The Roles of Borrower Private Information and Mortgage Relief Design in Foreclosure Prevention

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Introduction

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  - Borrowers and debt holders face significant losses
  - *7.8 million foreclosures between 2007 and 2016 in the U.S.*

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- Numerous market frictions have been studied, but open questions remain around strategic borrower behavior and the role of information in the mortgage renegotiation
- This project addresses a gap in the literature about the role of information asymmetry in mortgage debt relief through loan modifications and how it affects the occurrence of foreclosures

Research question

What prevents banks/servicers from granting debt relief to struggling borrowers?

- Information asymmetry
  Borrowers hold private information about their financial health, creating adverse selection problem

- Transaction costs
  Granting relief is not worthwhile because of large costs associated with screening borrowers and modifying contractual terms

- Relief sufficiency
  Borrowers may need so much relief that debt holders prefer foreclosure

This paper

Introduce structural model of foreclosure prevention

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Study the Home Affordable Modification Program (HAMP)

- Quantify role of government incentive payments
- Assess level of relief generosity under program

Loan modification under HAMP

	Annual Interest	Term in Years	Principal	Monthly Payments	NPV of Loan
Pre-mod	6.0%	25	$200K	$1,289	$200k
Post-mod	4.5%	40	$210K	$944	$172k

-$345 per month

-14% value to creditor

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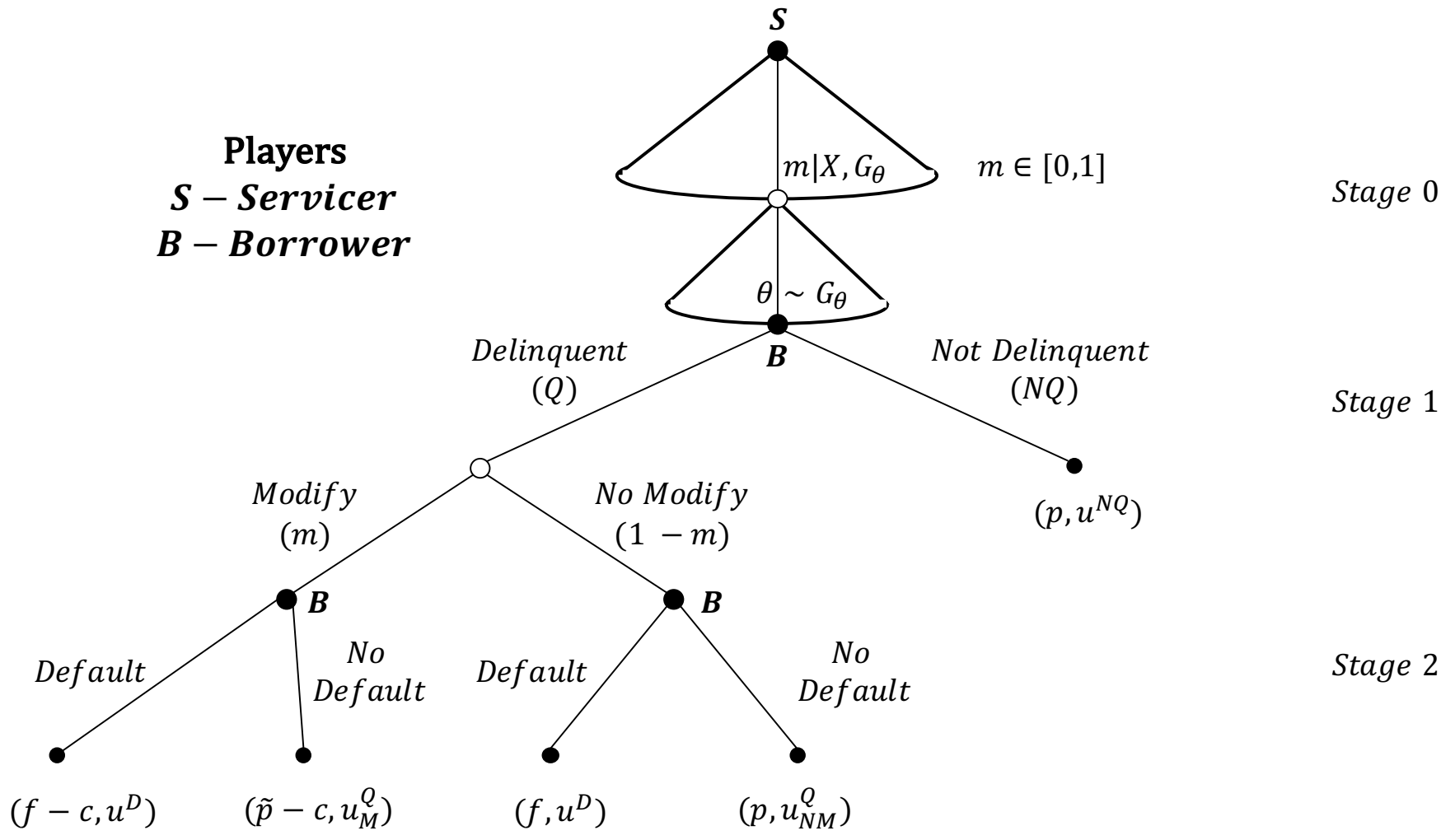
- **Borrower HAMP savings:** typically $300-$400 per month
- **Payments to servicers:** Range of $4,000 to $6,000 per modification (Agarwal et al. 2017, Hembre 2018)

