

Digital Collateral

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Motivation

Collateralized lending predominant source of credit in rich countries

- More than 80% of US household debt is secured
- Collateral incentivizes repayment (moral hazard) and prevents bad risk from applying for loans (adverse selection)

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Use of collateral less widespread in poor countries. Why?

- *Supply side*: High repossession costs (relative to asset values)
 - Contracts are difficult to enforce
 - Property rights are difficult to establish
- *Demand side*: Income risk renders low demand for traditional secured loan
 - Threat of repossession unattractive to households

This paper

New form of secured lending using digital collateral -- collateralized lending without traditional repossession

- Traditional Collateral

- Costly to repossess, but valuable to creditor
- Repossession is irreversible, wipes out borrower's equity

- Digital Collateral

- Facilitated by “lockout” technology
- Cheap to repossess, but may have little value to creditor
- Repossession is easily reversible, borrower may retain equity

Role of Collateral

- Repossessing collateral serves (at least) two roles:
 - *Recovery*: Provides something of value to creditor in case borrower defaults.
 - *Incentives and Screening*: Takes something of value away from borrower.
- In models of collateralized lending:
 - These two roles are inherently bundled.
 - Repossession (or liquidation) is irreversible.
- ***Digital Collateral*** facilitates richer set of contractual arrangements.
 - Digitally disrupt flow services from asset via ***lockout technology***
 - Decouples 2 roles
 - Temporary/reversible

Examples in the market

- PAYGO for Solar Home Systems (Fenix, M-Kopa)
 - Battery, solar panel, and small appliances with GSM chip installed in battery
 - If delinquent, battery remotely locked so will not discharge electricity
- Smart Phones (Payjoy)
 - Phone remotely locked if borrower is delinquent
- Subprime Auto Loans (PassTime, Trax SI)
 - Interrupter installed on starter
 - Remotely activated when borrower is sufficiently delinquent
- Utilities (Electricity, internet, water, etc)
 - Service disabled if miss payments
 - Last mile connection costs & asset purchases

New *ReadyPay* Rates.

Enjoy **DISCOUNTS** when you complete your loan early!



10W <i>ReadyPay</i> Home Eco 2	
Deposit:	19,000/-
Daily Rate:	600/-
Monthly Rate:	18,000/-
Duration:	35 months
Buy in Cash:	519,000/-
Buy on Loan:	649,000/-

Complete in 12 months for a 100,000/- DISCOUNT



10W <i>ReadyPay</i> Home Plus	
Deposit:	39,000/-
Daily Rate:	1,000/-
Monthly Rate:	30,000/-
Duration:	25 months
Buy in Cash:	631,000/-
Buy on Loan:	789,000/-

Complete in 12 months for a 100,000/- DISCOUNT



17W <i>ReadyPay</i> Home Comfort	
Deposit:	49,000/-
Daily Rate:	1,350/-
Monthly Rate:	40,500/-
Duration:	24 months
Buy in Cash:	799,000/-
Buy on Loan:	999,000/-

Complete in 12 months for a 110,000/- DISCOUNT



34W <i>ReadyPay</i> Home Deluxe	
Deposit:	99,000/-
Daily Rate:	1,800/-
Monthly Rate:	54,000/-
Duration:	24 months
Buy in Cash:	1,116,000/-
Buy on Loan:	1,395,000/-

Complete in 12 months for a 160,000/- DISCOUNT



34W <i>ReadyPay</i> TV Deluxe (Zuku)	
Deposit:	149,000/-
Daily Rate:	3,000/-
Monthly Rate:	90,000/-
Duration:	26 months
Buy in Cash:	1,999,000/-
Buy on Loan:	2,539,000/-

Complete in 12 months for a 270,000/- DISCOUNT

(Includes 1 Year Zuku subscription)
(Includes 2 Years Zuku subscription)

Pay well to be eligible for **UPGRADES** in 3 months!

