

The Real Effects of Financial Technology: Marketplace Lending and Personal Bankruptcy

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Philadelphia Fed, 14 Nov 2018

The Real Effects of FinTech

Study how **new financial technology** affects household welfare in terms of **personal bankruptcy** focusing on relatively new type of credit, **marketplace lending**.

Marketplace Lending: Risk and Benefits

Benefits: Potential to *decrease* personal bankruptcies.

- ▶ Rationed borrowers get credit access (De Roure, Pelizzon, Tasca, 2016; Jagtiani - Lemieux, 2017; Schweitzer - Barkley, 2017).
- ▶ Quickly granted (Fuster, Plosser, Schnabl, Vickery, 2018).
- ▶ Lowers debt refinancing cost, particularly card debt (Balyuk, 2017).

Risks: Potential to *increase* personal bankruptcies.

- ▶ Providing credit to less credit-worthy HHs (Jagtiani-Lemieux, 2017).
- ▶ Borrowers overestimate ability to pay (Ausubel, 1991).
- ▶ Debt increases personal bankruptcies (Domowitz and Sartain, 1999; Gross and Souleles, 2002; Fay, Hurst, and White, 2002; Dick and Lehnert, 2010; Livshits, Macgee and Tertilt, 2007, 2010, 2016).

We find benefits: **rationing of marketplace credit raises personal bankruptcies among low-income households.**

Identification Strategy – Diff-in-Difference

We exploit the decision by U.S. Second Circuit Court of Appeals in the case of *Madden vs Midland Funding*. [⊕]

The court, covering CT, VE, and NY, ruled in May 2015 that

- ▶ loans originated to borrowers in those states with interest rate above borrower's state usury limit are null and void if loans held by non-bank financial institutions.

Case unrelated to marketplace industry but **cast doubt on enforceability of marketplace loans**

- ▶ Most marketplace loans are originated [⊕] by a fronting bank located in a state without usury cap and immediately sold to marketplace platforms, non-banks under current OCC rules.

Difference-in-Difference Estimation

Compare changes in bankruptcy filings and marketplace lending in treatment (Connecticut and New York) and control group (all other states), before and after treatment event.

$$(1) \ln(Y)_{sm} = \beta_1 \text{Madden}_m * \text{State}_s + \beta_2 \text{State}_s + \beta_3 \text{Madden}_m + \varepsilon_{sm}$$

$$(2) \ln(Y)_{sm} = \alpha_s + \beta \text{Madden}_m * \text{State}_s + \delta \text{Controls}_{sm} + \gamma_m + \varepsilon_{sm}$$

where s denotes state and m month:

$\ln(Y)_{sm}$ log of marketplace loans; bankruptcy rates/workforce.

Madden equal to 1 for months June 2015 – Dec 2017. [⊕]

State equal to 1 for Connecticut and New York states.

Controls incl. marketplace loan demand (volume of funds requested via P2P platforms).

α state dummies.

γ month dummies.

Data

Lending Club and Prosper: Marketplace lending data

- ▶ No of loan requests, borrower's residence, origination date, loan purpose, loan size, internal risk rating of applicant, loan status.
- ▶ We exclude states whose residents were or still are unable to raise funds through Prosper / Lending Club: IW, MN, MI, NE, ND, WV

U.S. Courts Administrative Office: bankruptcy cases filed per month in every state since 2013 by: [\[+\]](#)

- ▶ Bankruptcy chapter (Chapter 7, 11, 12, 13), nature of filing (personal business and consumer), annual income of each filer.

NY FRB CMD: annual volume of card, student and auto loans.

U.S. BLS: unemployment rates and labor force data.

