Unraveling Information Sharing in Consumer Credit Markets

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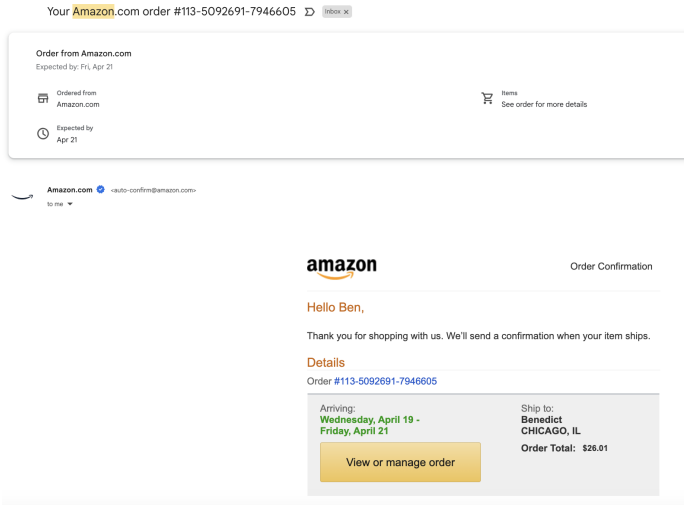
Work-in-Progress!

3 Motivating Examples of Firms Stopping Sharing Information

1. Amazon Stops Sharing Order Details



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3. **Twitter Stops Sharing API for Free**

What connects these?

Harnessing Market Power from Information Rents, to Limit Potential of Disruptive Innovation

Selection markets with heterogeneous consumers where ability to target drives profits.

- $t = 0$: Incumbent firms with market power from informational rents share data.
- $t = 1$: New technological innovation potentially threatened incumbents.
- $t = 2$: Incumbents respond by $\downarrow$ information sharing to foreclose on (potential) entrants.

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3 Examples

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- Response to scraping technology

2. Apple Stops Sharing Location Data

- Response to tracker technology

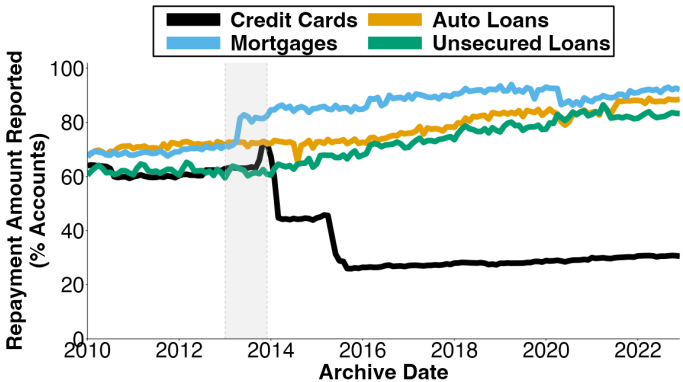
3. Twitter Stops Sharing API for Free

- Response to ChatGPT technology

US consumer credit markets regarded as the most developed in the world

Why did repayments information reporting to US credit bureaus unravel?

- Credit cards: $\Delta < 0$
- Autos, Mortgages, Loans: $\Delta \geq 0$



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   - High spenders are often longer tenure & profitable.
   - Repayments data high marginal value for predicting spending & lifetime profits.

Data: University of Chicago Booth's TransUnion Consumer Credit Panel (BTCCP)

- BTCCP is TransUnion anonymized sample of US credit reporting data.
- 1 in 10 sample of consumers with US credit reports.
- Monthly, individual credit tradelines + consumer-level data (e.g. credit scores).
- Anonymized consumer, trade, and furnisher identifiers.
- Apply standard data cleaning steps (Gibbs et al., *AEA 2023 Panel*)

No individual firms are identified in BTCCP data.

Roadmap

1. Credit Card Market
2. Unraveling Information Reporting
3. Innovation
4. Heterogeneity
5. Predicting Profitable Credit Cards
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Credit Card Market

Credit card profitability depends on ex-post consumer behaviors: multiple dimensions of information asymmetry & revenue streams

$t = 1$:

- \$1,000 new spending ($\rightarrow$ generates \$5 interchange revenue net of rewards)
- \$1,000 statement balance & \$10 minimum payment due

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- \$1,000 - \$250 = \$750 revolving debt ($\rightarrow$ generates interest revenue but risk of charge-off)
- \$12 interest + \$30 fee = \$42 financing charges

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- $1,000 - $250 = $750 revolving debt ($\rightarrow$ generates interest revenue but risk of charge-off)
- $12 interest + $30 fee = $42 financing charges
- $2,000 new spending ($\rightarrow$ generates $10 net interchange revenue)
- $2,792 statement balance & $70 minimum payment due