SCHOOL FEES LOANS



Warranty:

- All systems come with a **3-year** limited warranty on the battery and panel.
- Accessories come with a **2-year** limited warranty.
- Any faults caused during manufacturing will be replaced for FREE at a *ReadyPay* service centre.

Home Eco customers who pay well can **upgrade** to a Home Comfort in 3 months

How Fenix Power works:

Method 1



Take your Fenix Power System home and enjoy 7 days of FREE power!



After your 7 free days, the system will lock.



Dial *165*62# to make a payment with MTN Mobile Money.



You will receive an SMS confirming your payment



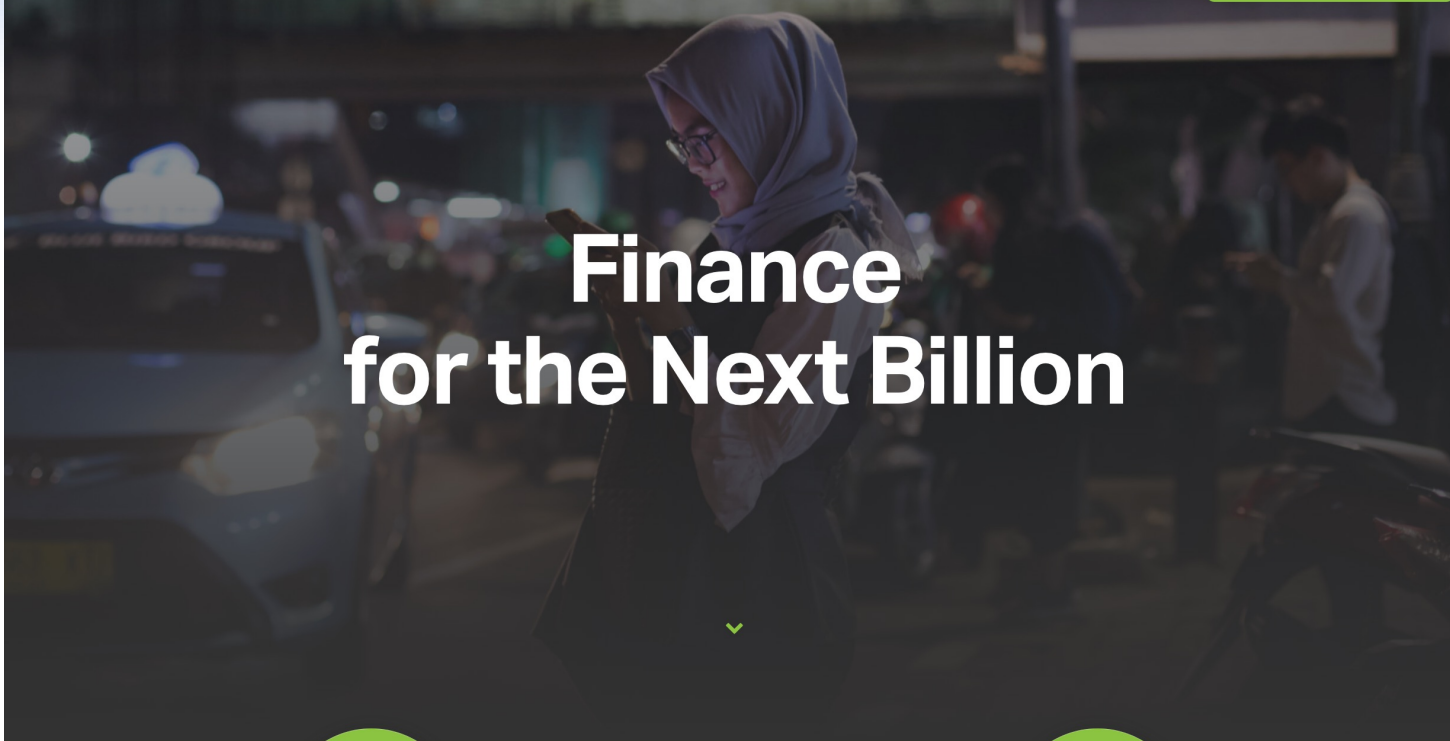
Press network button for atleast 5 seconds after receiving SMS



Your system will unlock. Bigger payments give you MORE power!