Policy-setting game



Fannie Mae fixed-rate mortgages

Model estimated with single family loan performance data

- Californian loans
- Originated between 2004-2007, follow until December 2019
- Sample of around 52,000 loans

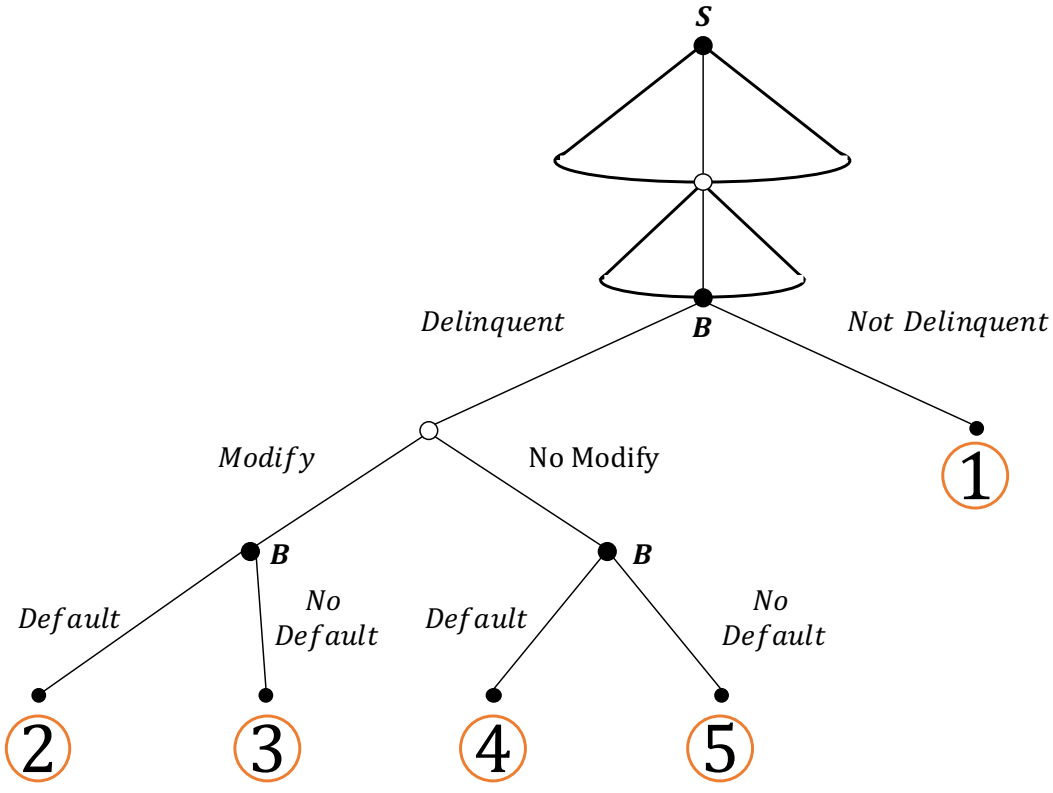
Loan-level panel

- Monthly loan characteristics and repayment status
- Rich borrower characteristics at origination
- Detailed foreclosure outcomes, including proceeds and costs

Supplemental data

- House Price Index from *Federal Housing Finance Agency*
- Unemployment data from *Bureau of Labor Statistics*

Simulated Maximum Likelihood



Matching predicted probabilities to observed outcomes:

$$\mathcal{L}(Y, X; \Theta) = \prod_{i=1}^{n} \prod_{j=1}^{5} [\Pr(y_i = j | \mathcal{X}_i, \Theta)^{\mathbb{1}(y_i = j)}]$$

Findings: Observed outcomes for delinquent loans

Foreclosure \ Relief awarded	No	Yes
No	**Self-cure:** 9%	**Cure:** 18%
Yes	**Default:** 61%	**Re-default:** 12%

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Findings: Counterfactual outcomes for delinquent loans

		Relief awarded	
		No	Yes
Foreclosure	No	**Self-cure:** 9% · *Never Default:* 9%	**Cure:** 18% · *Needs aid:* 14% · *Never Default:* 4%
	Yes	**Default:** 61% · *Always Default:* 55% · *Needs aid:* 6%	**Re-default:** 12% · *Always Default:* 12%

Needs aid borrowers represent the preventable foreclosures!