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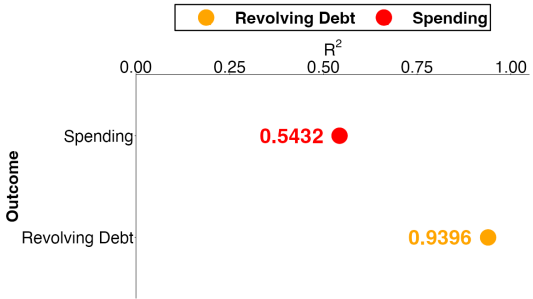
$$spending_t = statement\ balance_t - statement\ balance_{t-1} + repayment_t - fincharge_t$$

$$revolving\ debt_t = statement\ balance_{t-1} - repayment_t$$

If $repayment_t$ unobserved, ↑ noise to measurement of spending & revolving debt



$$Y_{i,t} = \alpha + \beta\, f(\textit{statement balance}_{i,t}, \textit{statement balance}_{i,t-1}) + \varepsilon_{i,t}$$

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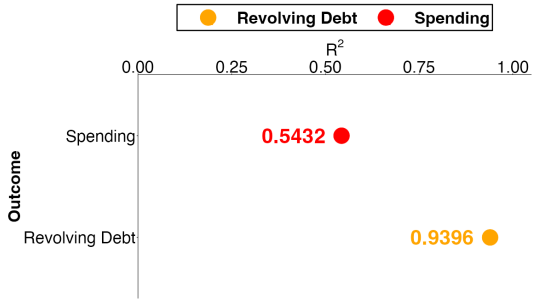

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Bad news for academics & policymakers measuring consumption (e.g. Ganong & Noel, 20 AER; Gross, Notowidigdo, & Wang, 20 AEJ: Macro) and revolving debt (e.g. Indarte, 22 WP).

Noise heterogeneously affects credit card lenders' business models

Firms vary in reliance on interchange revenue:

	American Express	Capital One
Interchange Revenues (% Revenues)	55%	27%
Net Interchange Revenues (% Net Revenues)	68%	18%
Marketing Costs	\$5.5 bn	\$4.0 bn

Sources: American Express & Capital One Annual Accounts

Marketing large expense for all firms.

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Market Structure

- **Concentrated in 6 large firms**:
  - JPMorgan Chase, Citibank, American Express,
  - Bank of America, Capital One, Discover. *(Nilson Report)*
- **High returns:** $\approx 4\%$ p.a. ROA *(Federal Reserve)*
- Market power from informational rents.

Roadmap

1. Credit Card Behaviors
2. Unraveling Information Reporting
3. Innovation
4. Heterogeneity
5. Predicting Profitable Credit Cards
6. Why Didn't Other Credit Markets Unravel?

Unraveling Information Reporting

Credit reporting data

Core credit data required (FACT Act, FCRA, METRO2)

- statement balance
- minimum payment due
- delinquency status
- credit limit (for revolving products e.g. credit cards, retail cards, HELOC)*
- opening date
- origination terms (for installment loans e.g. auto loans, mortgages, unsecured loans)

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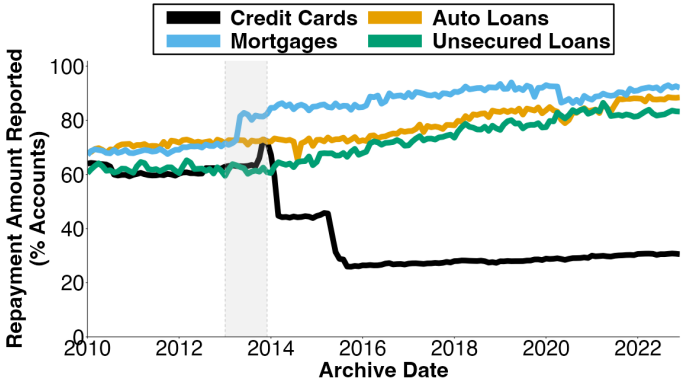
US credit reporting data used by lenders for:

- Marketing (pre-solicited credit offers)
- Credit risk (underwriting, portfolio management).

Unraveling in credit card reporting of repayments amounts to US credit bureau

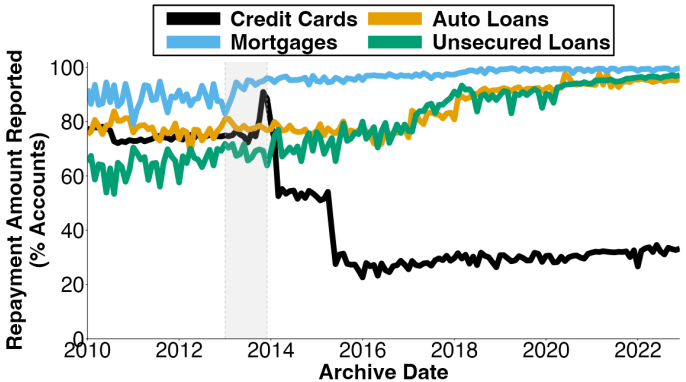


Source: BTCCP

Also occurs in other US credit bureaus: Equifax & Experian.

