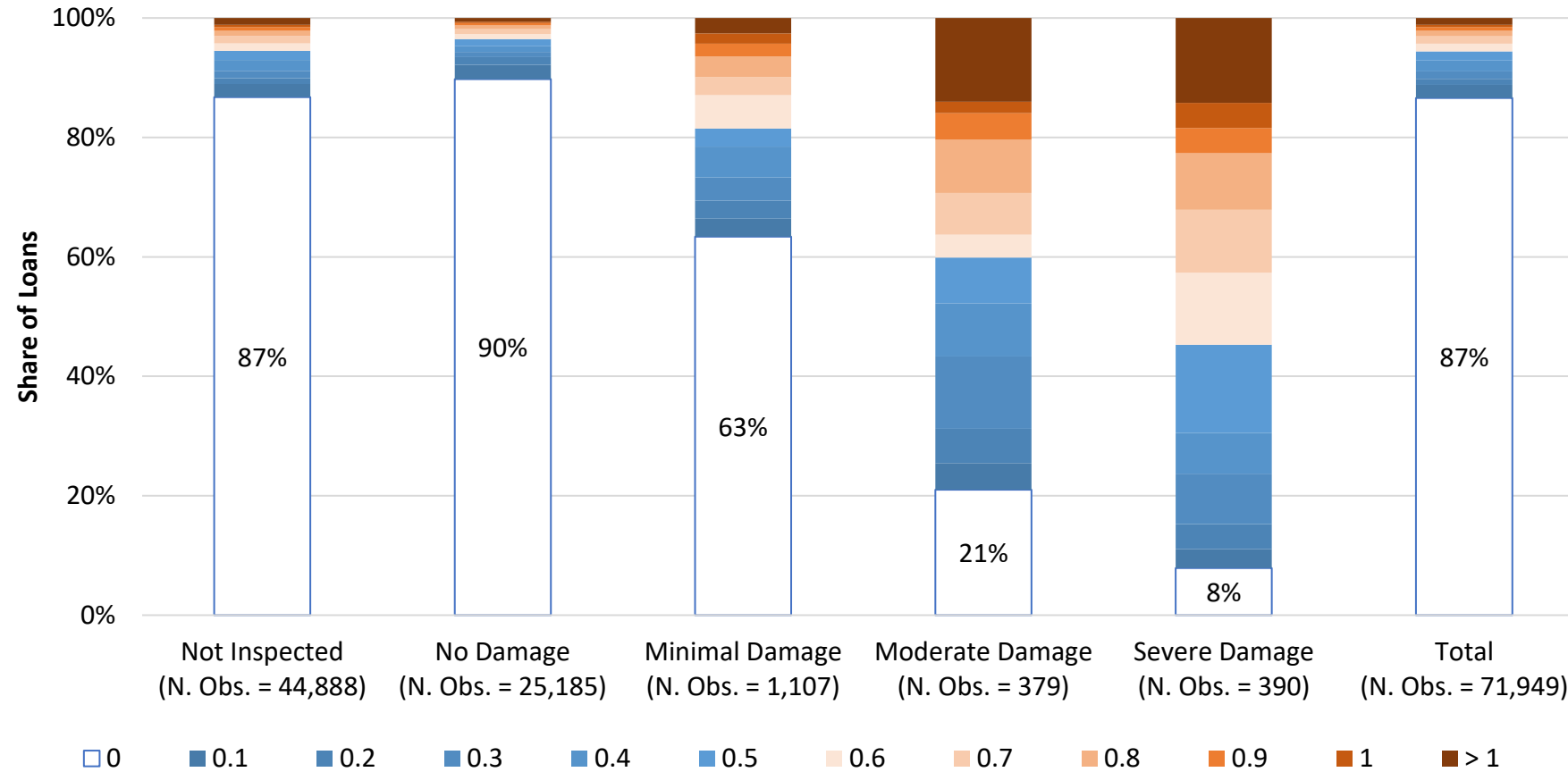
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# Are flood insurance claims a good measure of flood damages?