Findings: Counterfactual outcomes for delinquent loans

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Correct to award relief only when foreclosure is preventable

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Mistake to award relief to other borrowers or fail to prevent foreclosure

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Mistake to award relief to other borrowers or fail to prevent foreclosure

Information counterfactual Optimal subsidies

Conclusion

Debt relief can be a powerful tool for preventing foreclosure but its effectiveness relies on a number of factors

- Information asymmetry - Key issue for policy design
- Transaction costs - Policy actionable, but may not be effective
- Relief sufficiency - Policy actionable, but will be constrained by relative foreclosure losses

Many future avenues for research

- Relief's effect on long-term borrower composition
- Importance of timely relief - *Work in progress!*
- Understanding bank heterogeneity

Contribution to literature

Little work that leverages structural methods to study information in the context of foreclosure prevention
In other contexts: Einav et al. (2007), Hendren (2013, 2017, 2021), Einav et al. (2013), Xin (2020), Marone & Sabety (2022), Matcham (2023), Nelson (2023)

Current project adds to literature by:

- Modelling the strategic interaction between borrowers and their financial institutions
- Addressing a new set of channels potentially undermining relief policy
- Novel approach for quantifying drivers of default and costs of foreclosure

Summary statistics

		Sample Q2 2004-07	All Fannie Mae SF Q2 2004-07
Scale	Geography	California	U.S.
	Observations	51,884	1,102,482
	Total balance ($)	13 billion	204 billion
	Number of servicers	Top 7 (∼80% of CA loans)	17+
Mean origination characteristics	Principal balance ($)	244.8k	185.4k
	Loan-to-value	59.4%	71.0%
	Credit Score	730.9	722.7
	Debt-to-income	37.3%	37.0%
	Housing price %Δ (2007-11)	-43%	-21%
	Unemployment rate %Δ (2007-11)	135%	102%
Outcome shares	Delinquent (90-days)	15.1%	11.3%
	Modified	4.5%	4.0%
	Foreclosed	10.5%	6.4%

Borrower utility function

Repay without delinquency

$$u_i^{NQ} = \underbrace{x_i'\beta + \xi_i + \varepsilon_i}_{\text{Home utility relative to default } (H_i)} - -$$

Repay with delinquency but without modification

$$u_i^{Q}|NM = x_i'\beta + \xi_i + \varepsilon_i - -$$

Repay with delinquency and modification

$$u_i^{Q}|M = x_i'\beta + \xi_i + \varepsilon_i - -$$

Default

$$u_i^{D} = 0 - -$$

■ Unknown to econometrician ■ Unknown to econometrician *and* loan servicer

Borrower utility function

Repay without delinquency

$$u_i^{NQ} = \underbrace{x_i'\beta + \xi_i + \varepsilon_i}_{\text{Home utility relative to default } (H_i)} - \underbrace{p_i}_{\text{Payment disutility}} -$$

Repay with delinquency but without modification

$$u_i^{Q}|NM = x_i'\beta + \xi_i + \varepsilon_i - p_i -$$

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Repay with delinquency but without modification

$$u_i^{Q}|NM = x_i'\beta + \xi_i + \varepsilon_i - p_i - \underbrace{Q_i(x_i'\lambda, \eta_i)}_{\text{Delinquency cost}}$$

Repay with delinquency and modification

$$u_i^{Q}|M = x_i'\beta + \xi_i + \varepsilon_i - \underbrace{\tilde{p}_i}_{\text{Modification disutility}} - Q_i(x_i'\lambda, \eta_i)$$

Default

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Identification challenge of ξ_i

Servicers know about borrower unobservables, causing selection into modification. This creates endogeneity when estimating the causal effect of debt relief

