Designing Dealer Compensation in the Auto Loan Market: Implications from a Policy Change

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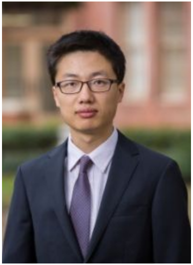
Collaborators



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Introduction

- Many transactions are made through intermediaries.
- Compensation of the intermediaries can affect their incentives.
- This paper: **Auto dealers in indirect auto lending**
- How banks compensate dealers affects the outcomes for consumers.

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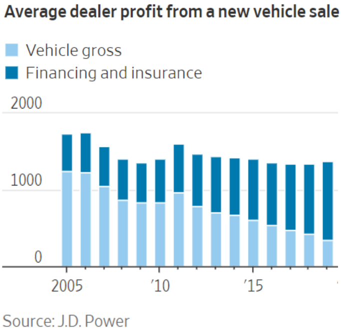
The Economic Significance of Dealer Profit from Financing

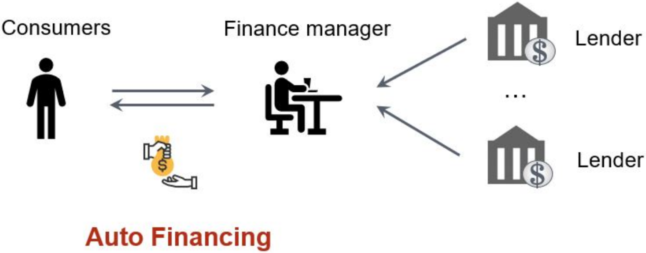
- Financing contributes to a significant portion of the dealer profit.
  - Profit from financing: $245-555 (prior literature)[1], $714 (industry report)[2]



1: Cohen 2012 (data period 1993-2004); Grunewald 2021 (data period 2010-2014)
2: AutoNation 2019 Annual report. (AutoNation is the largest auto retailer in the U.S. with more than 300 retail outlets.)

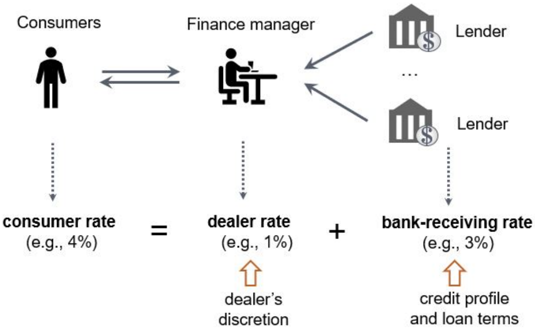
Indirect Auto Lending

- Majority of car buyers get their auto loans through dealership.



Discretionary Markups as Dealer Compensation

- Dealers impose a markup as their compensation (*dealer rate*)



Potential Discriminatory Pricing

- Equal Credit Opportunity Act of 1974: illegal to discriminate against any applicant on the basis of race, gender, religion, national origin, marital status, or age among other things.
- Consumer rate = risk-based bank-receiving rate + **discretionary** dealer markup
  - Certain groups of consumers (disadvantaged consumers, e.g., minorities) systematically pay higher interest rates than others with the same credit score and loan terms.

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Regulatory Actions

- CFPB, together with DOJ, fined several lenders for alleged discriminatory consumer rates.
  - Ally 2013

cfpb Consumer Financial Protection Bureau

Consumer Education | Rules & Policy | Enforcement | Compliance | Data & Re

< Newsroom

CFPB and DOJ Order Ally to Pay $80 Million to Consumers Harmed by Discriminatory Auto Loan Pricing

Ally to Pay Additional $18 Million in Civil Penalties for Harming More Than 235,000 Minority Borrowers

DEC 20, 2013

Policy Change in Dealer Compensation

CFPB advised lenders to "eliminate dealer discretion to mark up buy rates and fairly compensating dealers using another mechanism, such as a flat fee per transaction, that does not result in discrimination."[1]

- Policy change: under this regulatary environment, several banks switched to a **non-discretionary** compensation scheme.
  - Dealers are paid 3% of loan amount.