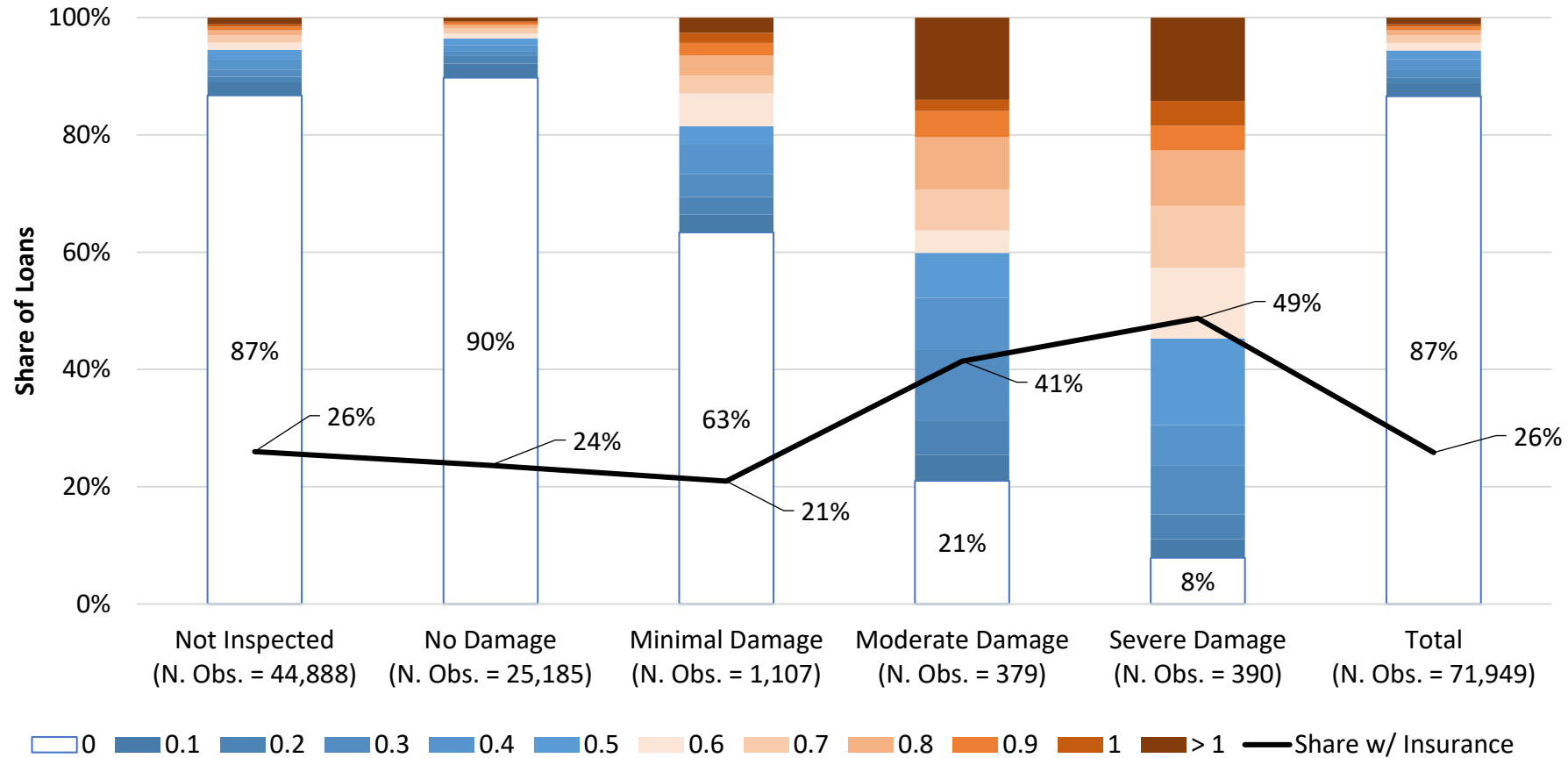


# Insurance Claim-to-Value Ratio by Inspected Damage Category



Note: Insurance claim-to-value ratio is the ratio of insurance claim amount to MTM property value. A value of zero indicates no claim. Values above 1 indicate that the claim amount is larger than the MTM property value.

# Insurance Claim-to-Value Ratio and Share with Insurance Policy by Inspected Damage Category



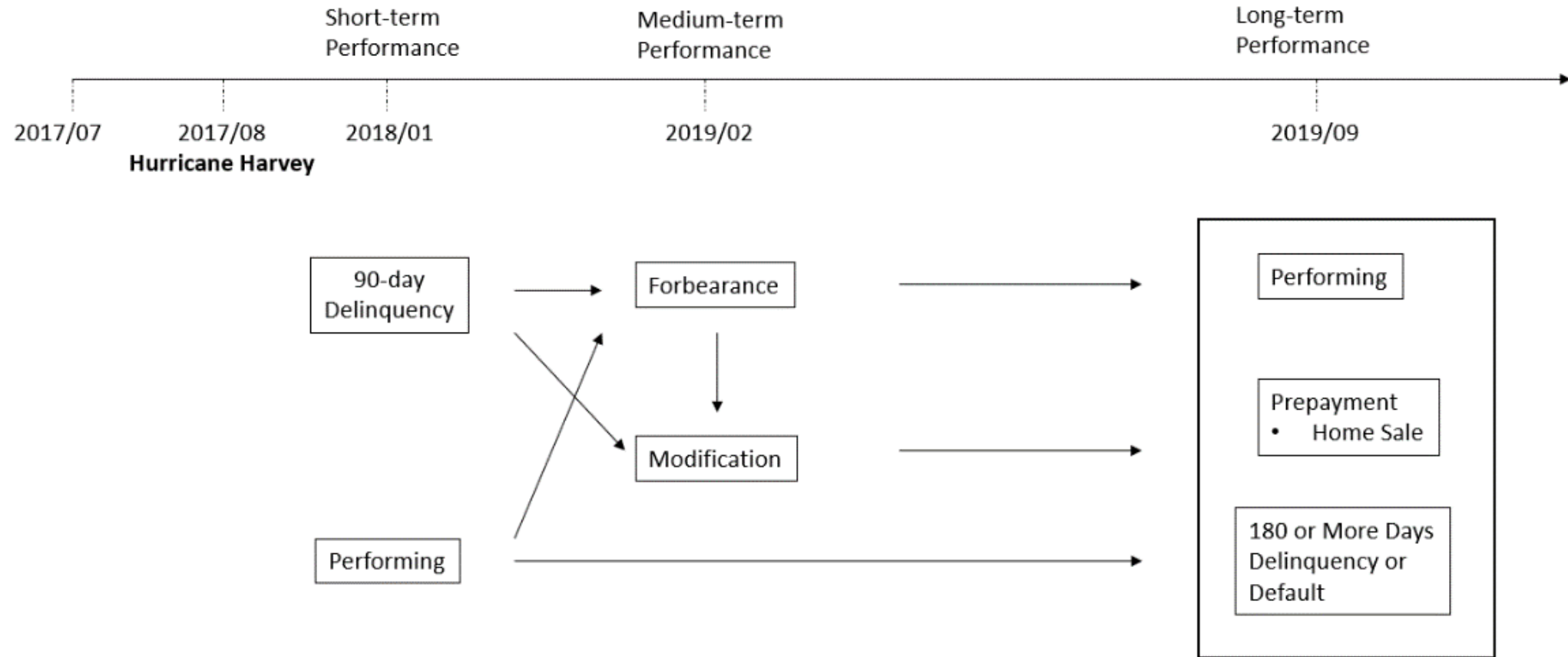
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# Results for Loan Performance Outcomes