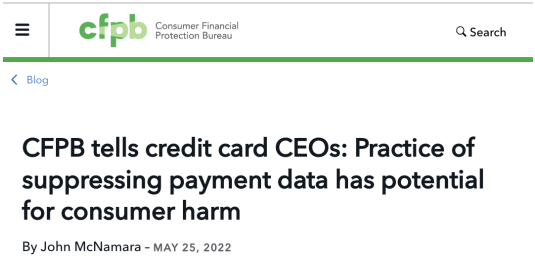
No lenders plan to to voluntarily restart reporting repayments amounts (CFPB).

Replicating CFPB: Restricting to months updated with payment in last month



N.b. Not all lenders appear to regularly update date of last payment.

Highly policy relevant to CFPB!



CFPB documents:

- **Non-Reporters:** American Express, JPMorgan Chase, Citibank, Bank of America, Capital One, Discover.
- **Of these:**
  - 2 never report
  - 1 stopped in 2014
  - 3 later stopped (1x 2014, 2x 2015)

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Innovation

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Traditional credit reports create point-in-time variables (e.g. current balance, any delinquency in last 7 years).

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– especially combining repayments data with balances.

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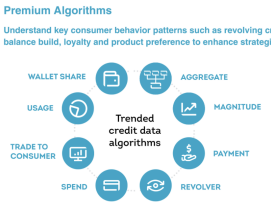
Trended Data creates a bundle of variables using credit reports over time (trends!) – especially combining repayments data with balances.

- Reveals **credit cards** behaviors driving profitability beyond delinquency.

  - Revolving debt.
  - New spending.
  - Interest rates.



Reveals not just credit risk but who profitable consumers are.

"Trended Data" is technological advance ↑ information from data

- **New information revealed** from data
- **Cost reduction:** Technically firms could construct from raw data themselves.
  In practice they did not. Why?
  - **Technological constraints:**
  "It took us time just to build the infrastructure to house the data."
  (Equifax Earnings Call 2013)
  - **Legal constraints:** FCRA compliance concerns prevented firms previously constructing trended data.
  - **Cost constraints:** constructing trended data would mean purchasing 24 archives.

How is "Trended Data" used by firms?

- **Targeted marketing**:
  "Helps Clients...calculate profit by providing an estimate of consumer spend...prioritize marketing investments and target higher spending consumers...optimize enhanced value propositions to the right spending segments." - Experian.

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  - Fannie Mae (consistent with Equifax, Experian, TransUnion, FICO, & VantageScore).

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Why launched then?

- CARD Act limited credit card fees (Agarwal et al., 15) & interest (Nelson, 22).

- Interchange revenues become increasingly important source of credit card revenue.

Theoretical trade-offs of reporting data non-reciprocally

Benefits of Reporting

1. Technology
2. Reduce Information Asymmetries

Costs of Reporting

1. Short-Run Poaching
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Incumbents report data. Why? e.g. firm inertia, fear of regulators, limits scope of entry.

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Post-Trended Data:

Adverse selection $\downarrow$, consumer switching costs $\downarrow \Rightarrow$ information reporting $\downarrow$

Am adapting Brouckaert & Degryse (06 EJ) to market structure to explain reporting decisions.

Moral hazard versions (Padilla & Pagano, 97 RFS; Gehrig & Stenbacka, 06 EER)

Unraveling of repayments data is US-specific

Repayments data remain reported in UK and Canada post trended data introductions.

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Why?

- **UK's** Principles of Reciprocity by industry body Steering Committee on Reciprocity:
  (i) bans use of credit files for pre-solicited marketing to individuals
  (ii) reciprocality in sharing data

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  (i) bans use of credit files for pre-solicited marketing to individuals
  (ii) reciprocality in sharing data
- **Canada** has limited use of credit files for marketing e.g. can use for geographic variables but not for individual targeting.

Much less trade-off of sharing repayments data in UK or Canada: less risk of poaching.

Recap of key findings so far

- Credit card profitability depends on ex-post consumer behaviors with multiple dimensions of information asymmetry & revenue streams.
- Observing repayments data crucial to measuring consumer behaviors.
- Unraveling of reporting repayments data by credit card lenders (2013 - 2015).
- Timing due to credit bureau data innovation revealing private consumer behaviors:
  - spending (driving interchange revenue)
  - revolving (driving interest revenue).

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Heterogeneity

Unraveling Driven By Some Credit Card Lenders Stopping Reporting

Aggregate furnishers in BTCCP based on reporting behaviors:

Group	% 2012 Cards	% 2012 Balances
Always: Share repayments data in 2012 & 2015.	17%	16%
Stoppers: Share repayments data in 2012 but not 2015	43%	44%
Nevers: Never share repayments data in 2012 & 2015	30%	33%
Others: Everyone else.	10%	7%

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Lenders' Responses to CFPB:

Stoppers:

- Firm 4: "Doesn't believe benefits outweigh proprietary interests."
- Firm 6: "Other major issuers were no longer providing...left at competitive disadvantage".