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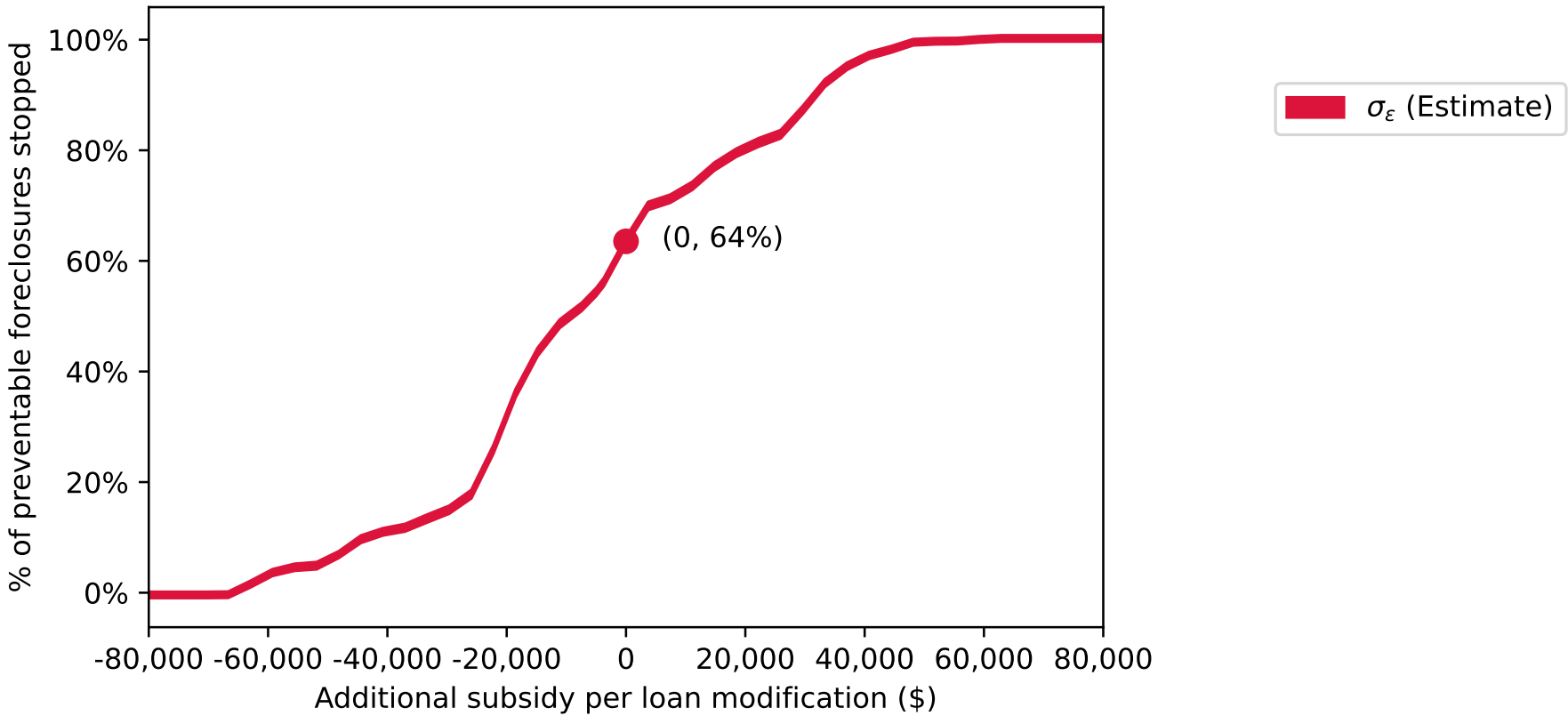
Key assumptions:

- *Relevance:* Servicer identity drives differences in modifications rates
- *Orthogonality:* Unobservable borrower distributions are the same across servicers

Information, costs, & foreclosure

Back



Information, costs, & foreclosure

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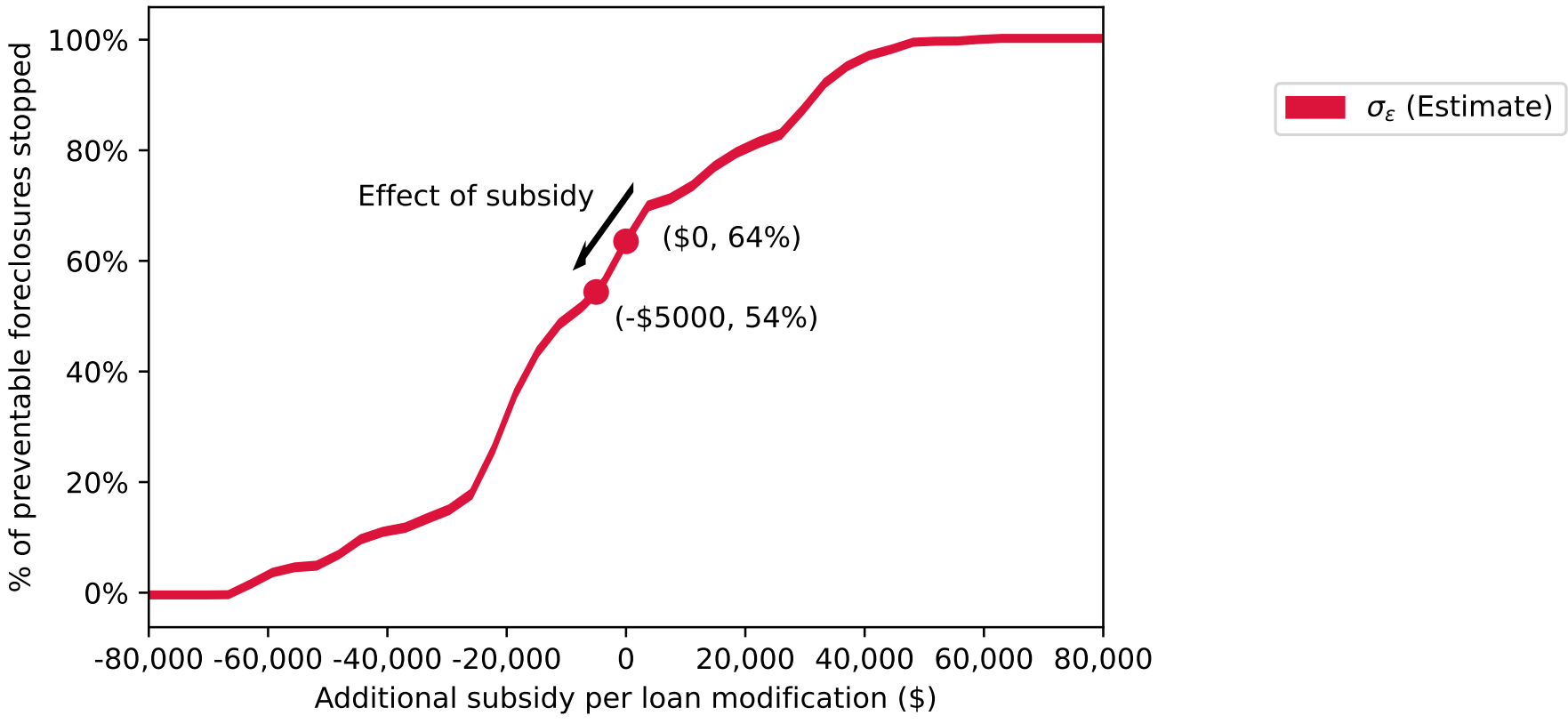

