The Real Effects of Financial Innovation Evidence from Credit Card Markets

Antoinette Schoar, MIT and NBER BIS Annual Conference, June 28th, 2019

Motivation

- Financial innovation and Fintech have significant effect on contracts and pricing in retail financial services
 - Impact through changed underwriting models, not market structure
 - Retail finance products have grown in complexity and price over the last decades, see Philippon (2016), Greenwood and Scharfstein (2013)
- Card issuers have been using "big data" for decades
 - Differentially target borrowers: Targeting of credit constraints versus rent extraction from unsophisticated borrowers
 - Focus on shrouding and design features of offer letters

Motivation II

- What are implications for monetary policy?
 - Effectiveness of monetary policy might differ across borrower groups, if contracts shroud credit terms for unsophisticated borrowers
 - Potentially delayed response of borrowing and spending

Prior Findings: Ru & Schoar (2016)

- Card companies target consumers based on their financial sophistication (education) with different offers
 - Less educated consumers receive more back-loaded terms, and more shrouded offers
- Issuers rely more heavily on back-loaded and shrouded contracts when credit risk of consumers is reduced
 - Use state level Unemployment insurance (UI)-shocks that increases cash flows in bad states

Implications for Design and Targeting of Offers

- Offer letter design
 - Rational consumers: Pay attention to all contract terms, no need for shrouding
 - Behavioral consumers: Choice of forms, position in offer letter or language can induce borrowers to ignore unattractive terms and focus on attractive ones; shrouding might have an impact
- Targeting of backloaded terms by characteristics
 - Rational consumers: Target characteristics that proxy for credit constraints, e.g. income or fico
 - Behavioral consumers: Target lack of financial sophistication holding constant all other characteristics
 - Educational attainment as a measure for financial sophistication, Lusardi and Mitchell (2007, 2011)

Models of the Credit Card Market

- Behavioral view: Myopic consumers do not understand shrouded attributes, Gabaix and Laibson (2006)
 - Firms compete by lowering "visible" costs and charge high costs on hidden features. Myopic consumers subsidize sophisticated ones
 - Alternative micro foundation: Consumers don't understand their own demand, e.g. DellaVigna and Malmendier (2004, 2006), Heidhues and Koszegi (2010), Grubb (2010)

Rational view: Credit constraints

 Credit constrained borrowers who have increased cash flows in the future want to increase current consumption and postpone charges (late fees, over-limit fee)

Data

- Obtain data from Compremedia on credit card mailers sent to US households from 1999 to 2016
 - ~160,000 individual credit card mailers sent to consumers
 - Collected monthly by ~4000 "mock clients" across US, represent demographic distribution credit card owning population
 - Pre-approved credit card solicitations are done by mail, all the information that customers get is **observable to researcher**
- Use OCR and our own algorithms to code the mailers
 - Visual dimension: Colors, font, amount of info, complexity of language and where displayed
 - Hard features: Fees, interest rate, reward programs

Example:

WITH THE MISTERGOLD CARD YOUR POSSIBILITIES ARE ENDLESS

on balance transfers and purchases

Dear Sir/Madam,

Intro

APR

for

You're Pre-Approved for a MisterGold Card with a Credit Line up to \$3,000.

Isn't it time you get the credit you deserve? Your credit history shows that you're a perfect match for this card. We offer you unmatched convenience, an exclusive rewards program, no annual fee and superb client service.

Enjoy Premium 0% Intro APR for the First 12 Months.

Enjoy a 0% introductory APR for 12 months on purchases and balance transfers after your account is opened – after that, a variable APR, currently 18.99%. That's a year of savings!

Enjoy the Benefits of Being a MisterGold Card Member.

Earn one point for every dollar you spend on purchases. You can redeem points for a statement credit towards any travel purchase you have made on the Card. It gets better. With the MisterGold card, there is no annual fee and you have the flexibility to pay for your purchases over time.

Act Now and Get Your MisterGold Card.

Don't miss out on this exceptional opportunity to enjoy the benefits and buying power of your MisterGold card with a credit line up to \$3,000.

We look forward to welcoming you as a new XYZ Bank member.