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Nevers:

- Firm 1: "Not required to do so. Not consistently furnished nor adequately studied."
- Firm 5: "Not required, furnishing is voluntary. Doesn't believe cost...is worth it."

Selection in Reporting Repayments Data

	Always	Stoppers	Nevers
Credit Score	720.53	719.62	743.32
(S.D.)	(87.54)	(89.96)	(77.03)
Tenure	69.85	96.49	145.96
(S.D.)	(81.21)	(83.40)	(120.84)
Credit Limit	8,615.89	9,508.78	10,397.93
(S.D.)	(7,659.00)	(9,528.84)	(9,520.58)
Statement Balance	2,204.53	2,426.43	2,580.47
(S.D.)	(3,811.80)	(4,279.58)	(4,852.06)
Utilization	0.36	0.39	0.30
(S.D.)	(0.39)	(0.41)	(0.35)
Proxy Spending	266.29	294.64	364.36
(S.D.)	958.96	1,171.50	1,524.48

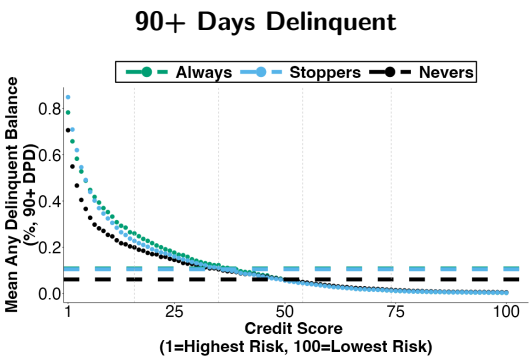
Adverse Selection in Reporting Repayments Data Residual of Credit Risk: Always < Stoppers < Nevers

	Always	Stoppers	Nevers
Residual Tenure	-35.87	-9.34	32.90
(S.D.)	(78.27)	(79.72)	(116.83)
Residual Credit Limit	-710.27	185.62	134.99
(S.D.)	(6,720.39)	(8,536.33)	(9,317.46)
Residual Statement Balance	-313.73	-74.73	278.08
(S.D.)	(3,651.87)	(4,145.36)	(4,633.57)
Residual Utilization	-0.01	0.01	-0.01
(S.D.)	(0.26)	(0.28)	(0.27)
Residual Proxy Spending	-44.63	-13.68	43.81
(S.D.)	956.12	1,167.17	1,521.42

Residual of 100 credit score quantiles.

Credit risk not main reason for differential reporting

Lenders Have Similar Delinquency Rates Conditional on Credit Score.



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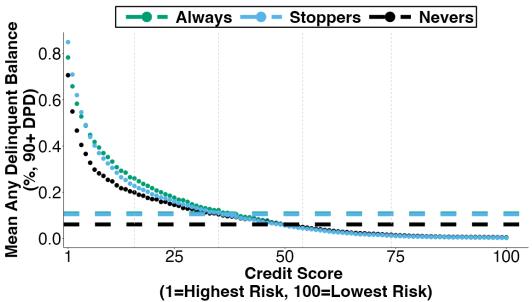
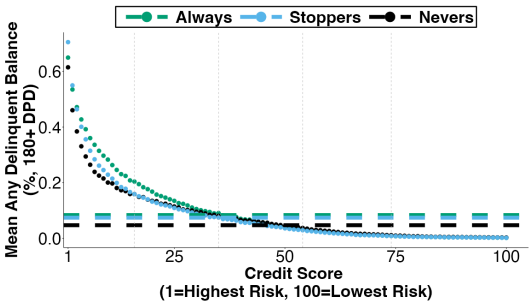
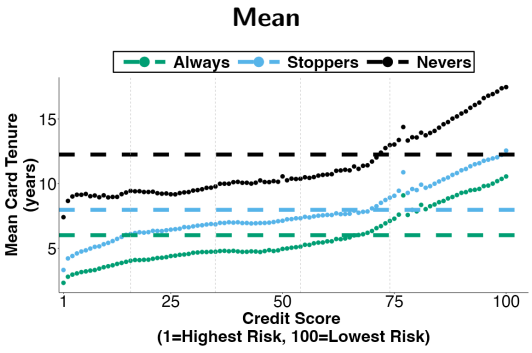