Sample: 60-months (01/2013 – 12/2017), 2,700 obs, 45 states [\[+\]](#)

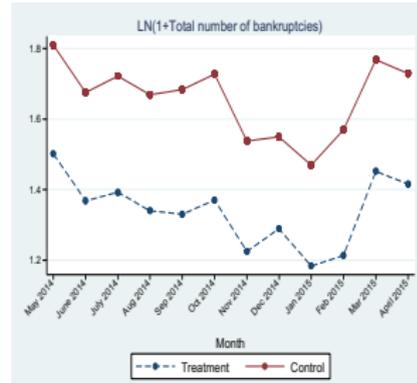
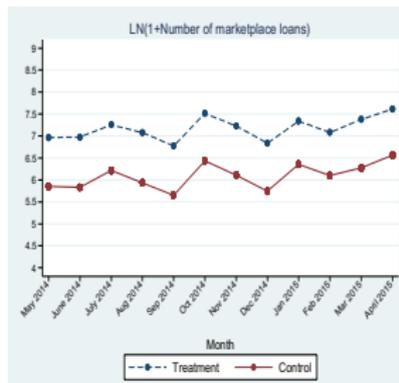
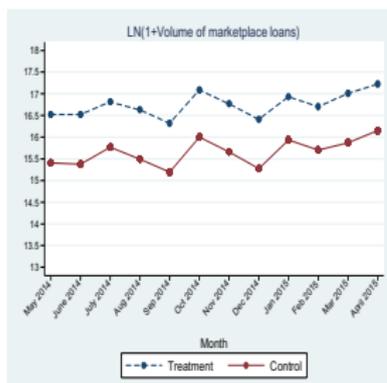
Difference-in-Difference Assumptions

(I.) *Exogeneity:*

- ▶ Court case was unrelated to marketplace industry. [†]
- ▶ No evidence conditions related to bankruptcy rates in affected states was considered by court in reaching its verdict.

(II.) *Parallel Trends:*

FIGURE I
PARALLEL TRENDS



Why focus on rationing of marketplace lending?

As opposed to other types of consumer credit, because:

Madden leaves non-marketplace consumer credit unaffected.

FIGURE II
EFFECT OF MADDEN ON CONSUMER LOANS

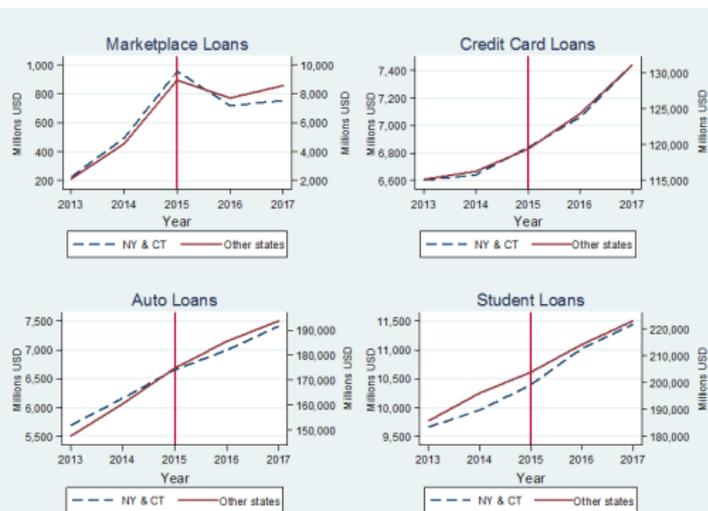


TABLE V
MADDEN AND CONSUMER CREDIT

Panel A: Effect of Madden on consumer credit

<i>Dependent var</i>	Mktplace loans	Credit card loans	Auto loans	Student loans
$LN(I+X)$:				
Madden*State	-0.098*** (-6.50)	-0.004 (-0.47)	-0.019* (-1.87)	-0.010 (-0.38)
Controls	YES	YES	YES	YES
State FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	225	225	225	225
R-squared	0.999	0.994	0.992	0.990
SE Cluster	State	State	State	State