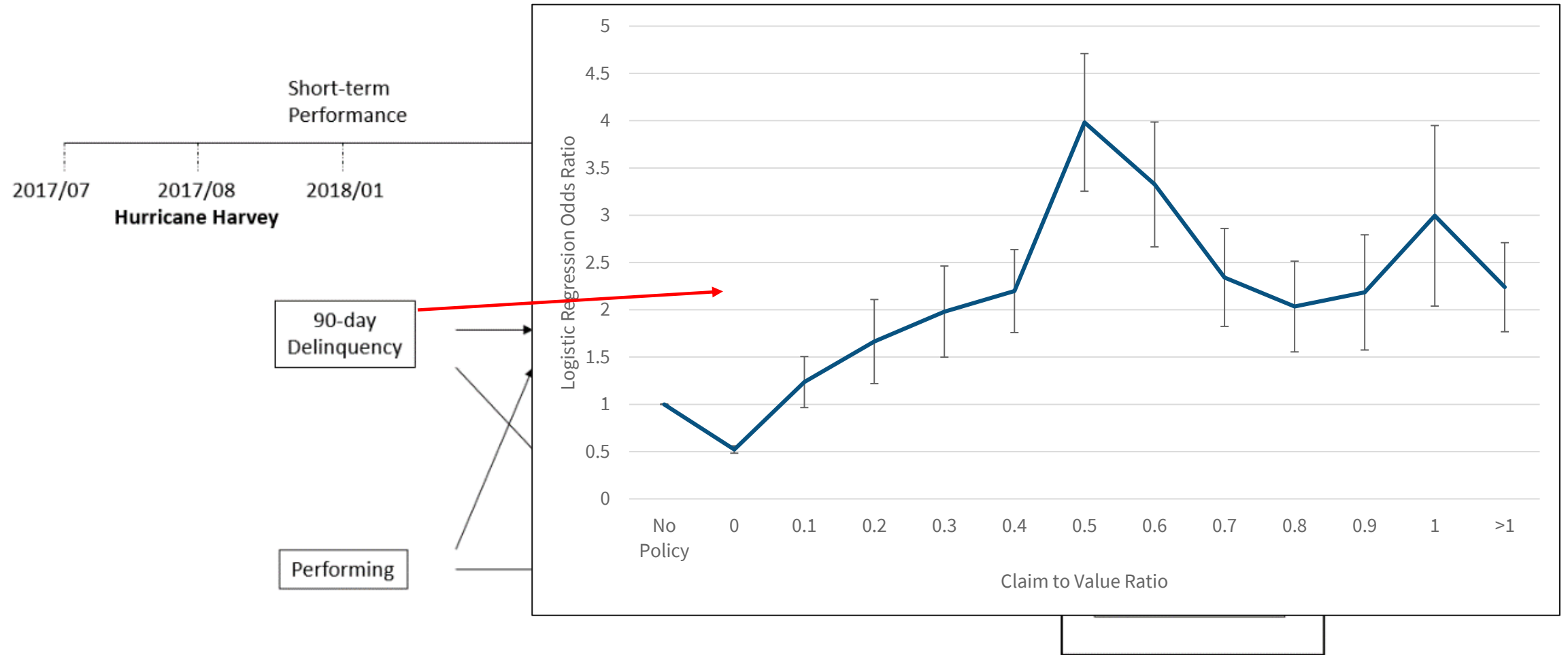
# Loan Performance Measures

## Timeline of Loan Performance Measures



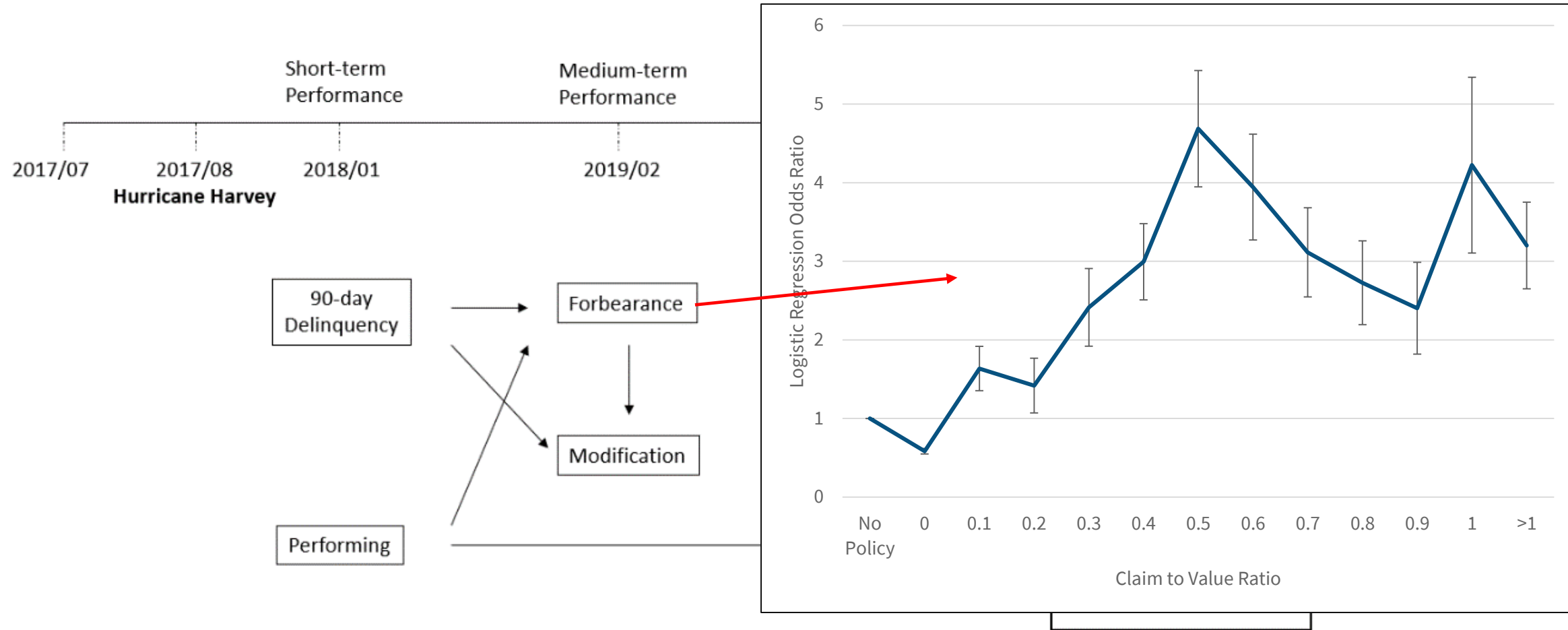