180+ Days Delinquent

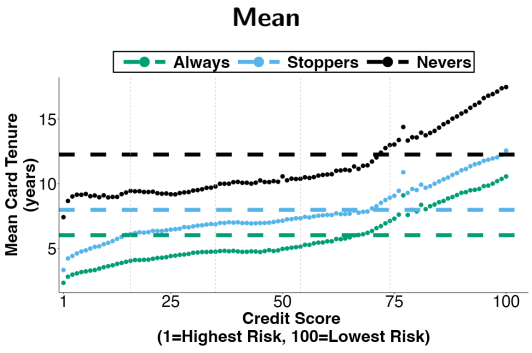


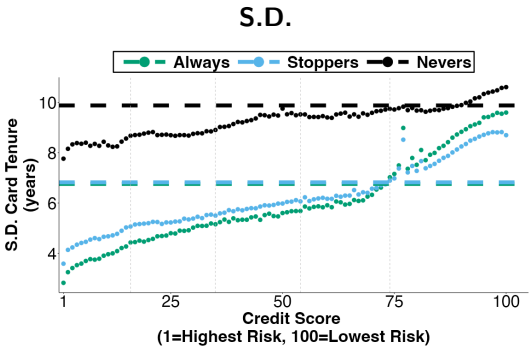
N.b. Fixed thresholds for credit score quantiles across all groups and charts.

Lenders Have Different Card Tenure for Given Risk: Informational Rents!



Lenders Have Different Card Tenure for Given Risk: Informational Rents!





Develop New Methodology for Measuring Financing Charges

Minimum payment (M_t) determined by: $M_t = \max\{\$D,\ I\%\ balance_t + interest_t + fees_t\}$

- Infer potential $\$D$ and $I\%$ for each furnisher from transacting months.
- Upward errors are fees or trailing interest. Penalize errors below.
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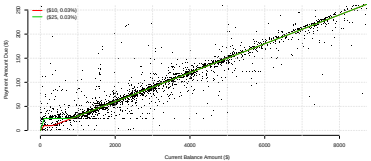
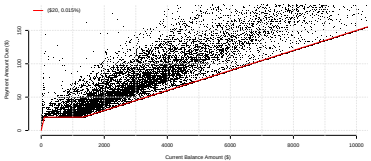
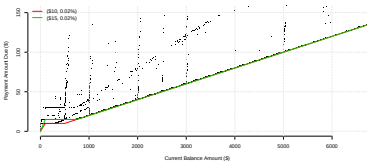
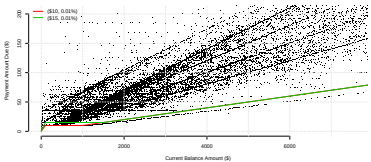
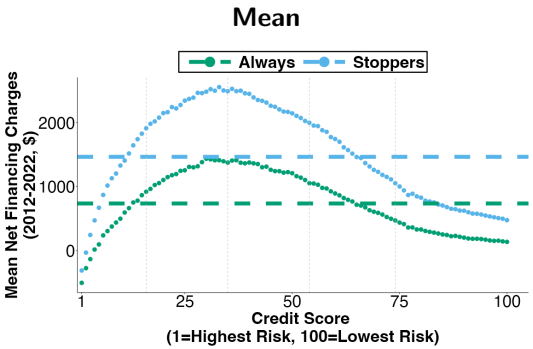








Always & Stoppers : Financing Charges - Charge-Offs (2012 to 2022)



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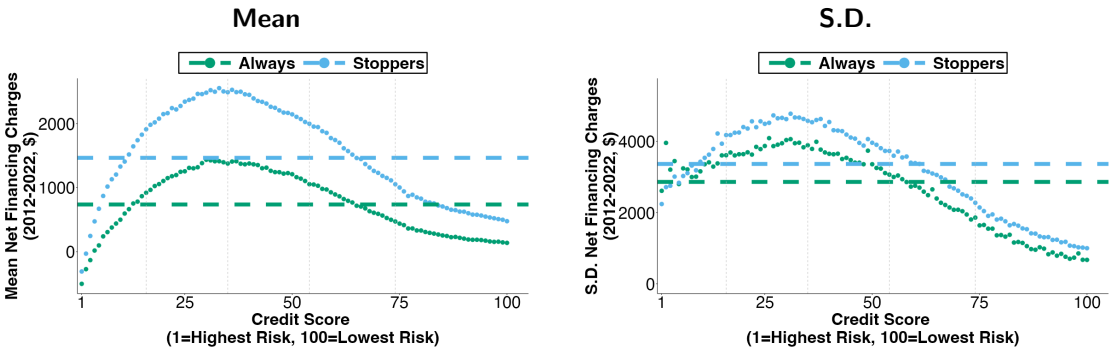
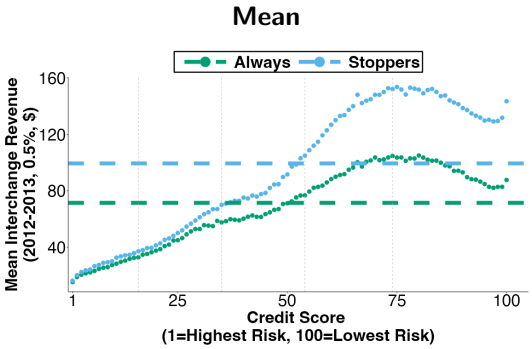


Mean estimated financing charges consistent with Agarwal et al. (15 QJE, 22 WP).