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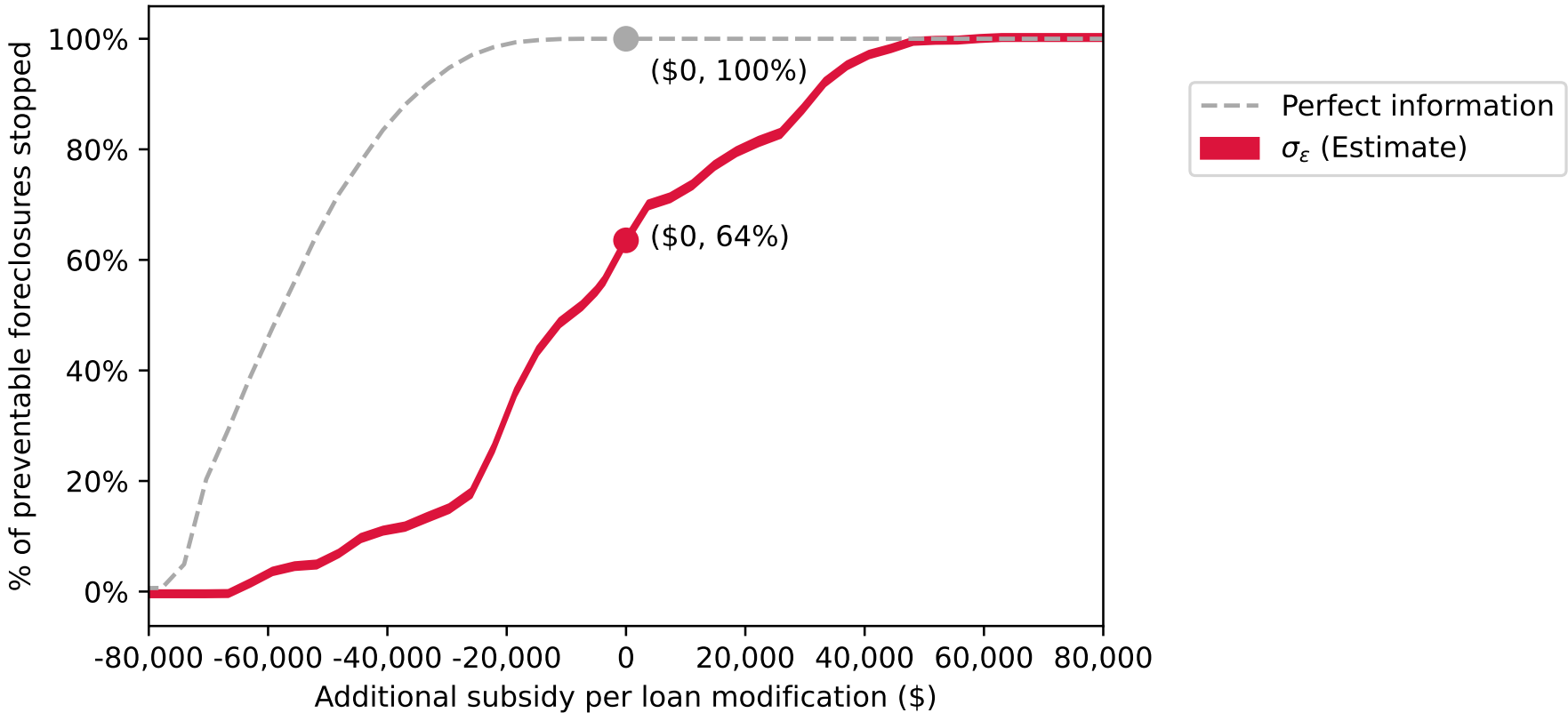
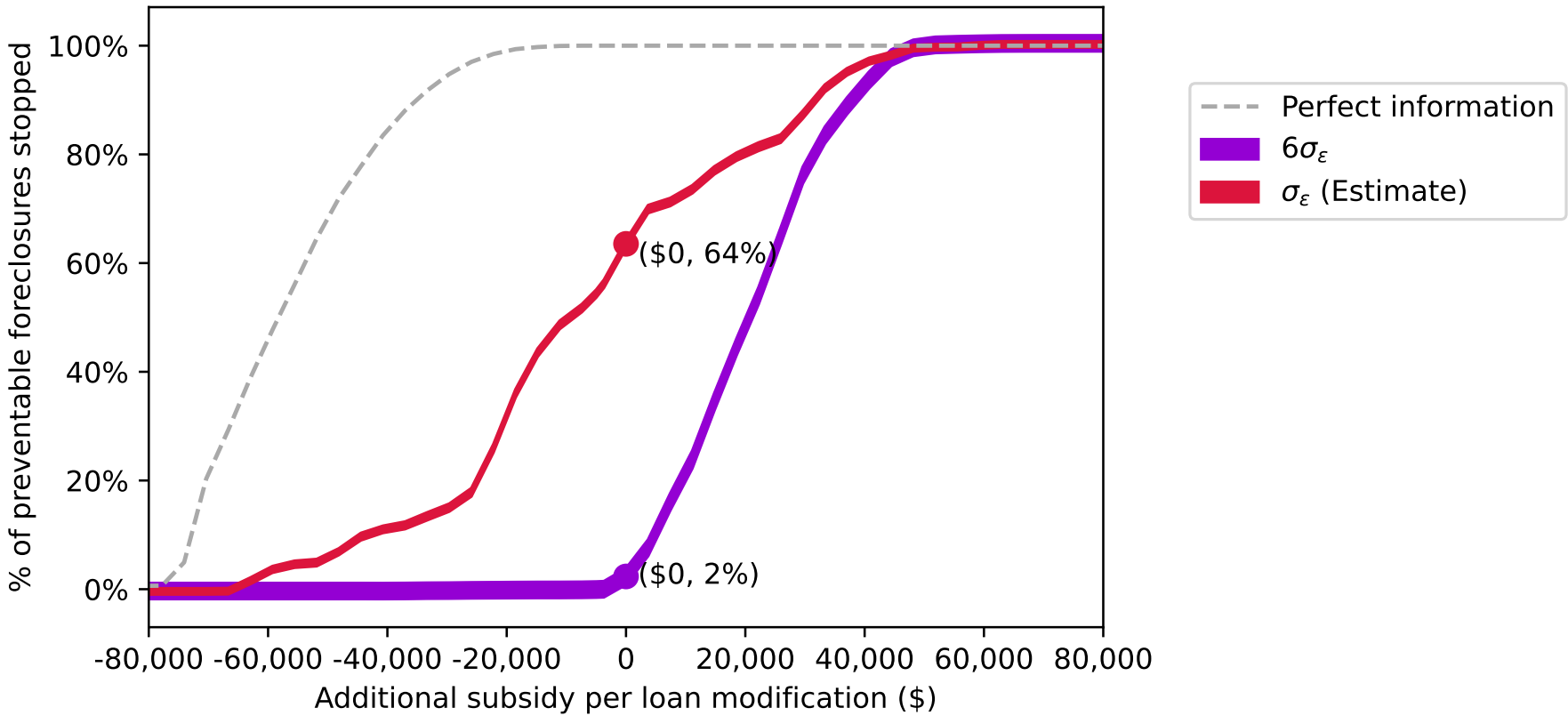