Sincerely,

JuliaSpire

Julia Squire Senior Vice President





Finding I: Shrouding of Features

- Card offers show strategic placement of terms
 - Attractive features are on first page, large font, bold, or in color
 - If terms are placed on first page they are typically more competitive, if on last page they are less competitive
- Back-loaded features are typically shrouded
- Shrouding more pronounced for less educated costumers

Credit Card Design

Panel A	Late fee	Default APR	Over limit fee	Annual fee	MILE	Intro APR
% of cards that have	100.00%	100.00%	100.00%	100.00%	8.23%	67.86%
Is term mentioned on 1st page	6.06%	3.87%	7.27%	78.02%	100%	89.69%
Font size if mentioned on 1st page	9.56	9.39	9.82	13.39	16.56	13.43
Font size if not mentioned on 1st page	9.56	9.64	9.52	14.47	9.91	11.50
Font color if mentioned on 1st page	32.92%	32.29%	25.53%	64.42%	60.89%	58.30%
Font color if not mentioned on 1st page	23.69%	24.96%	21.82%	44.53%	29.47%	43.84%
Font bold if mentioned on 1st page	38.91%	25.58%	34.18%	77.82%	72.70%	75.78%
Font bold if mentioned on 1st page	42.71%	10.66%	32.97%	53.78%	18.08%	63.09%
# Obs	611,797	611,797	611,797	611,797	611,797	611,797
Panel B						
If term is on first page	27.89	27.56%	28.38	5.95		
If term is in the back (Schumer box)	34.63	27.75%	30.62	26.12	_	

Credit Card Offers and Education

Less-educated more likely to be offered cards with higher late and over-limit fees



Source: Authors' calculations using Compremedia data

Differential Targeting of Consumers

Dependent							
Variable	1	2	3	4	5	6	7
	APR	Late Fee	Default APR	Over-limit	Annual Fee	Intro_APR	Backward
				Fee			
FFR	0.736***	0.067***	1.495***	-0.349***	0.515***	-0.013***	0.007***
	(0.004)	(0.007)	(0.004)	(0.008)	(0.023)	(0.000)	(0.001)
Education_2	-0.156***	-0.169***	-0.151***	-0.272***	-0.528***	-0.007**	0.008
	(0.030)	(0.048)	(0.025)	(0.047)	(0.168)	(0.003)	(0.008)
Education_3	-0.072**	-0.395***	-0.144***	-0.386***	-0.177	-0.019***	-0.008
	(0.032)	(0.048)	(0.027)	(0.051)	(0.178)	(0.003)	(0.008)
Education_4	-0.234***	-0.366***	-0.217***	-0.790***	0.342*	-0.030***	-0.036***
	(0.032)	(0.050)	(0.028)	(0.053)	(0.185)	(0.003)	(0.009)
Education_5	-0.137***	-0.652***	-0.279***	-1.179***	1.290***	-0.048***	-0.087***
	(0.034)	(0.056)	(0.030)	(0.060)	(0.212)	(0.003)	(0.010)
Fixed Effects	Y	Y	Y	Y	Y	Y	Y
Observations	785,950	798,936	586,259	749,306	800,546	808,430	746,656
R-squared	0.341	0.151	0.507	0.203	0.265	0.151	0.038

Finding II: Shock to Credit Risk

- Use changes in state level unemployment insurance (UI)
 - Reduces exposure to one of the largest negative economic shock that customers might suffer
 - UI increased in staggered way across US states during 2000s
 - Instrument from Hsu, Matsa and Meltzer (2014)
- Standard Difference in Difference estimator

 $Y_{i,t} = UI_{dummy} + UI_{pre-trend} + CellFE + BankFE + TimeFE + \varepsilon$

- UI dummy for states where the change in UI is >10% (first jump)
- Keep offers for one year before after jump
- Checked many other cut-offs as well