Clear your balance and it will belong to you!



Finance for the Next Billion



Phone Finance

Buy a smartphone on installment payments and build your credit history.

[GET A PHONE](#)



Cash Loans

Apply for a cash loan from your smartphone and receive your money in minutes

[GET A LOAN](#)

How PayJoy Works

Apply for a phone or cash loan

At PayJoy you only need an ID, Facebook account and a valid phone number to apply.

Use your phone as a virtual guarantee

Use your phone as collateral to access more credit opportunities.

Build your credit history

Every payment you make impacts your credit history in a positive way.



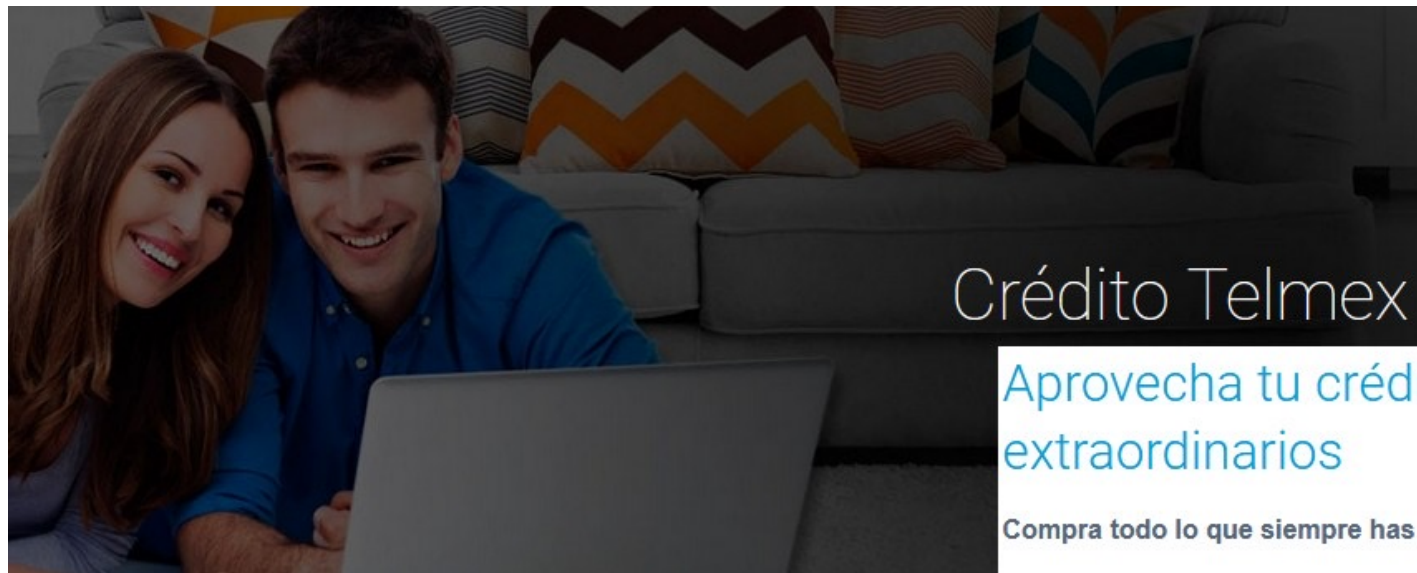
"With PayJoy, I was able to get a phone, pay over time, and now I am able to get a cash loan whenever I need money. Highly recommend!"

Customer in Mexico, since 2018.