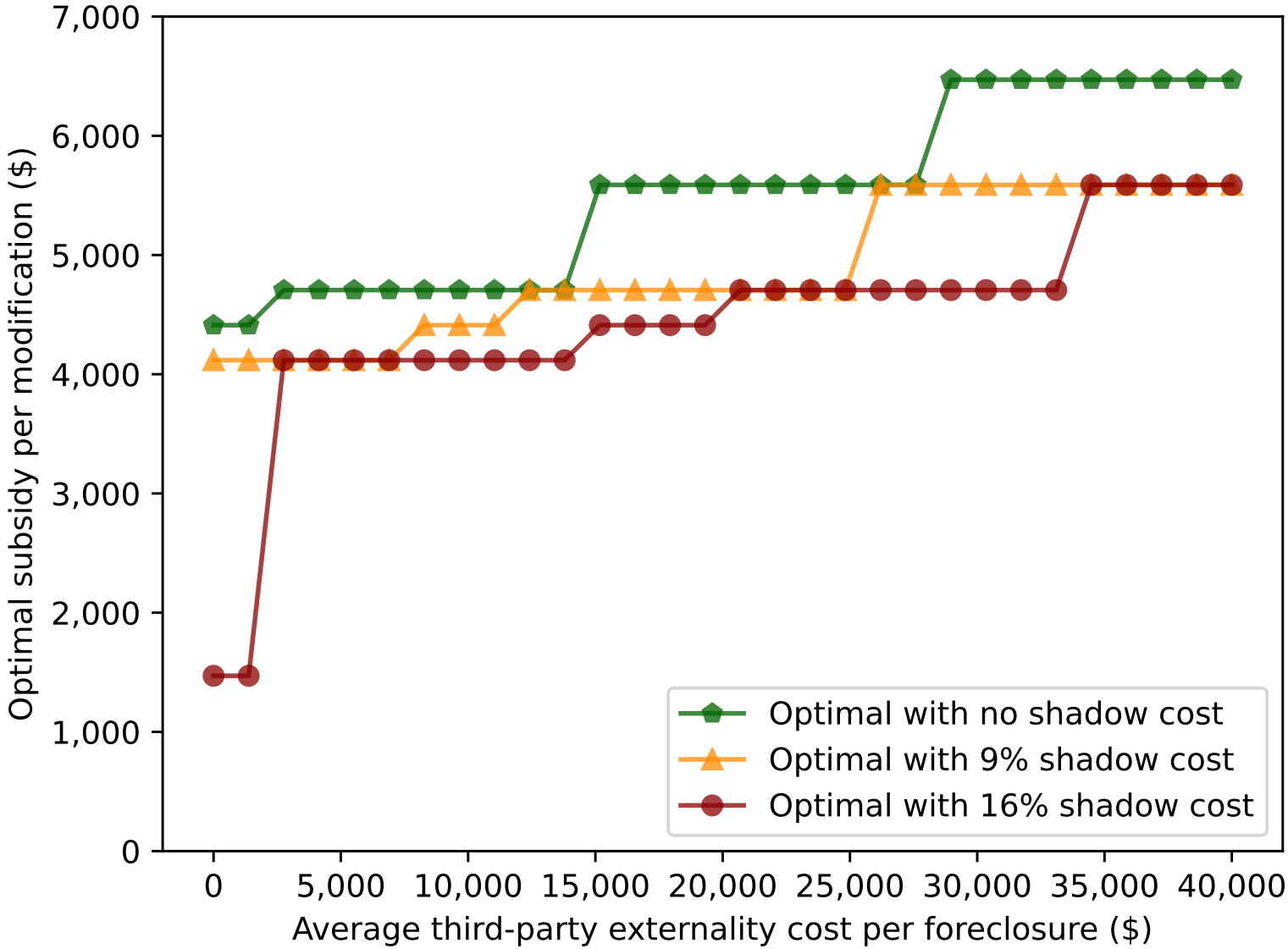
Information, costs, & foreclosure

Back Conclude



Subsidies, cost of public funds, and