Always & Stoppers: 0.5% Spending Interchange Net of Rewards (2012 to 2013)



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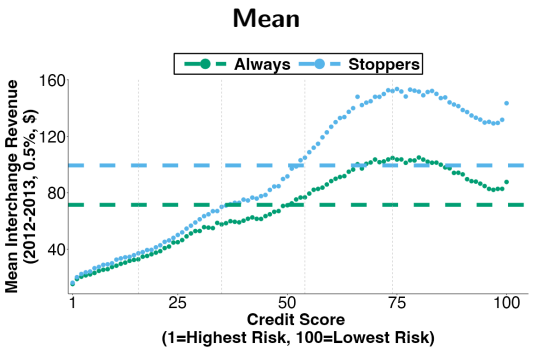
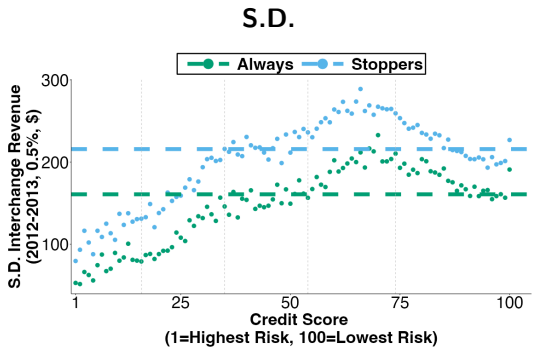


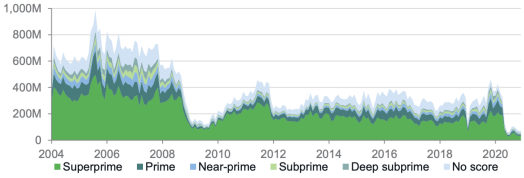


- Gap will widen when adjust for card tenure.
- Variation within (zipcode) income and within-consumer's card wallet.
  High returns from being 'top-of-wallet'.

Are transactors profitable?

- Hard to reconcile with large, costly marketing to superprime transactors.

Credit Card Offers Mainly Superprime



Source: CFPB, 2021

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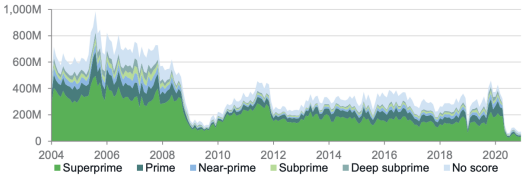
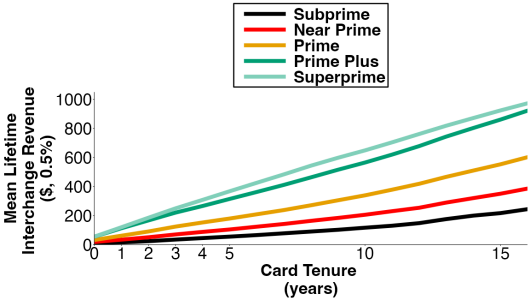


Source: CFPB, 2021

Lifetime Interchange Revenue By Card Tenure & Credit Score



Average transactor may have 'low' p.a. net revenues...but longer tenure means $NPV > 0$.

For Always, interchange increases mean lifetime profits of 2012 transactors: \$230 to \$450.

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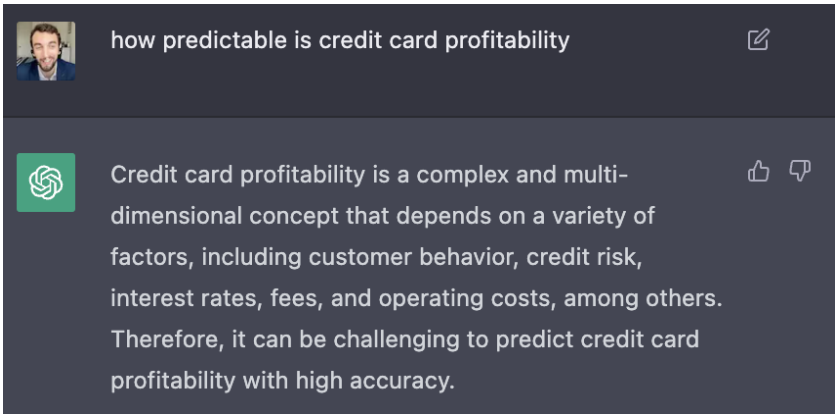
Roadmap

1. Credit Card Behaviors
2. Unraveling Information Reporting
3. Innovation
4. Heterogeneity
5. Predicting Profitable Credit Cards
6. Why Didn't Other Credit Markets Unravel?

Predicting Profitable Credit Cards

Predicting Credit Card Profitability is Hard!