Unemployment Insurance Shock

Panel A	1	2	3	4	5	6
	APR	Default APR	Late Fee	Annual	IntroAPR	Backward
_		Dummy		Fee	All	
FFR	0.421***	-0.048***				0.006
	(0.043)	(0.003)				(0.005)
UI	-0.276	0.044	0.909**	0.271	0.123**	0.061*
	(0.353)	(0.028)	(0.389)	(0.454)	(0.056)	(0.035)
UI_Pre_3M	-0.005	0.022	0.655***	-0.036	0.140*	0.050
	(0.120)	(0.021)	(0.185)	(0.361)	(0.077)	(0.040)
UI_Pre_6M	0.156	-0.068***	-0.204	-0.159	0.066	0.058**
	(0.269)	(0.024)	(0.450)	(0.714)	(0.043)	(0.024)
UI_Small	-0.052	-0.015	0.125	-1.321	0.065	0.020
	(0.158)	(0.015)	(0.402)	(0.925)	(0.042)	(0.034)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	93,224	93,491	92,876	93,215	93,940	90,700
R-squared	0.263	0.410	0.179	0.193	0.121	0.100

UI and Design Features

Panel A	7	8	9
	Color	DefaultAPR	LateFee
		MainPage	MainPage
FFR			
UI	0.027**	-0.011***	-0.012**
	(0.012)	(0.003)	(0.005)
UI_Pre_3M	0.015	-0.005	-0.010
	(0.017)	(0.005)	(0.009)
UI_Pre_6M	0.012	-0.004	-0.001
	(0.008)	(0.004)	(0.010)
UI_Small	0.010	-0.006	0.012
	(0.012)	(0.004)	(0.010)
Fixed Effects	Yes	Yes	Yes
Observations	81,968	46,161	46,161
R-squared	0.038	0.054	0.029

In sum ..

- Card issuers take target households' behavioral biases
 - Strategic placement of attractive features and shrouding of less attractive features
 - Unsophisticated households: receive more back-loaded fees and teaser rates
- Reduced credit risk (UI shock) leads to more back-loaded and shrouded credit terms
 - Card issuers take into account trade-off between short term fees and long-term exposure to worse credit risk
- Suggests issuers use "naiveté based price discrimination"

Which Terms Respond to Monetary Policy?

- Look at pass through in the Fed-funds rate (FFR)
 - Use funding shocks to issuers from changes in FFR
 - Test which terms of the cards are used to price credit, i.e. show sensitivity to FFR
 - Ausubel (2001): no perfect pass through of FFR shocks
- Differential targeting of customers by education levels

 $Y_{i,j,t} = \beta_1 \times FFR_M + \beta_2 \times FFR_M \times LowEdu_{i,j,t} + \beta_3 \times LowEdu_{i,j,t} + FE_{i,j,t} + \varepsilon_{i,j,t}$

Monetary Policy Changes Terms of Pass-Through to (un) sophisticated borrowers

Table 4								
	1	2	3	4	5	6	7	
		Annual		Over-Limit	Default APR	Intro	LogMaxCar	
	APR	Fee	Late Fee	Fee	Dummy	APR	dLimit	
FFR	0.755***	0.671***	0.007	-0.424***	-0.061***	-0.014***	0.013***	
	(0.005)	(0.033)	(0.011)	(0.011)	(0.001)	(0.001)	(0.002)	
LowEdu	0.163***	1.148***	0.007	-0.042	0.030***	0.011***	-0.053***	
	(0.032)	(0.158)	(0.043)	(0.047)	(0.004)	(0.003)	(0.009)	
LowEdu*FFR	-0.050***	-0.440***	0.101***	0.173***	0.003**	0.003***	-0.012***	
	(0.008)	(0.048)	(0.014)	(0.016)	(0.001)	(0.001)	(0.003)	
Cell F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Bank F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	785,950	800,546	798,936	749,306	808,430	808,430	463,490	
R-squared	0.318	0.252	0.208	0.199	0.162	0.146	0.586	

Implications

- Pass-through of monetary policy differs across credit card offers
 - Financially sophisticated: Upfront terms adjust; APR, annual fee
 - Less sophisticated: Back-loaded terms adjust; increased late fees, over-limit fees or penalty APR
- Effectiveness of monetary policy depends on borrower understanding of the cost of capital
 - If unsophisticated consumers do not understand changes in cost of capital, might adjust spending very slowly
 - Could induce more credit risk in uneducated borrowers