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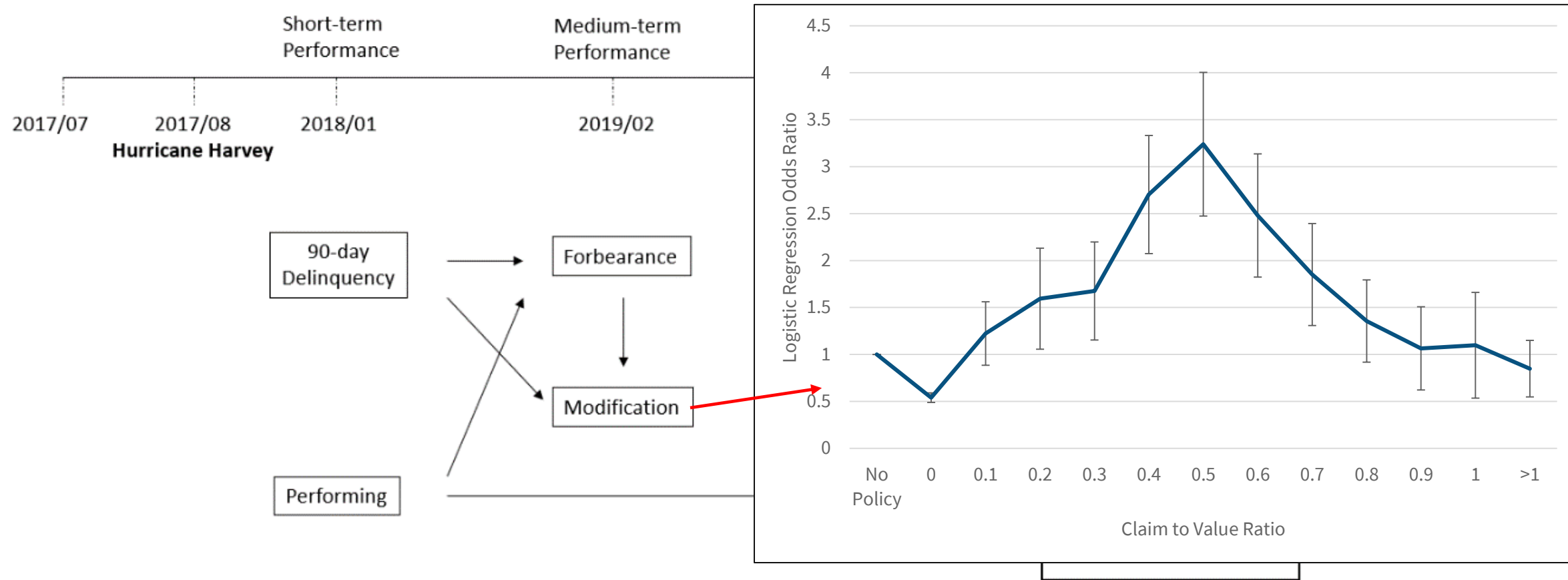
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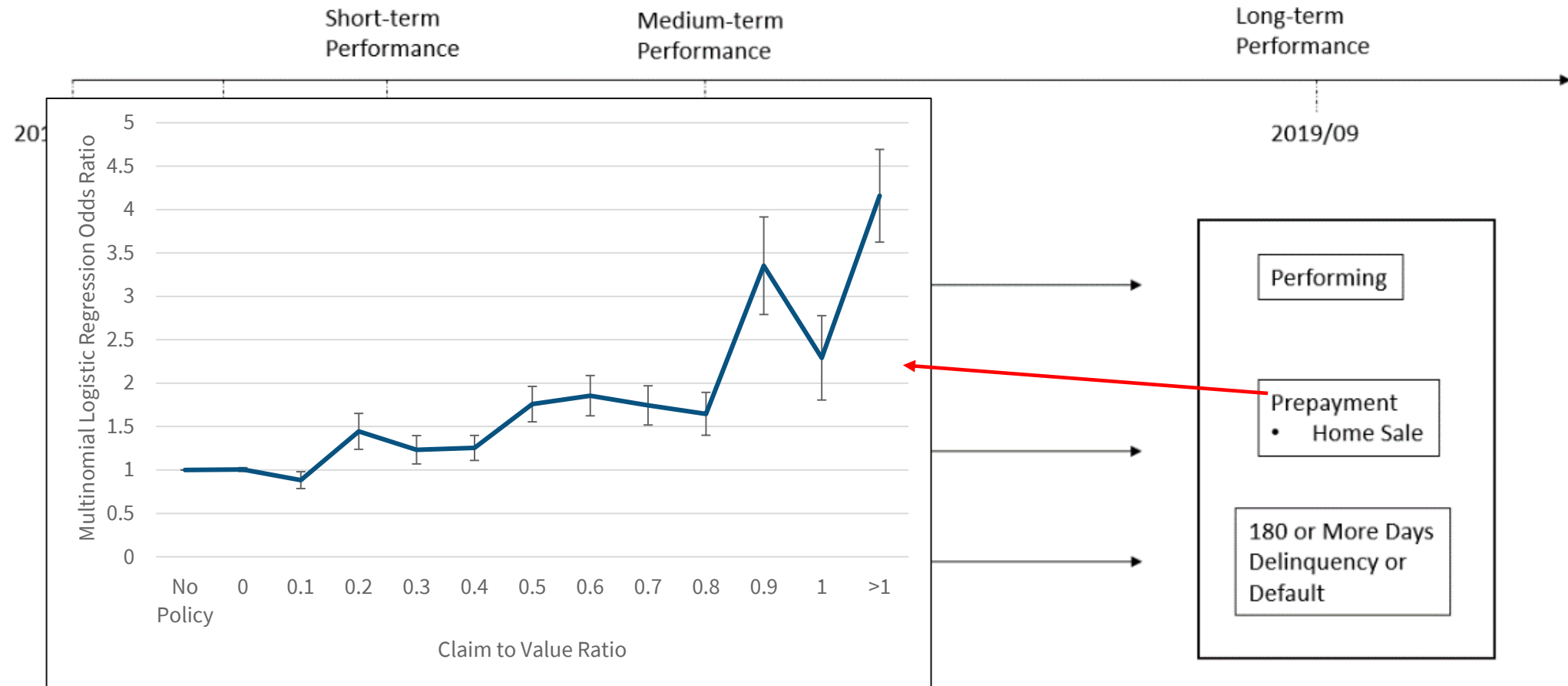