GET STARTED

Utilities (Telephone, Electricity, Internet)

- Use to finance last mile connection costs
- Also finance asset purchases using similar method (e.g., Telmex)



Cargos del Mes	
Planes y Paquetes	328.00
Tiendas Telmex	180.39
IEPS 3%	8.90
IVA 16%	82.51

Research Questions

- How valuable is securing loans with digital collateral to the firm?
 - Quantify the effect on repayment and profitability
- What is the mechanism?
 - Moral hazard vs adverse selection
- What are the impacts of the loans on households?

Field Experiment with Fenix International

- Largest SHS supplier in Uganda (> 600k customers)
- Range of SHS products, 10-34 W
 - LED bulb \approx 4-7W
 - Refrigerator \approx 500W
- 3rd largest user of mobile money in Uganda



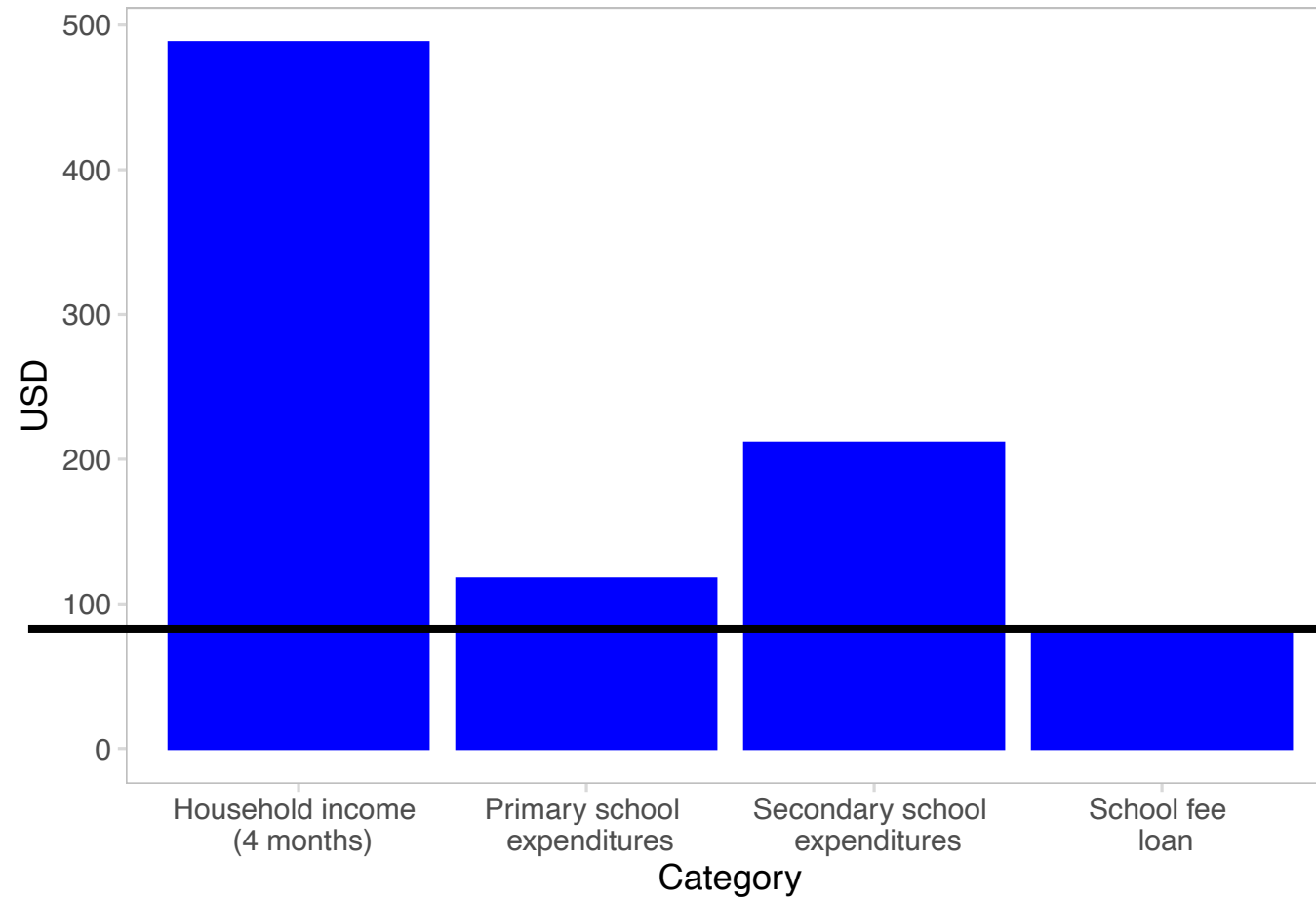
Loan Product – School Fee Loans

Fenix offers “school fee” loans to existing SHS customers that were in good standing on their account

- Loan amounts from 100k-500k (\$25-\$125), 3x per year
- 100-day maturity, 15-20% deposit
- PAYGO structure, e.g., on 300k loan
 - Make 50k deposit
 - Receive 300k a few days later
 - Payback 3k per day, completed after 100 payments
 - If delinquent -> device locks until start paying again