externalities - Q2'04

Back



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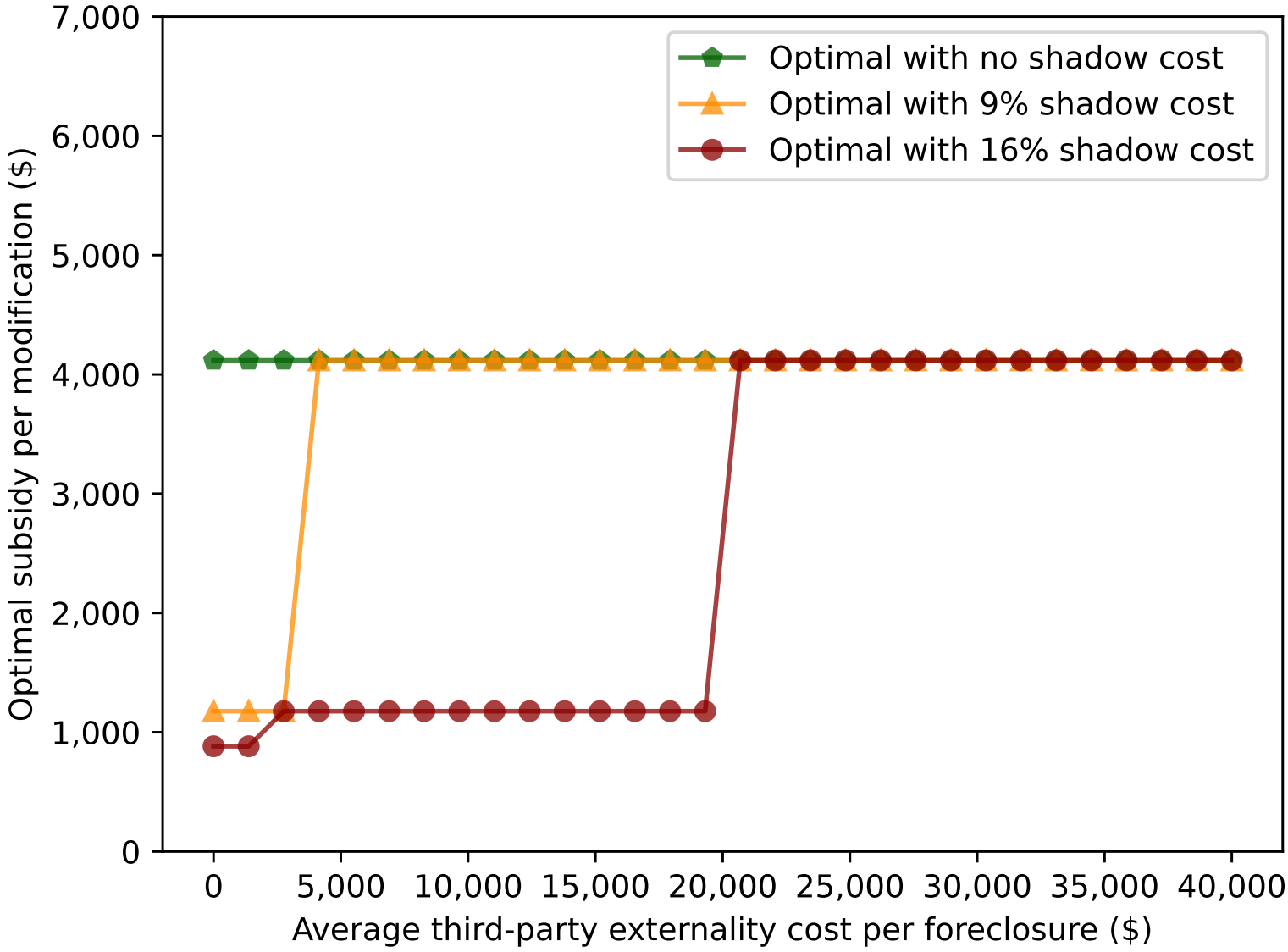