The Effect of Madden on Marketplace Lending

TABLE II
THE EFFECT OF *MADDEN* ON MARKETPLACE LENDING

Panel A: Intensive margin									
<i>Dependent variable: LN(1+Volume of marketplace loans)</i>									
<i>Borrower rating:</i>	<i>ALL</i>	<i>ALL</i>	1	2	3	4	5	6	7
Madden*State	-0.158***	-0.102***	-1.715***	-0.865***	-0.615***	-0.475***	-0.355***	-0.255***	-0.185***
	(-4.63)	(-7.64)	(-7.69)	(-10.16)	(-11.16)	(-11.86)	(-12.36)	(-12.76)	(-13.16)
State	1.096*								
	(1.81)								
Madden	0.890***								
	(30.55)								
Controls	NO	YES	YES	YES	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES	YES	YES	YES
Month FE	NO	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
R-squared	0.147	0.993	0.570	0.679	0.764	0.897	0.967	0.990	0.835
SE Cluster	State	State	State	State	State	State	State	State	State
Panel B: Extensive margin									
<i>Dependent variable: LN(1+Number of marketplace loans)</i>									
<i>Borrower rating:</i>	<i>ALL</i>	<i>ALL</i>	1	2	3	4	5	6	7
Madden*State	-0.174***	-0.134***	-0.865***	-0.615***	-0.475***	-0.355***	-0.255***	-0.185***	-0.135***
	(-5.55)	(-7.62)	(-8.46)	(-10.16)	(-11.16)	(-11.86)	(-12.36)	(-12.76)	(-13.16)
State	1.096*								
	(1.81)								
Madden	0.890***								
	(30.55)								
Controls	NO	YES	YES	YES	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES	YES	YES	YES
Month FE	NO	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
R-squared	0.147	0.993	0.570	0.679	0.764	0.897	0.967	0.990	0.835
SE Cluster	State	State	State	State	State	State	State	State	State
Panel C: By purpose of the loan									
<i>Dependent variables:</i>	<i>LN(1+Relevant loans)</i>	<i>LN(1+Relevant loans)</i>	<i>LN(1+ debt refinancing loans)</i>	<i>LN(1+ medical expenses loans)</i>	<i>LN(1+small business loans)</i>	<i>LN(1+other loans)</i>			
Madden*State	-0.160***	-0.101***	-0.162***	-1.130***	-0.395***	-0.164***			
	(-4.63)	(-8.67)	(-6.92)	(-4.96)	(-3.78)	(-7.19)			

Volume of marketplace lending declines by 10%.

From \$13 million to \$11.7 million for avg state.

Number of marketplace loans decline by 13.4%.

From 900 to 780 marketplace loans for avg state.

TABLE II
THE EFFECT OF *MADDEN* ON MARKETPLACE LENDING

Panel A: Intensive margin									
<i>Dependent variable: LN(1+Volume of marketplace loans)</i>									
<i>Borrower rating:</i>		1	2	3	4	5	6	7	
Madden*State		-1.715*** (-7.69)	-0.654*** (-10.67)	-0.471*** (-13.07)	-0.328*** (-12.51)	-0.021 (-0.59)	0.038** (2.42)	0.021 (0.72)	
State									
Madden									
Controls		YES	YES	YES	YES	YES	YES	YES	
State FE		YES	YES	YES	YES	YES	YES	YES	
Month FE		YES	YES	YES	YES	YES	YES	YES	
Observations		2,700	2,700	2,700	2,700	2,700	2,700	2,700	
R-squared	0.147	0.293	0.570	0.679	0.764	0.897	0.967	0.835	
SE Cluster	State	State	State	State	State	State	State	State	
Panel B: Extensive margin									
<i>Dependent variable: LN(1+Number of marketplace loans)</i>									
<i>Borrower rating:</i>	ALL	ALL	1	2	3	4	5	6	7
Madden*State	-0.174*** (-3.55)	-0.134*** (-7.62)	-0.799*** (-8.46)	-0.793*** (-28.41)	-0.519*** (-29.88)	-0.359*** (-21.89)	-0.039 (-0.79)	0.002 (0.12)	-0.005 (-0.36)
Panel C: By purpose of the loan									
<i>Dependent variables:</i>	LN(1+Relevant loans)	LN(1+Relevant loans)	LN(1+ debt refinancing loans)	LN(1+ medical expenses loans)	LN(1+small business loans)	LN(1+other loans)			
Madden*State	-0.160*** (-4.65)	-0.101*** (-8.67)	-0.162*** (-6.92)	-1.130*** (-4.96)	-0.395*** (-2.78)	-0.164*** (-7.19)			