1. https://files.consumerfinance.gov/f/201303_cfpb_march_-Auto-Finance-Bulletin.pdf

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Research Questions and Preview of Results

- What is the impact of the policy change on lenders and consumers?
  - Consumer rates decrease for more disadvantaged consumers; but the market share also decreases.
  - Dealer incentives have substantial influence on the loans consumers get.
- Design **non-discretionary compensation** scheme that can increase the lenders' market share.
  - Propose a dealer-consumer bargaining model that takes into account the incentives of both parties.
  - Fixed lumpsum payment can help banks increase market share while ensuring consumer protection.

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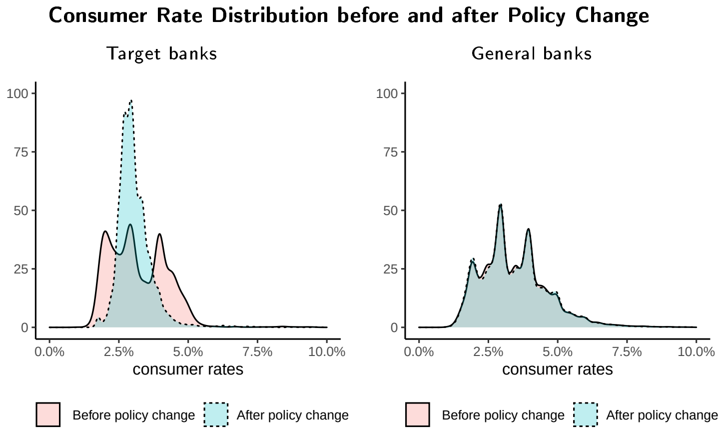
Data and Reduced Form Results

Data

- **Target banks**: a group of banks that adopted the non-discretionary scheme (3% of loan amount).
- **General banks**: similar banks (geographic area and pricing patterns) who maintained the discretionary scheme.
- Loan-level data during 20 weeks period before and after policy change from Equifax
  - Observe loan characteristics (e.g., loan amount, length, interest rate) as well as customer characteristics (e.g., credit score, zip code)
  - 180,000 loans

Impact on Consumer Rates

- A direct consequence of the change in dealer compensation

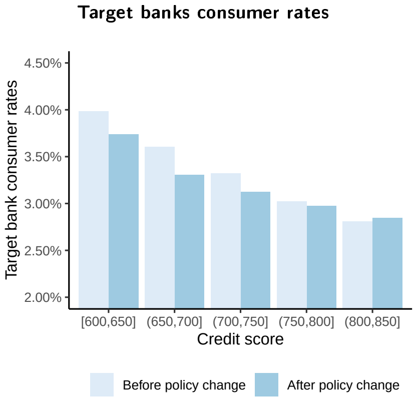


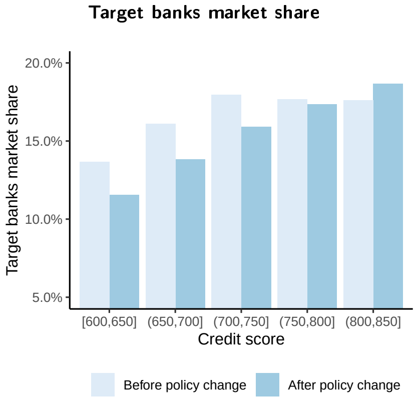
Relation between Consumer Rates and Market Share

- Despite lower consumer rate, the market share decreases for low-credit consumers; opposite pattern for high-credit consumers.

  $\rightarrow$*A reversal of the standard demand curve*

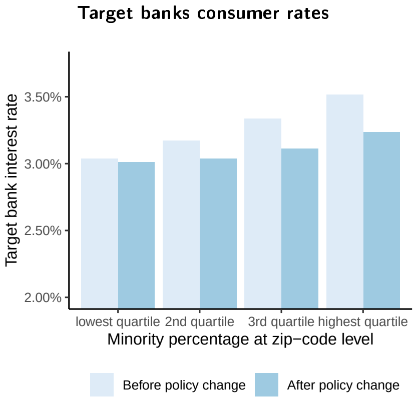
- Explanation: Dealers incentivized by their compensation

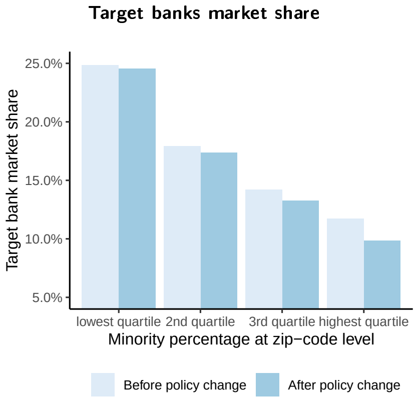




Relation between Consumer Rates and Market Share for Minority Consumers

- Minority consumers get lower consumer rates but lower market share for target banks.