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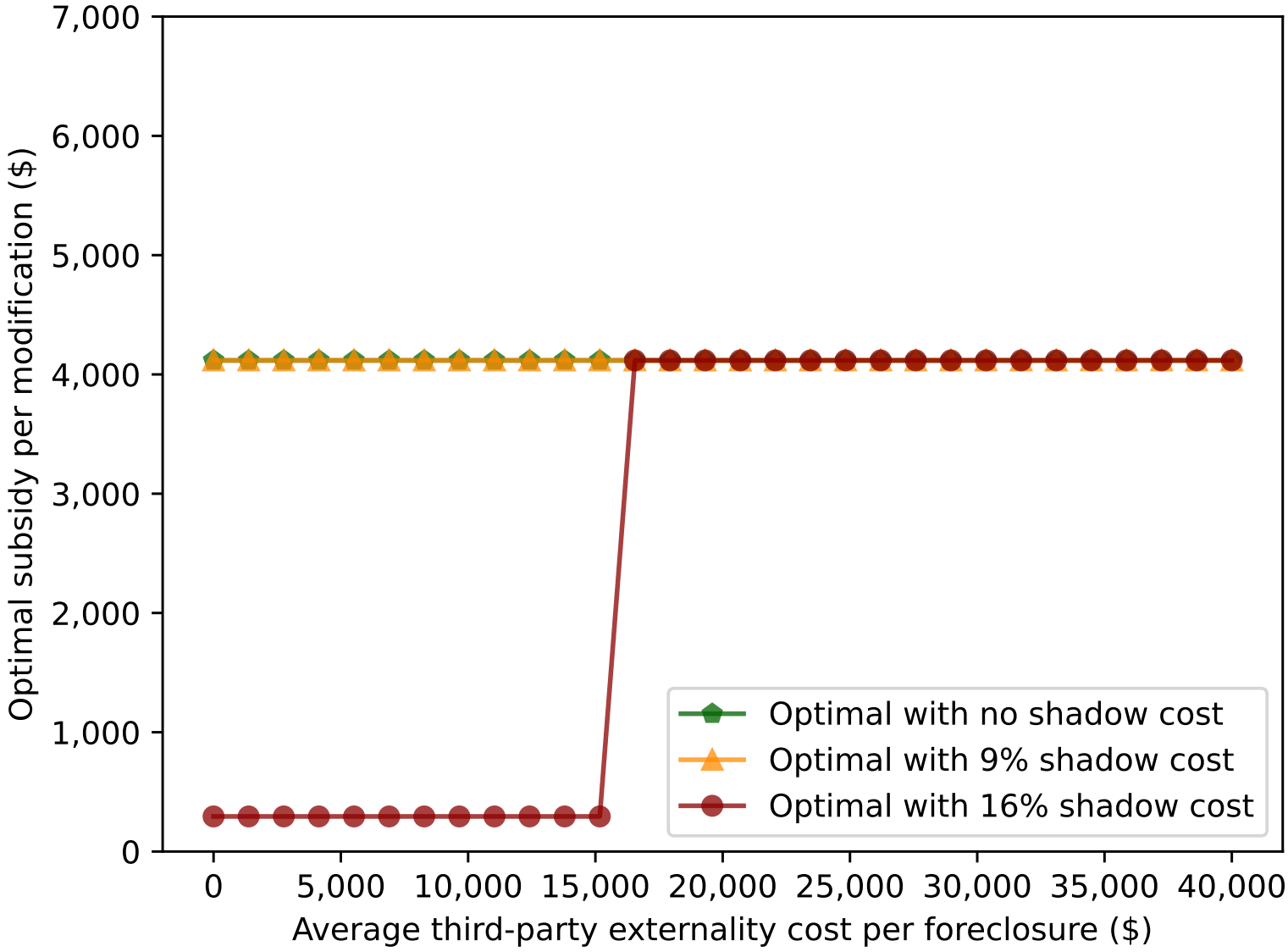

Subsidies, cost of public funds, and externalities - Q2'07

Back Conclude