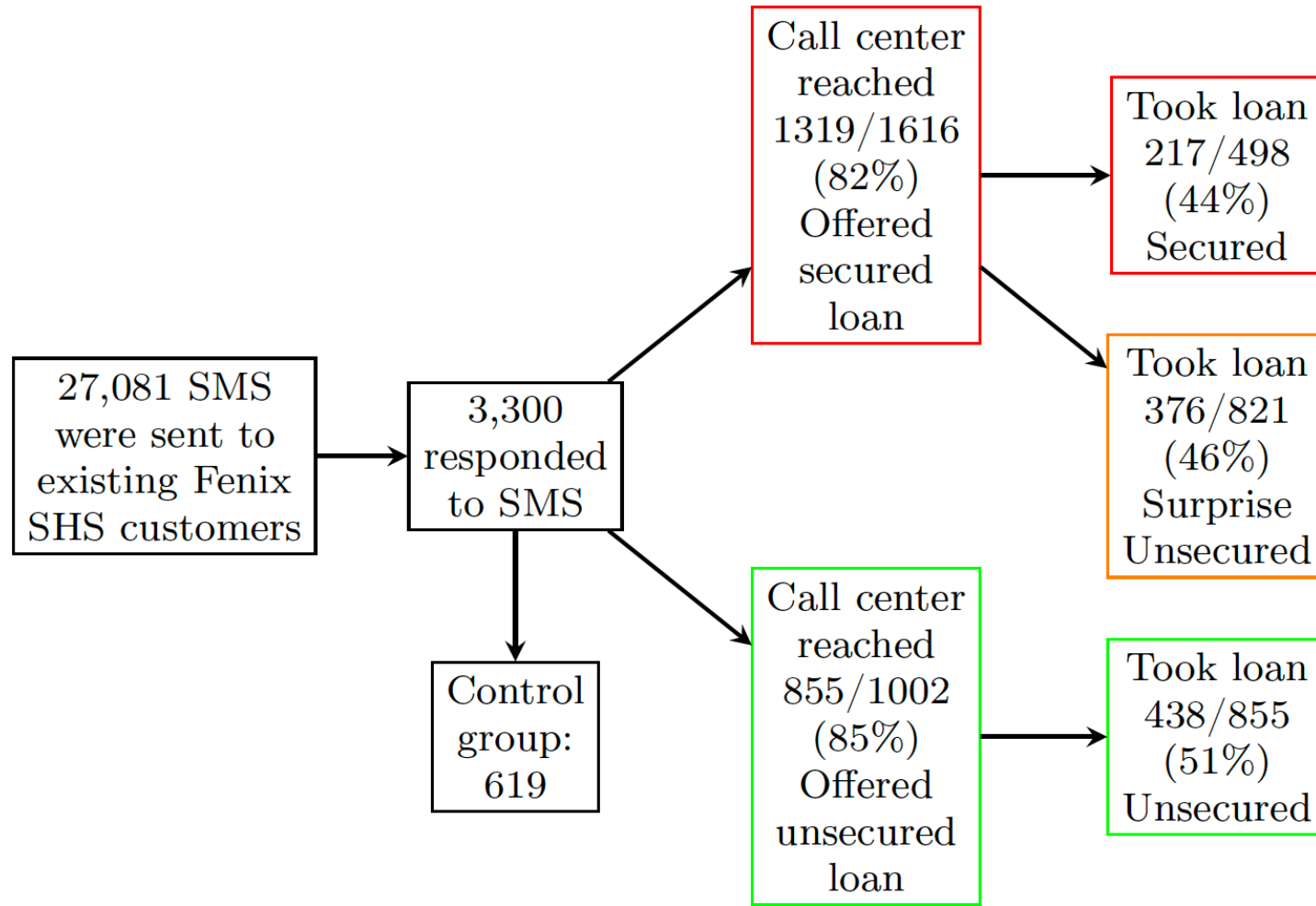
School Expenditures Per Term



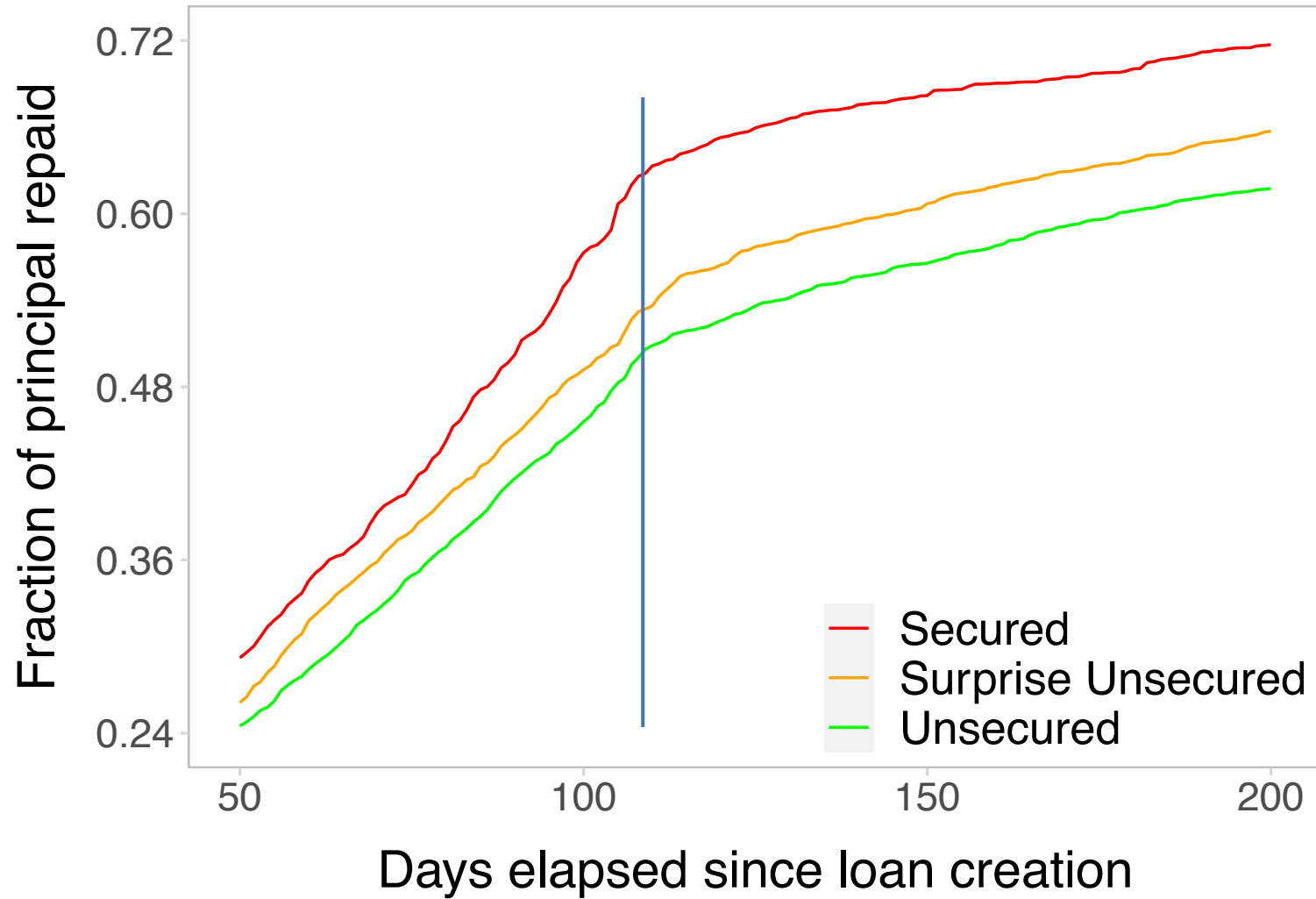
Experimental Design

- Randomly assigned into 1 of 4 groups
 1. Secured: Offered a loan secured by digital collateral (their SHS)
 2. Unsecured: Offered an unsecured loan
 3. Surprise Unsecured: Offered secured loan, if they accepted, we “surprised” them (a la Karlan and Zinman, 2009)
 4. Control: No offer
- Difference in repayment btw Secured & Unsecured captures MH & AS
 - Secured – Surprise Unsecured: same offer -> only MH
 - Surprise Unsecured – Unsecured: different offer -> only AS