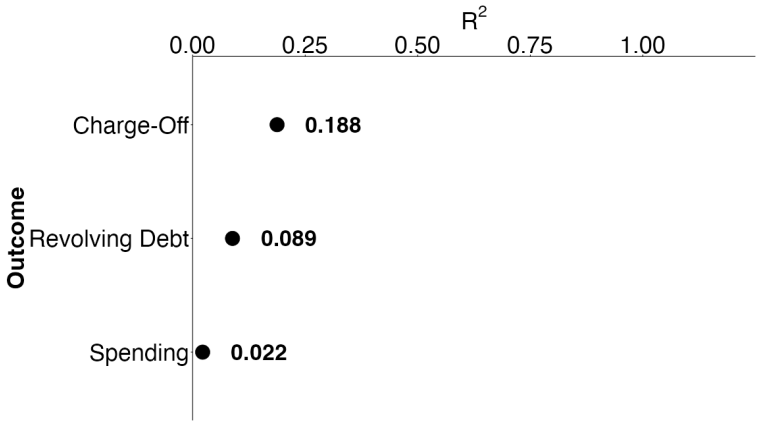
How Predictable are Consumer Behavior & Profitability?

Lender's problem is predicting profitable types to target marketing to.

Use data to December 2012 to predict 2013+ card-level outcomes for Always + Stoppers.

Show out-of-sample R^2.

Credit Scores Alone Do Not Predict of Spending & Revolving Debt



OLS regressions on 100 credit score quantiles.

Evaluating Value of Repayments Data

Lender's problem is predicting profitable types to target marketing to.

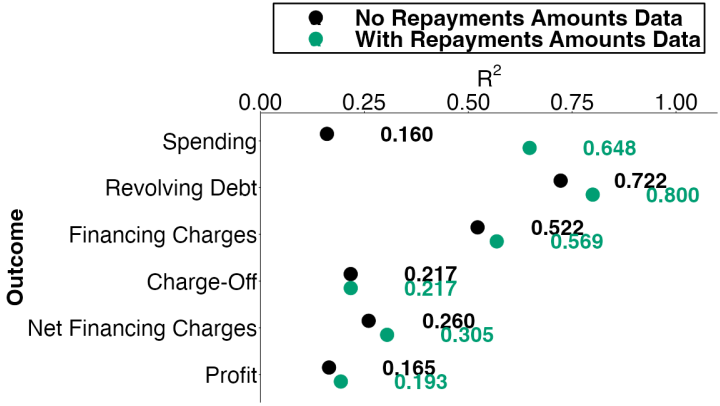
1. Credit Score + Core (e.g. credit limit, statement balances, utilization, delinquency)
2. Credit Score + Core + **Repayments (e.g. spending, revolving debt)**

Use data to December 2012 to predict 2013+ outcomes.

OLS regressions on 100 credit score quantiles.

Show out-of-sample R^2.

Repayments Data Predicts Profitability: Especially Spending Driving Interchange Revenue



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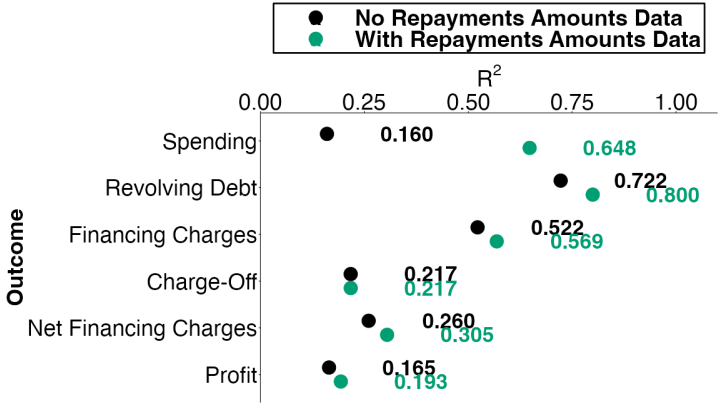

- Uplift in profit prediction an under-estimate as do not observe lifetime interchange revenue.

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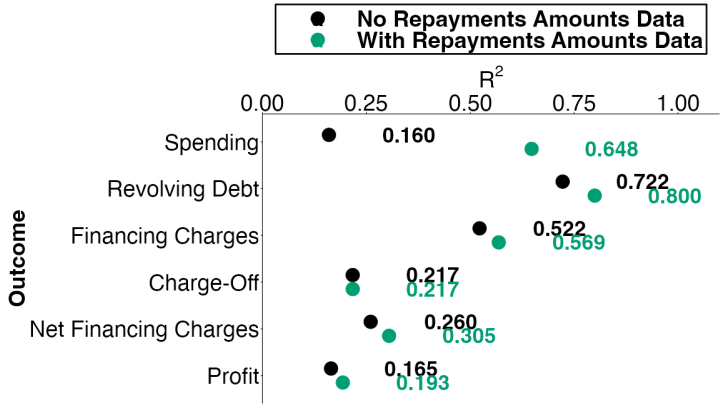

- Uplift in profit prediction an under-estimate as do not observe lifetime interchange revenue.
- If train models on Always (feasible in 2023), poor out-of-sample fit on Stoppers.