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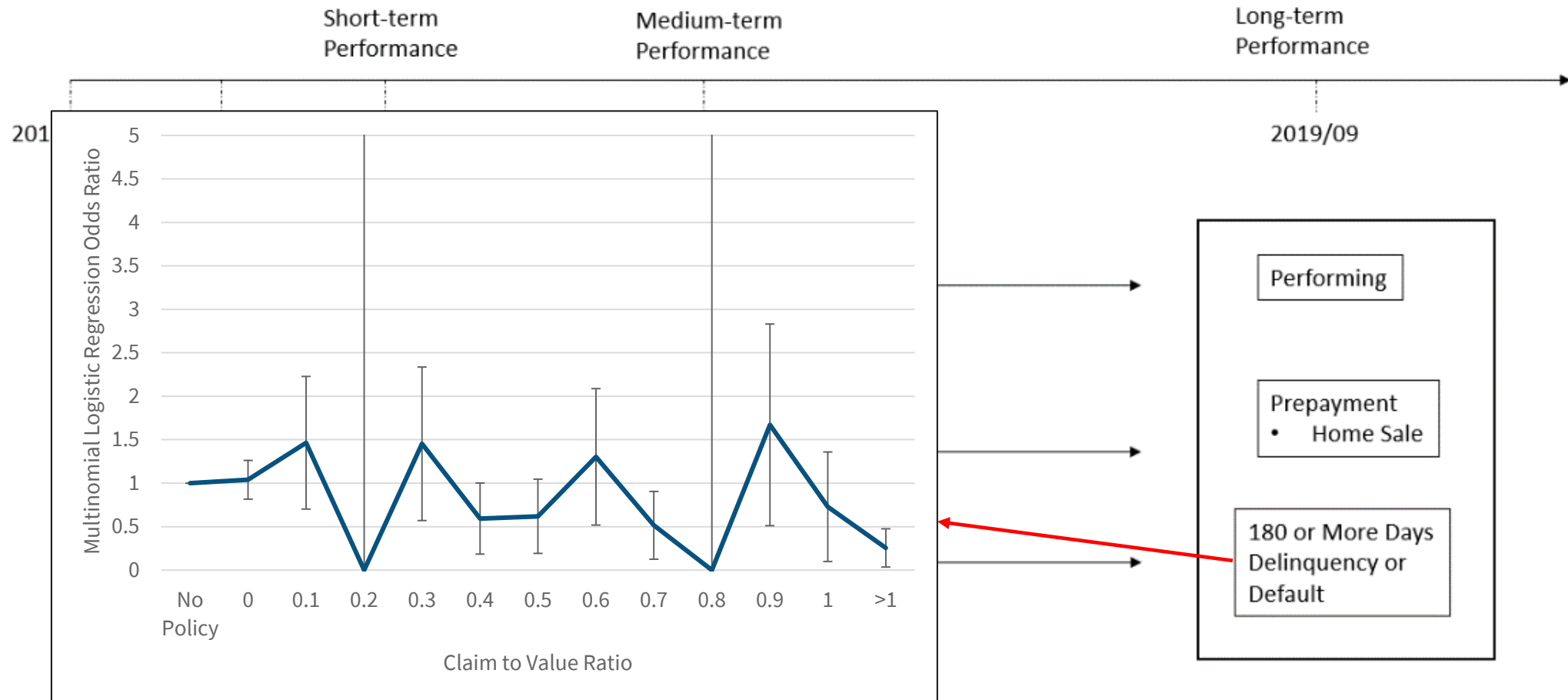
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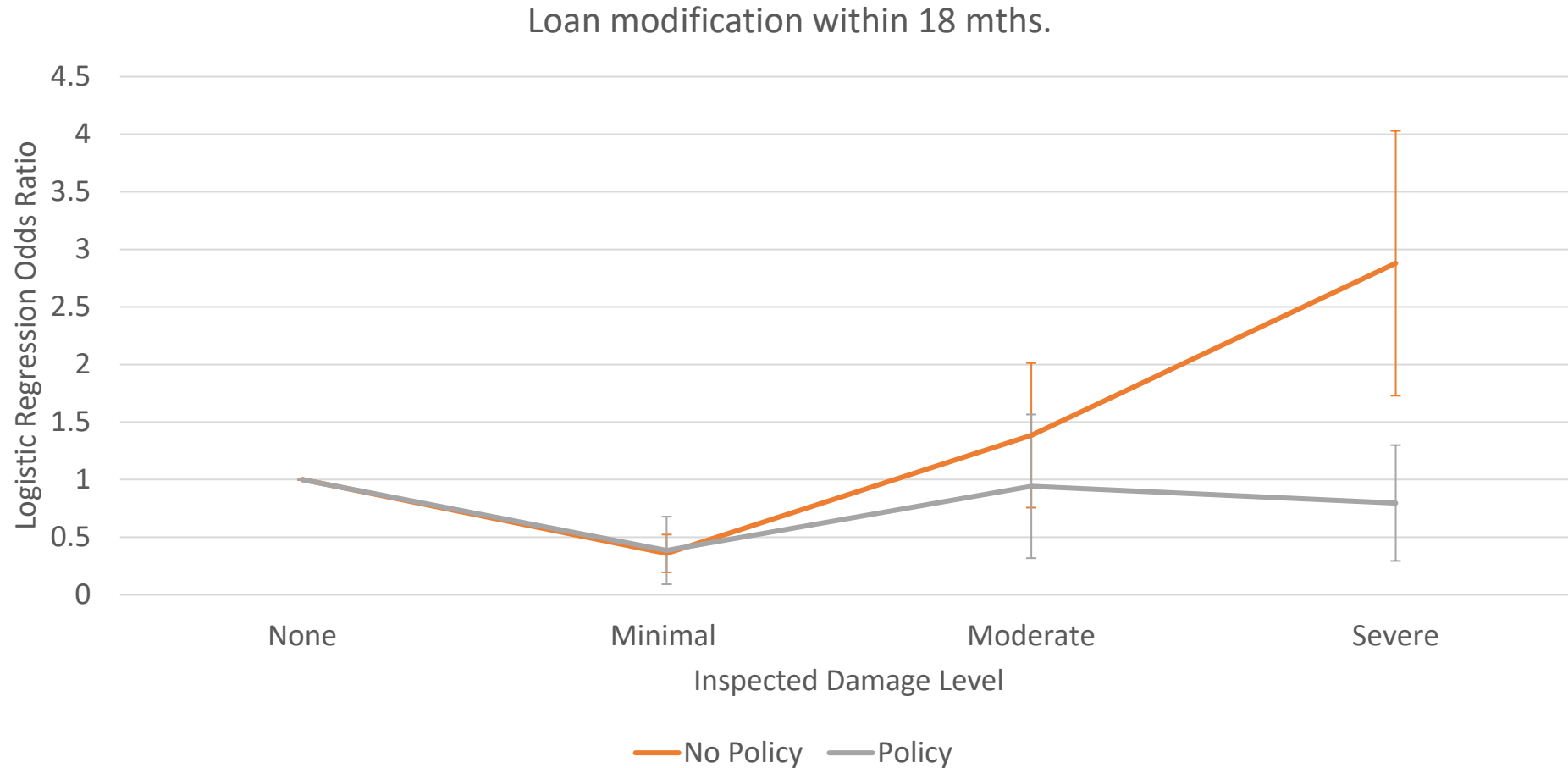