Sample Sizes and Take-up

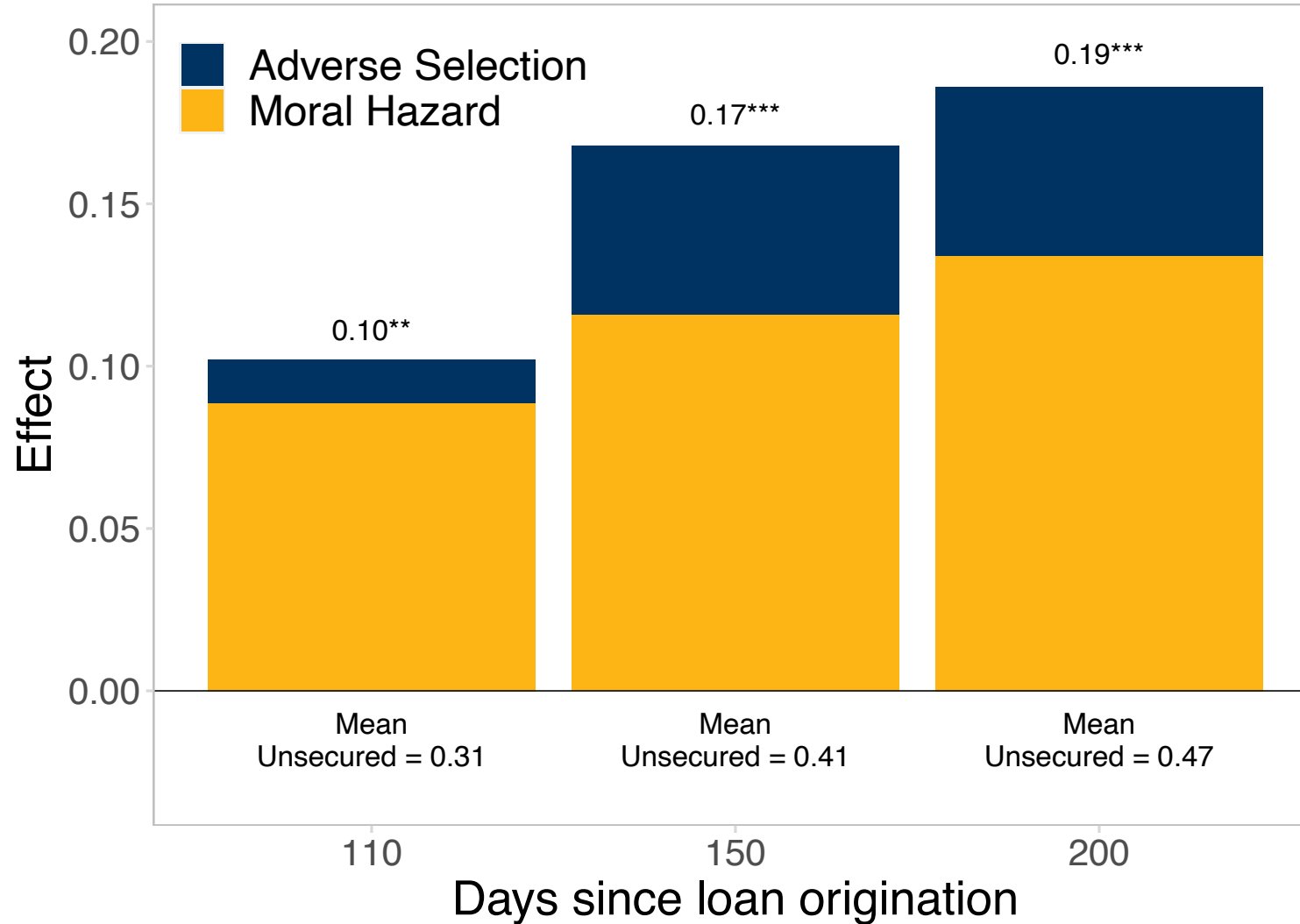


Loan Repayment



Loan Completion

LATE Estimates



Profitability

Monthly IRRs of Loan Portfolios

Treatment Group	Account percent locked			All	<i>n</i>
	1 st tercile	2 nd tercile	3 rd tercile		
Secured	0.2% [0.00, 0.06]	-2.5% [0.06, 0.19]	-8.4% [0.19, 0.57]	-3.7% [0.00, 0.57]	217
Unsecured	-3.7 [0.00, 0.05]	-6.3 [0.05, 0.19]	-10.2 [0.19, 0.64]	-6.9 [0.00, 0.64]	438
Prior School-Fee Loans (Secured)	6.6 [0.00, 0.04]	6.0 [0.04, 0.13]	3.2 [0.13, 0.30]	5.1 [0.00, 0.30]	1377

- Range of the fraction of days locked is reported in square brackets
- Prior SFL loans: smaller, stricter eligibility criterion

Educational Outcomes

Household-level LATE Estimates

	Enrollment	Days absent	Log school expenditures
Loan	0.06* (0.03)	0.03 (0.34)	0.30** (0.13)
Outcome control mean	0.88	1.28	86
<i>n</i>	1683	1625	1625

- Share of school-aged kids not enrolled decreased by half.
 - Increase in enrollment concentrated in males
 - Increase in expenditures larger for females

Effect on Asset Purchases, Sales, and Money Borrowed in the Last 6 Months

Household-level LATE Estimates

	Asset purchases	Asset sales	Money borrowed	Net difference
Loan	18 (79)	5 (36)	52 (85)	-39 (111)
Outcome control mean	236	96	283	-143
<i>n</i>	1877	1877	1877	1877

- No significant impact on household finances

Conclusion

New loan product that uses lockout technology to digitally secure loans

- Firms: Securing loans with DC significantly increases repayment and profitability
- Households: Relatively high demand for credit secured by DC
 - Increased access to credit with digital collateral
 - Access to credit increases school enrollment and expenditures
 - No evidence of a “debt trap”
- But not without cost: median HH locked 25% of first 200 days
 - Room for improvement?