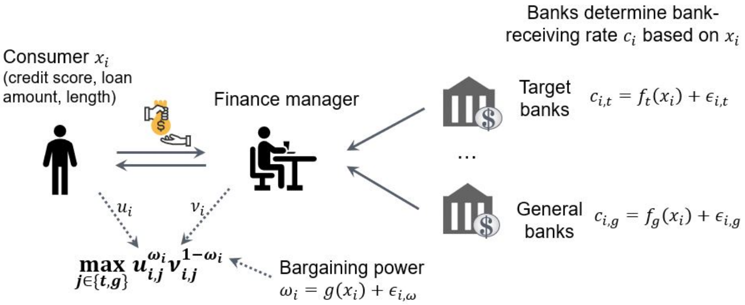




Model and Identification

Sketch of the Model

- A bargaining framework that captures both dealer and consumer incentives.



- Model determines consumer rate and bank choice (target vs. general banks)

Model - before policy change

- Setup:
  - Consumer i: credit score & loan terms collected in $\boldsymbol{x}_i$.
  - Consumer bargaining power: $\omega_i = \text{Logistic}(\boldsymbol{\lambda}'\boldsymbol{x}_i + \varepsilon_{i,\omega})$
  - Bank-receiving rate: $c_{i,j} = \exp\left(\boldsymbol{x}_i'\boldsymbol{\alpha}_j + \varepsilon_{i,j}\right)$ for target banks v.s. general banks $j \in \{t, g\}$
  - Consumer reservation rate: $R_i = \min_j\{c_{i,j}\} + \overline{R}$.
- Before policy change:

$$\max : u^{\omega_i} v^{1-\omega_i}$$

$$\text{subject to: } \underbrace{\{u + v = R_i - c_{i,g}\}}_{\text{provided by general banks}} \cup \underbrace{\{u + v = R_i - c_{i,t}\}}_{\text{provided by target banks}}$$

  - Consumer rates are bargained outcomes.
  - Both parties prefer the bank with lower $c_{i,j}$.

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Model - after policy change

- After policy change:

$$\max : u^{\omega_i} v^{1-\omega_i}$$

$$\text{subject to: } \underbrace{\{u + v = R_i - c_{i,g}\}}_{\text{provided by general banks}} \cup \underbrace{\{u + v = R_i - c_{i,t} \text{ and } v = \widetilde{v}_{i,t}\}}_{\text{provided by target banks}}$$

  - $\widetilde{v}_{i,t}$ is the dealer rate equivalent to 3% of loan amount.
  - No more rate bargaining at target banks.
  - Bank choice is still a bargained outcome.
    - The dealer and the consumer may prefer different banks.

Identifying Bargaining Power

- Key challenge: we do not observe bank-receiving rate.
- Make use of policy change:
  - Target banks after policy change: know dealer rates $\rightarrow$ back out bank-receiving rates.
  - Across different consumer groups, how consumer & dealer preference change after policy.
  - Bargaining power is identified from changes in market shares.

    E.g., low-credit consumers have higher benefits but larger decrease in market share
    $\rightarrow$ lower bargaining power.

Results

Estimation Results

	Estimates	S.E.
General banks receiving rate α_g:		
Constant	-2.3722	(0.1373)
Loan amount	0.0084	(0.0006)
Loan length	0.0183	(0.0137)
Credit score	-0.2217	(0.0159)
Target banks receiving rate α_t:		
Constant	-3.6035	(0.2573)
Loan amount	0.0292	(0.0012)
Loan length	0.0174	(0.0270)
Credit score	-0.1305	(0.0168)
Consumer Bargaining power λ:		
Constant	0.5457	(0.3806)
Loan amount	**0.0965**	**(0.0099)**
Loan length	**-0.4482**	**(0.0604)**
Credit score	**0.2926**	**(0.0411)**
Non-financial value δ_t:		
600-650	-0.2122	(0.0148)
651-700	-0.1625	(0.0109)
701-750	-0.1228	(0.0085)
751-800	-0.0962	(0.0076)
801-850	-0.0823	(0.0074)
General banks pricing sd: $\log(\sigma_g)$	-0.8462	(0.0301)
Target banks pricing sd: $\log(\sigma_t)$	-1.1201	(0.0958)
Bargaining power sd: $\log(\sigma_\omega)$	-0.6350	(0.0891)

Discrimination?