# **Loan Performance Outcome Differences by NFIP Policy Status**



# Loan Modification

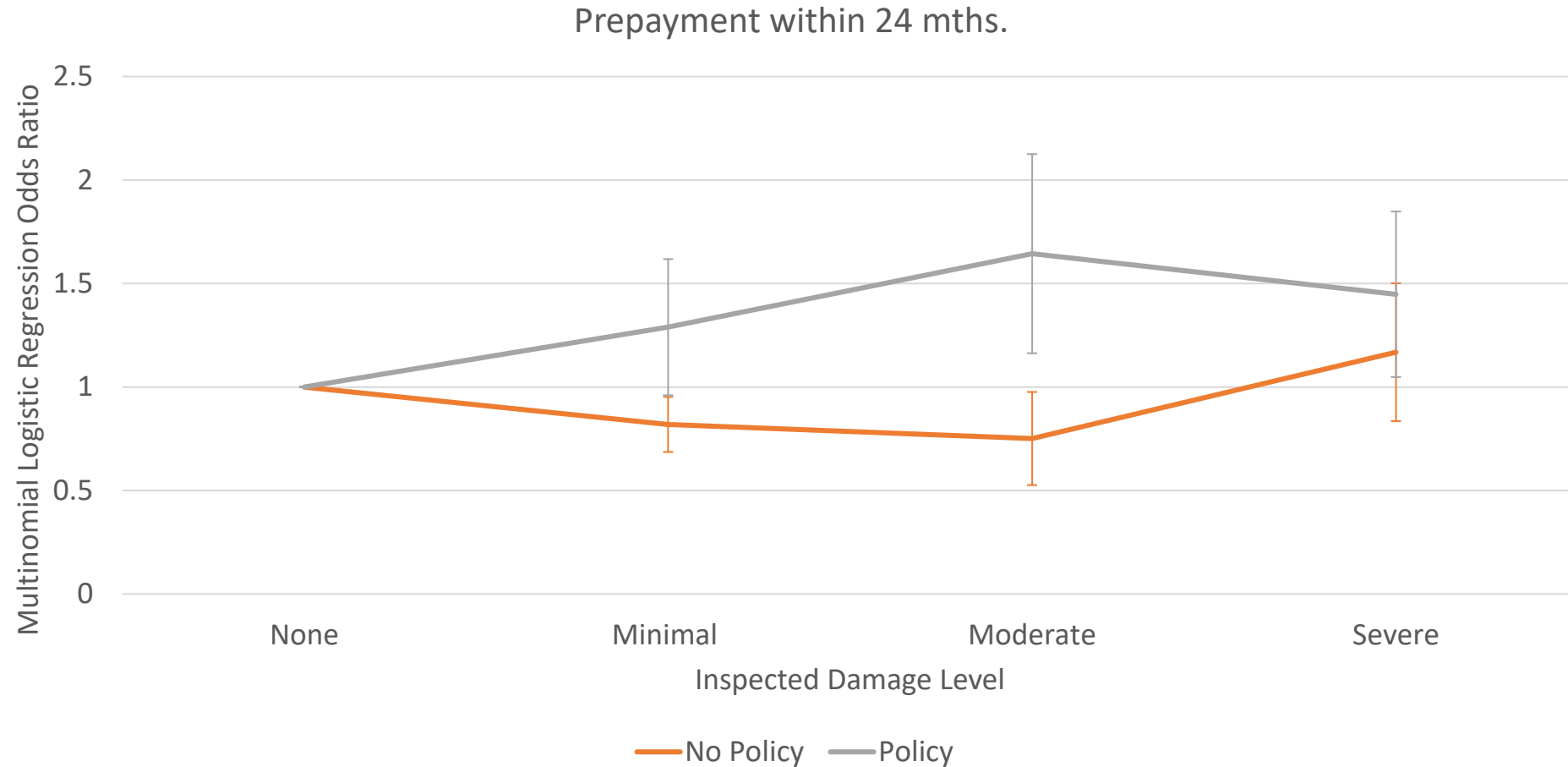
For loans with no NFIP policy increased damages consistently associated with loan modifications



Note: Error bars denote the 95% confidence bands around the estimated odds ratios.

# Loan Prepayment

No evidence of increased prepayment with larger damages for loans without NFIP policy