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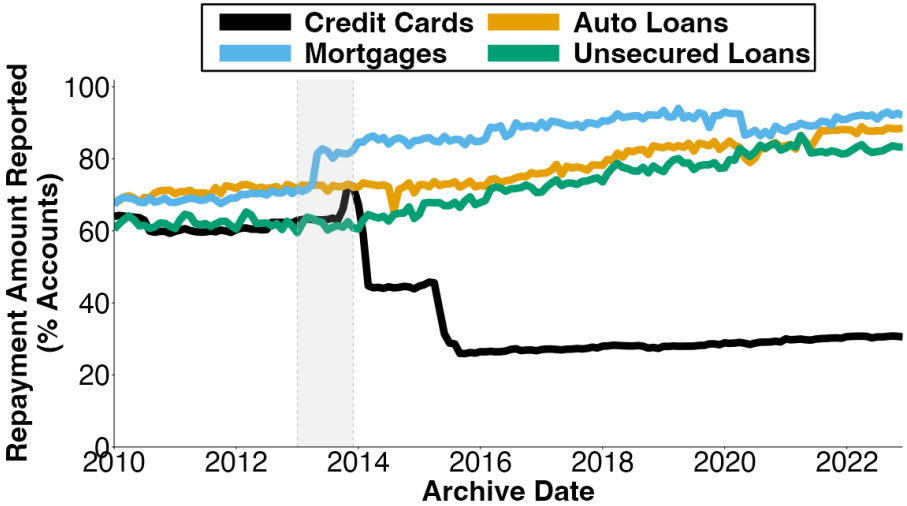
Why Other Markets Unravel?

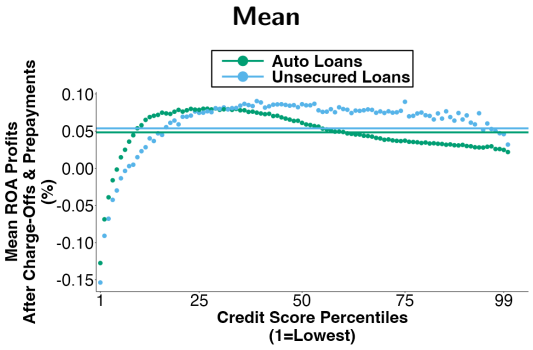
Reminder: Auto Loans, Mortgages, Unsecured Loans, Did Not Unravel

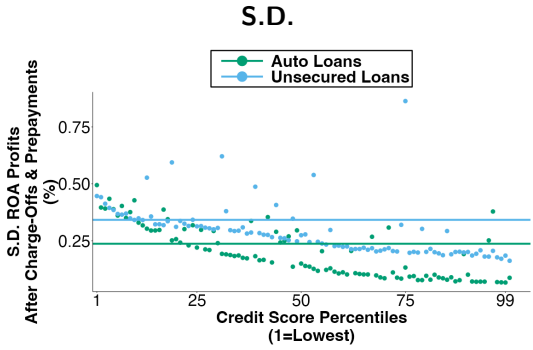


Ex-Post Profitability in Auto Loans and Unsecured Personal Loans Depends on (i) Charge-Offs (ii) Prepayments

	Auto Loans	Unsecured Loans	Credit Cards
Collateral	Secured	Unsecured	
Life	Fixed-Term		Open-Ended
Revenue Streams	Financing Charges (Interest, Fees)		Financing Charges (Interest, Fees), Interchange
Risks	Delinquency, Prepayment		Delinquency, Revolving Amount & Duration, Spending

Installment Loan Ex-Post Profits





$$ROA = \frac{\Pi}{A} = \frac{(P \times \frac{T}{N}) - C}{A}$$

where ROA is Return on Assets, A is loan principal, Π is ex-post realized profits,
P is scheduled monthly payments, C is charge-offs,
T is actual loan months (restrict to $T \leq N$), N is scheduled loan months.

‘Repayment amount’ does little to improve profitability prediction in Auto Loans & Unsecured Loans

Model	R^2 Predicting Profit	
	Auto Loans	Unsecured Loans
1. Credit Score + Core	0.376	0.952
2. Credit Score + Core + Repayment	0.382	0.954

Profit ($) are ex-post after charge-offs & prepayments.

Conclusions

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Conclusions

1. **Technological progress can unravel information sharing in developed markets.**
   - Lenders holding market power from informational rents strategically
   not reporting data to limit competitors' ability to poach profitable consumers.
2. **Importance of spending to credit card business**
   - 2nd source of information asymmetry.
   - High spenders are often longer tenure & profitable.
   - Repayments data high marginal value for predicting spending & lifetime profits.

Not shown today:

- Theory model adapting Brouckaert & Degryse (06 EJ)
- Effects of FTC mandating reporting of credit card limits on firm and consumer behaviors.

More work-in-progress:

- Refining profitability measures (charge-offs, charges, lifetime interchange, discount, risk)
- More work on prediction models (specifications and firm heterogeneity).

Thank you!

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