Credit rationing intensifies with borrower credit risk
(1 high-risk, 7 low-risk)

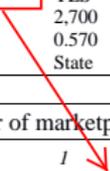


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THE EFFECT OF *MADDEN* ON MARKETPLACE LENDING

Panel A: Intensive margin									
<i>Dependent variable: LN(1+Volume of marketplace loans)</i>									
<i>Borrower rating:</i>	ALL	ALL	1	2	3	4	5	6	7
Madden*State	-0.158*** (-4.63)	-0.102*** (-7.64)	-1.715*** (-7.69)	-0.654*** (-10.7)	-0.471*** (-13.07)	-0.328*** (-12.51)	-0.021 (-0.59)	0.038** (2.42)	0.021 (0.72)
State	1.096* (1.81)								
Madden	0.000***								
Control	YES	YES	YES	YES	YES	YES	YES	YES	YES
State	YES	YES	YES	YES	YES	YES	YES	YES	YES
Model	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
R-squared	0.764	0.897	0.967	0.920	0.835				
SE	State	State	State	State	State				
Panel									
<i>Dependent variable: LN(1+Number of marketplace loans)</i>									
<i>Borrower rating:</i>	ALL	ALL	1	2	3	4	5	6	7
Madden*State	-0.174*** (-5.55)	-0.134*** (-7.62)	-0.490*** (-8.46)	-0.793*** (-28.41)	-0.519*** (-29.88)	-0.359*** (-21.89)	-0.039 (-0.79)	0.002 (0.12)	-0.005 (-0.36)
State									
Madden									
Control	YES	YES	YES	YES	YES	YES	YES	YES	YES
State	YES	YES	YES	YES	YES	YES	YES	YES	YES
Model	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
R-squared	0.764	0.897	0.967	0.920	0.835				
SE	State	State	State	State	State				
Panel									
Panel C: By purpose of the loan									
<i>Dependent variables:</i>	LN(1+Relevant loans)	LN(1+Relevant loans)	LN(1+ debt refinancing loans)	LN(1+ medical expenses loans)	LN(1+small business loans)	LN(1+other loans)			
Madden*State	-0.160*** (-4.65)	-0.101*** (-8.67)	-0.162*** (-6.92)	-1.130*** (-4.96)	-0.395*** (-2.78)	-0.164*** (-7.19)			

Decline in marketplace loans for medical cost (68%), debt refinancing (15%), and small business loans (33%)

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Panel A: Intensive margin									
<i>Dependent variable: LN(1+Volume of marketplace loans)</i>									
<i>Borrower rating:</i>	ALL	ALL	1	2	3	4	5	6	7
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State	1.096* (1.81)								
M									
U					YES	YES	YES	YES	YES
S					YES	YES	YES	YES	YES
M					YES	YES	YES	YES	YES
CB									
R									
SE									
Panel B: Extensive margin									
<i>Dependent variable: LN(1+Number of marketplace loans)</i>									
<i>Borrower rating:</i>	ALL	ALL	1	2	3	4	5	6	7
Madden*State	-0.174*** (-5.55)	-0.134*** (-7.62)	-0.493*** (-8.46)	-0.793*** (-28.41)	-0.519*** (-29.88)	-0.359*** (-34.72)	0.039 (-0.79)	0.002 (0.13)	-0.005 (-0.36)
State	1.096* (1.81)								
M									
U					YES	YES	YES	YES	YES
S					YES	YES	YES	YES	YES
M					YES	YES	YES	YES	YES
CB									
R									
SE									

Panel C: By purpose of the loan						
<i>Dependent variables:</i>	LN(1+Relevant loans)	LN(1+Relevant loans)	LN(1+ debt refinancing loans)	LN(1+ medical expenses loans)	LN(1+small business loans)	LN(1+other loans)
Madden*State	-0.160*** (-4.65)	-0.101*** (-8.67)	-0.162*** (-6.92)	-1.130*** (-4.96)	-0.395*** (-2.78)	-0.164*** (-7.19)

Decline in marketplace loans for medical cost (68%), debt refinancing (15%), and small business loans (33%)

Cost of medical expenses and credit card debt important determinants of personal bankruptcy, particularly for low-income households. (See: Gross and Notowidigdo, 2011; Domowitz and Sartain, 1999).