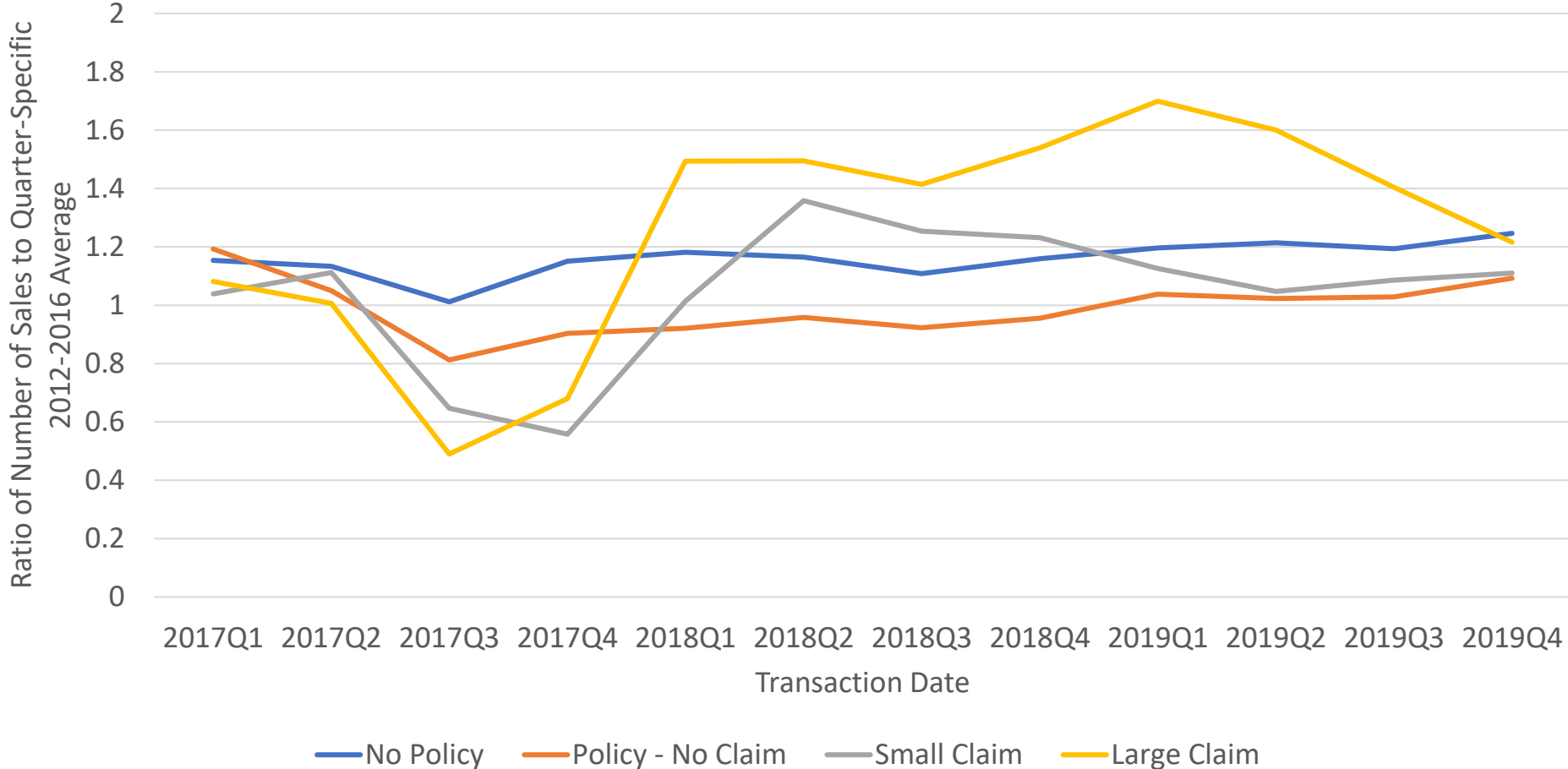


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# Results for Sale Outcomes

# Volume of Sales

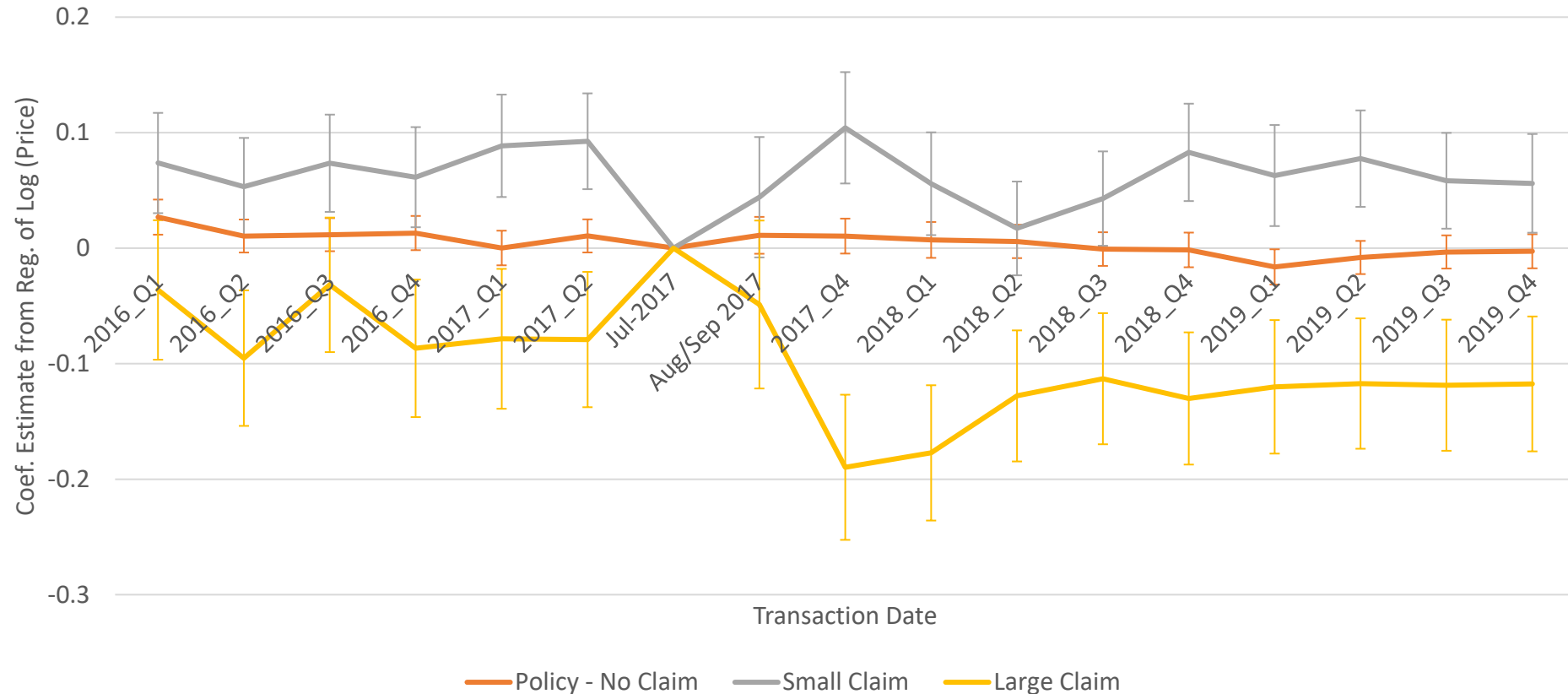
There is a clear dip in sale volumes for properties that have claims following Harvey.



Note: This analysis uses all sales for Harvey affected zip codes matched to NFIP insurance and claim information. Determination of whether claim is small or large is based off it being above or below 50% of the total insurance coverage (building + contents).

# Price

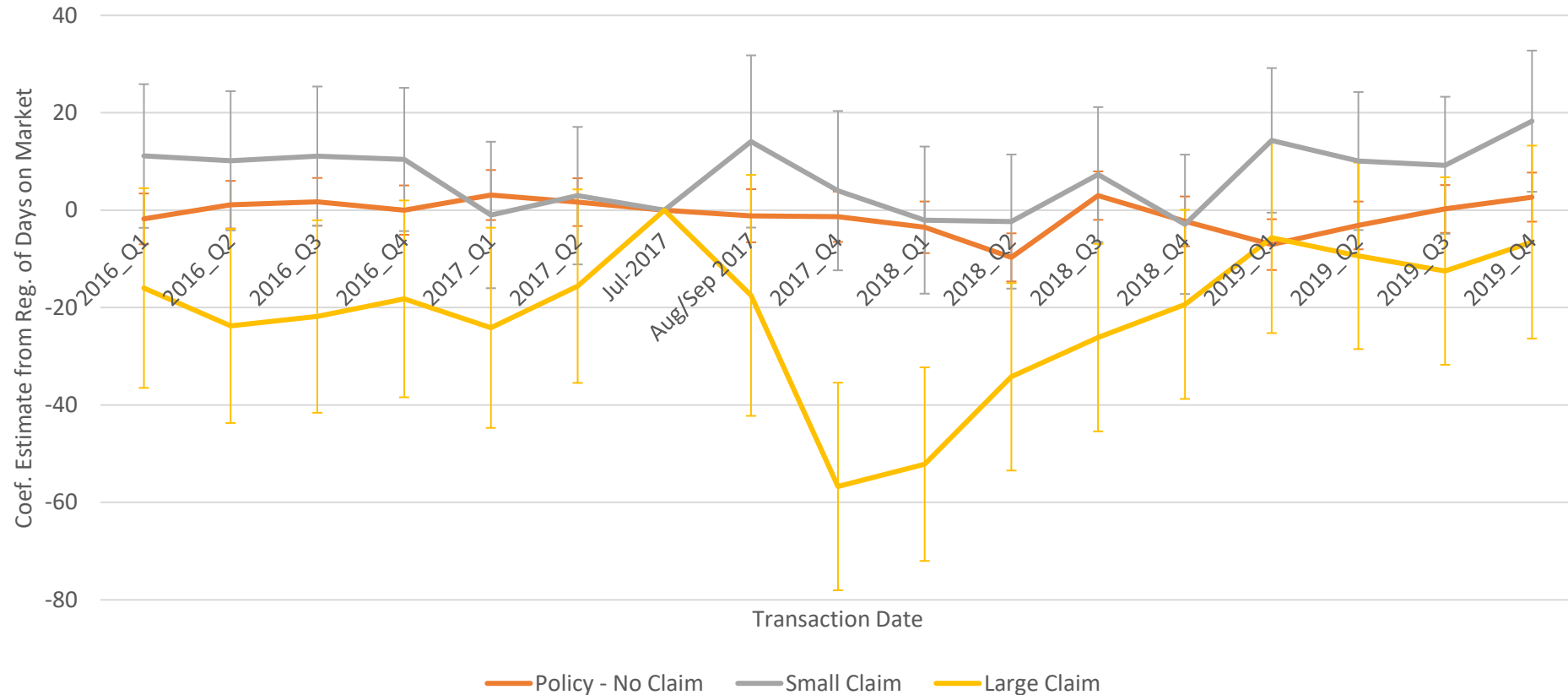
Relative to the no insurance policy group, there is a clear negative and persistent impact on prices for homes with large claims.