- Recall consumer bargaining power: $\omega_i = \text{Logistic}(\boldsymbol{\lambda}'\boldsymbol{x}_i + \varepsilon_{i,\omega})$
  - $\varepsilon_{i,\omega}$ explains about 37% of the variation in consumer rate.
- Obtain an estimate $\hat{\varepsilon}_{i,\omega}$ for each loan and regress it on zip-code demographics:

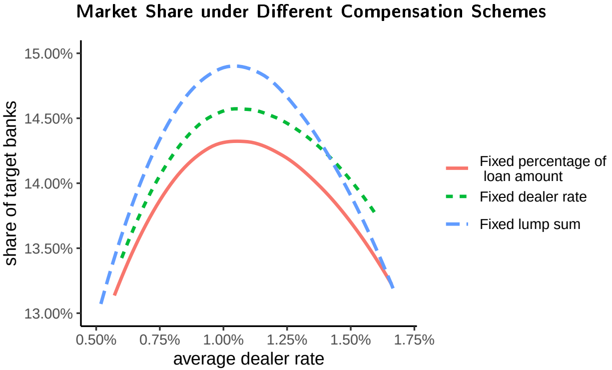
	$\widehat{\varepsilon}_{i,\omega}$
African American population percentage	-0.0540***
Hispanic population percentage	-0.0687***
Median household income	0.0110***
College education percentage	0.0749***
Constant	0.0130***
Observations	177,593
R^2	0.00321

Counterfactual Compensation Schemes

- Increase market share with **non-discretionary** compensation schemes.
  - Bank-receiving rates taken from model estimates.
- Consider three potential compensation schemes:
  - **Fixed percentage of loan amount** (e.g., 2% of loan amount or 3% of loan amount);
  - **Fixed dealer rate** (e.g., 1% or 2%);
  - **Fixed lump-sum** (e.g., $300 or $500).

Counterfactual Compensation Schemes

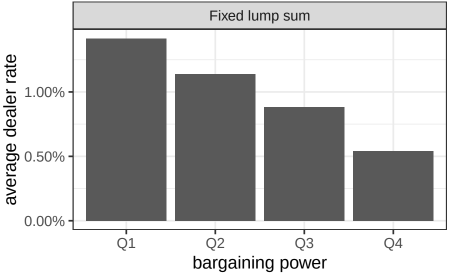
- Using fixed lump-sum compensation can increase the target banks market share.



Why Lump-Sum Works Well?

- Intuition: To attract loans, banks should offer a lower dealer rate (and thus a lower consumer rate) in cases where consumers have a higher bargaining power.
- Bigger loans strongly associate with higher consumer bargaining power.
  - Under lump-sum scheme, larger loan amount $\rightarrow$ lower dealer rate

Average Dealer Rate and Consumer Bargaining Power



Conclusion

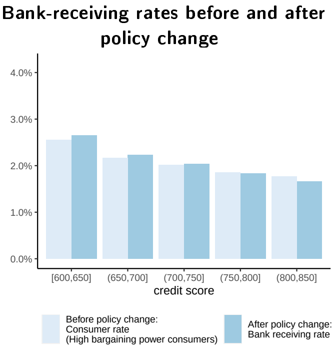
- Study consumer demand when banks (firms) rely on dealers (intermediary) to reach consumers.
- Document a reversal of demand curve after several banks switched to non-discretionary dealer compensation.
- Apply Nash bargaining to model joint decision making between consumers and dealers.
- Show a fixed lump sum compensation scheme can help banks increase market share while ensuring consumer protection.