The Effect of Madden on Personal Bankruptcy

TABLE III
THE EFFECT OF *MADDEN* ON PERSONAL BANKRUPTCY

PANEL A: Total bankruptcies						
<i>Dependent variable: LN(1+Total number of bankruptcies/workforce)</i>						
	<i>All chapters</i>	<i>All chapters</i>	<i>Chapter 7</i>	<i>Chapter 11</i>	<i>Chapter 12</i>	<i>Chapter 13</i>
Madden*State	0.067** (2.35)	0.079** (2.60)	0.059*** (3.87)	0.005 (0.45)	-0.000 (-1.56)	0.103** (2.58)
State	-0.346*** (-5.56)					
Madden	-0.169*** (-12.08)					
Controls	NO	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES
Month FE	NO	YES	YES	YES	YES	YES
Observations	2,700	2,700	2,700	2,700	2,700	2,700
R-squared	0.063	0.959	0.950	0.714	0.196	0.977
SE Cluster	State	State	State	State	State	State
PANEL B: Business bankruptcies						
<i>Dependent variable: LN(1+Number of business bankruptcies/workforce)</i>						
	<i>All chapters</i>	<i>All chapters</i>	<i>Chapter 7</i>	<i>Chapter 11</i>	<i>Chapter 12</i>	<i>Chapter 13</i>
Madden	0.023 (1.48)	0.018** (2.49)	0.005 (0.52)	-0.000 (-1.56)	0.001 (1.41)	
State	-0.001 (-0.12)					
Madden	-0.001 (-0.12)					
Controls	NO	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES
Month FE	NO	YES	YES	YES	YES	YES
Observations	2,700	2,700	2,700	2,700	2,700	2,700
R-squared	0.063	0.959	0.950	0.714	0.196	0.977
SE Cluster	State	State	State	State	State	State
PANEL C: Consumer bankruptcies						
<i>Dependent variable: LN(1+Number of consumer bankruptcies/workforce)</i>						
	<i>All chapters</i>	<i>All chapters</i>	<i>Chapter 7</i>	<i>Chapter 11</i>	<i>Chapter 12</i>	<i>Chapter 13</i>
Madden*State	0.064** (2.58)	0.076*** (2.84)	0.056*** (3.77)	0.000 (0.32)	0.000 (0.32)	0.103** (2.58)
State	-0.346*** (-5.56)					
Madden	-0.169*** (-12.08)					
Controls	NO	YES	YES	YES	YES	YES
State FE	NO	YES	YES	YES	YES	YES
Month FE	NO	YES	YES	YES	YES	YES
Observations	2,700	2,700	2,700	2,700	2,700	2,700
R-squared	0.063	0.959	0.950	0.714	0.196	0.977
SE Cluster	State	State	State	State	State	State

Personal bankruptcy filings increase by 8%.

Increase from 1,573 to 1,698 bankruptcies filings in avg state.