Note: This analysis uses all sales for Harvey affected zip codes matched to NFIP insurance and claim information. Determination of whether claim is small or large is based off it being above or below 50% of the total insurance coverage (building + contents). Hedonic regression on log transaction price controlling for full set of property and location characteristics and zip code fixed effects.

# Days on Market

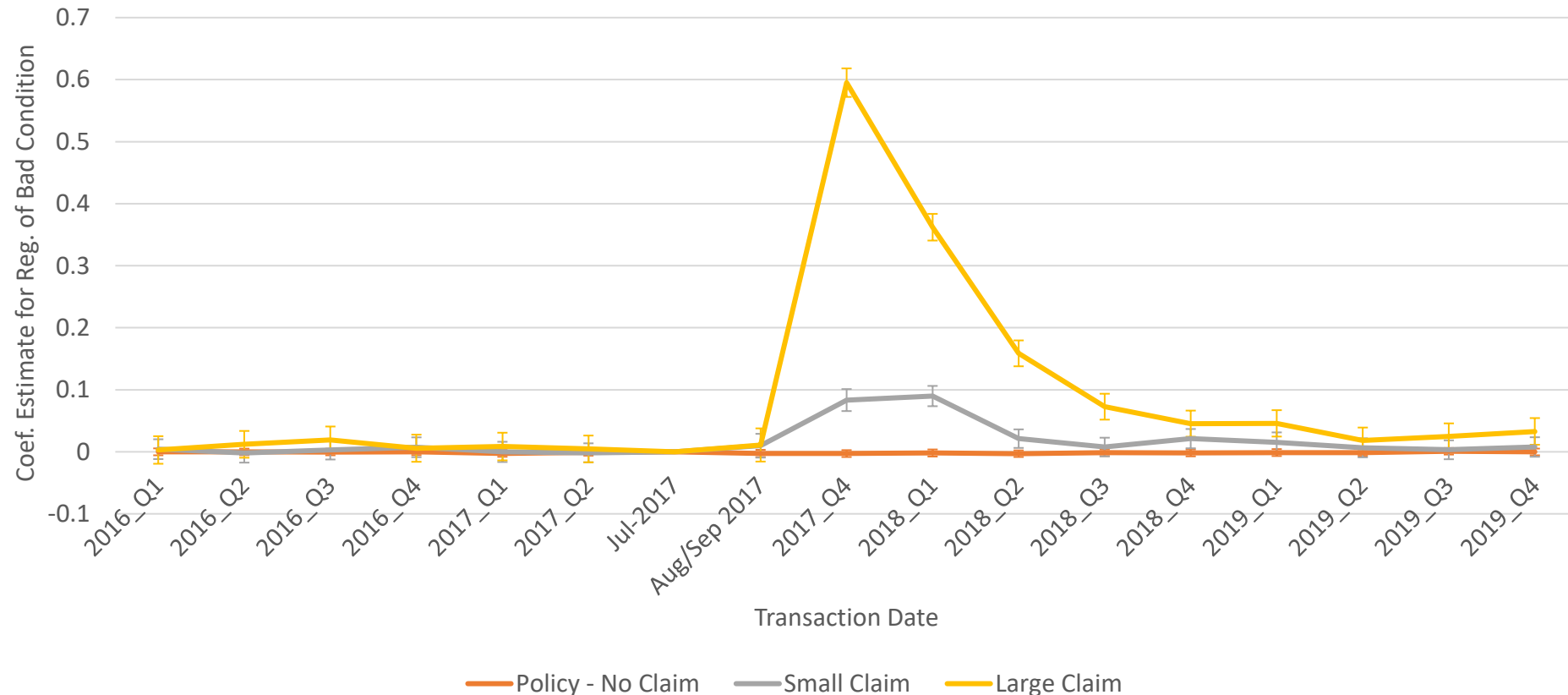
Relative to the no insurance policy group, we see markedly shorter time on market for homes with large claims following Harvey



Note: This analysis uses all sales for Harvey affected zip codes matched to NFIP insurance and claim information. Determination of whether claim is small or large is based off it being above or below 50% of the total insurance coverage (building + contents). OLS regression of days on market controlling for full set of property and location characteristics and zip code fixed effects.

# Property Condition

Relative to the no insurance policy group, we a much greater likelihood that properties being sold are in poor condition



Note: This analysis uses all sales for Harvey affected zip codes matched to NFIP insurance and claim information. Determination of whether claim is small or large is based off it being above or below 50% of the total insurance coverage (building + contents). OLS regression for indicator of “bad condition” (condition rating is 5 or 6) controlling for full set of property and location characteristics and zip code fixed effects.

# Conclusion

- NFIP claim amounts correlated with damages visible from inspections data
- Short-term loan performance is significantly impacted by damages from hurricane Harvey
  - Non-linearity evident in early delinquency, forbearance and modifications
- Long-term delinquency not seen to be strongly impacted by hurricane damages, but prepayment more likely for loans with greater damages
- Damaged homes are less likely to sell immediately following Harvey, sell for a lower price, sell faster, and are more likely to be sold in poor condition
- Some evidence that flood insurance allowed homeowners with damages to prepay their loan and sell their property