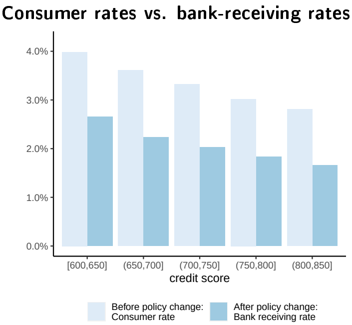
Broader Implication

- Managerial implication for indirect auto lending.
  - Designing dealer compensation policy must account for not only consumer protection but also the dealer influence on bank choice.
  - Intuitive thinking suggests pegging dealer compensation to loan size: reward dealer for bringing larger loans.
  - But accounting for consumer bargaining power suggests lump-sum compensation is better.
- Extend the application of Nash bargaining to demand estimation.
  - Firm prices have to pass through intermediaries, who have their own incentives and influence consumers' choices.
  - Model the joint decision making between two parties when choosing brands.

Identification Assumptions

- No changes in how target banks set bank-receiving rates.





- No changes in how general banks set bank-receiving rates.
- The choice set of consumers includes both the target and general banks.
  - Non-financial factors (e.g., dealer networks) stay the same.

Model - last detail

- The bank choice problem can be written as

$$W_{i,j} \equiv \omega_i \log(u_{i,j}) + (1 - \omega_i) \log(v_{i,j})$$

  - (u_{ij}, v_{ij}): bargained consumer-dealer utilities if choosing banks j

- Allow for non-financial factors: (e.g., existing customer relations & dealer networks):

$$V_{i,j} = W_{i,j} + \delta_j' \mathbf{z}_i$$

  - Target banks are chosen iff $V_{i,t} \geq V_{i,g}$.

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Impact on Other Loan Characteristics at Target Banks

- The average loan amount, loan length and credit score do not change substantially for target banks.

	Loan amount	Loan length	Credit score
Before policy	23,355.7	65.70	745.5
After policy	23,837.6	64.63	750.3

- The directions of the small changes are consistent with model prediction.
  - The policy change decreased the dealer compensation with low-bargaining-power consumers. The policy change should increase the average bargaining power of the consumers at the target banks.
  - Higher bargaining power is associated with larger loan amount, shorter loan length and higher credit score

Descriptive Statistics

Descriptive Statistics by Banks and Credit Score

	Number of loans	Market share	Consumer rate	Loan amount ($)	Loan length(year)
Target Banks:					
Overall	30,153	16.6%	3.2%	23,597	5.4
By Credit Score:					
801–850	6,669	18.2%	2.8%	22,679	5.2
751–800	9,001	17.5%	3.0%	23,330	5.4
701–750	7,928	16.9%	3.2%	23,917	5.6
651–700	4,757	15.0%	3.5%	24,726	5.6
600–650	1,798	12.6%	3.9%	23,945	5.6
General Banks:					
Overall	150,950	83.4%	3.5%	27,294	5.5
By Credit Score:					
801–850	30,050	81.8%	2.9%	25,947	5.2
751–800	42,394	82.5%	3.1%	27,378	5.4
701–750	38,974	83.1%	3.5%	27,605	5.6
651–700	27,046	85.0%	4.0%	28,155	5.7
600–650	12,486	87.4%	4.6%	27,412	5.7

Counterfactual Compensation Schemes

Market Outcomes at Target Banks by Compensation Scheme

	Optimal Compensation	Equiv. Dealer Rate (1)	Consumer Rate (2)	Market Share (3)	Increase in Market Share (4)
Benchmark (3% of loan amount)		1.12%	3.09%	14.29%	-
Fixed percentage of loan amount	2.76%	1.04%	3.01%	14.37%	0.56%
Fixed dealer rate	1.07%	1.07%	3.02%	14.60%	2.22%
Fixed lump-sum	$545.8	1.05%	3.06%	14.91%	4.34%

Counterfactual Compensation Schemes

Consumer Rate and Market Share at Target Banks by Credit Segments

	Benchmark (3% of loan amount)		Optimal percentage of loan amount (2.76%)		Optimal lump sum ($546)	
	Consumer Rate (1)	Market Share (2)	Consumer Rate (3)	Market Share (4)	Consumer Rate (7)	Market Share (8)
All consumers:	3.09%	14.29%	3.01%	14.37%	3.06%	14.91%
By credit segment:						
600-650	3.51%	11.20%	3.44%	11.07%	3.43%	11.43%
651-700	3.36%	12.71%	3.29%	12.63%	3.29%	13.17%
701-750	3.15%	14.48%	3.07%	14.48%	3.11%	15.08%
751-800	2.98%	15.26%	2.90%	15.40%	2.97%	16.01%
801-850	2.86%	15.21%	2.78%	15.53%	2.87%	15.97%