TABLE III
THE EFFECT OF *MADDEN* ON PERSONAL BANKRUPTCY

PANEL A: Total bankruptcies						
<i>Dependent variable: LN(1+Total number of bankruptcies/workforce)</i>						
	<i>All chapters</i>	<i>All chapters</i>	<i>Chapter 7</i>	<i>Chapter 11</i>	<i>Chapter 12</i>	<i>Chapter 13</i>
Madden*State	0.067** (2.35)	0.079** (2.60)	0.059*** (3.87)	0.005 (0.45)	-0.000 (-1.56)	0.103** (2.58)
State						
Madden						
Control		YES	YES	YES	YES	YES
State		YES	YES	YES	YES	YES
Madden		YES	YES	YES	YES	YES
Observations	2,700	2,700	2,700	2,700	2,700	2,700
R-squared	0.063	0.069	0.050	0.114	0.196	0.977
SE Cluster	State	State	State	State	State	State
PANEL B: Business bankruptcies						
<i>Dependent variable: LN(1+Number of business bankruptcies/workforce)</i>						
	<i>All chapters</i>	<i>All chapters</i>	<i>Chapter 7</i>	<i>Chapter 11</i>	<i>Chapter 12</i>	<i>Chapter 13</i>
Madden*State	0.021 (1.34)	0.023 (1.48)	0.018** (2.49)	0.005 (0.52)	-0.000 (-1.56)	0.001 (1.41)
PANEL C: Consumer bankruptcies						
<i>Dependent variable: LN(1+Number of consumer bankruptcies/workforce)</i>						
	<i>All chapters</i>	<i>All chapters</i>	<i>Chapter 7</i>	<i>Chapter 11</i>	<i>Chapter 13</i>	
Madden*State	0.064** (2.58)	0.076*** (2.84)	0.056*** (3.77)	0.000 (0.22)	0.103** (2.55)	

Consumer bankruptcy filings increase most.

But there is a rise also in personal business bankruptcies.

TABLE IV
THE EFFECT OF *MADDEN* ACROSS DIFFERENT INCOME GROUPS

Panel A: Effect of Madden on non-marketplace consumer credit

<i>Dependent variable:</i>		LN(1+Vol. of loans)	LN(1+No. of loans)	LN(1+No. of bankruptcies/workforce)		
				<i>Total</i>	<i>Business</i>	<i>Consumer</i>
<i>Income range:</i>						
<\$25,000	Madden*State	-1.022*** (-4.05)	-0.519*** (-4.96)	0.085*** (7.96)	0.009* (1.95)	0.081*** (7.65)
\$25,000-\$49,999	Madden*State	-0.558*** (-5.08)	-0.475*** (-6.11)	0.073*** (5.11)	0.002** (2.47)	0.071*** (4.59)
\$50,000-\$74,999	Madden*State	-0.316*** (-5.60)	-0.269*** (-5.26)	0.047*** (5.66)	0.000 (0.44)	0.046*** (5.65)
\$75,000-\$99,999	Madden*State	0.026 1.31	-0.064*** (-5.23)	0.002 (0.15)	0.001*** (3.53)	0.001 (0.05)
>\$100,000	Madden*State	-0.006 (-0.30)	-0.029 (-1.63)	0.000 (0.56)	0.000 (0.69)	0.000 (0.50)

Bankruptcy filings rise in proportion to credit rationing across different income groups

- ▶ high-income: no marketplace credit rationing, no rise in bankruptcy.
- ▶ low-income: severest credit rationing (64%), largest rise in BK (8.5%)

Rule out alternative explanations for BK rise post-Madden

1. BK rise not a temporary effect of marketplace credit rationing. Personal BKs remain persistently higher (2 year later) [↕]
2. BK rise not due to borrowers switching to forms of high-interest credit, such as payday loans. [↕]
3. BK rise not due to higher marketplace NPL. [↕]

Additional Robustness Checks

4. Matched sampling: match states based on pre-treatment volume of marketplace lending. [⊕]
5. Including Vermont in the treatment group. [⊕]
6. Placebo tests for treatment event
7. Alternative bankruptcy rates measures. [⊕]
8. Bootstrapped SEs [⊕] and state-month clustered SEs. [⊕]

Conclusion and Policy Impact

Our paper suggests marketplace lending's positive welfare effects:

- ▶ **Reversing access to new lending technology increases personal bankruptcies among low-income HHs.**

In contrast, bank credit (Dick-Lehnert, 2010), credit cards (Livshits, Macgee, Tertilt, 2016), payday loans (Melzer, 2011) all associated with adverse welfare effects.

Important b/c bankruptcy's impact household welfare [+]

Immediate policy implications as we show that Madden raises personal bankruptcies and leads to a "lack of access to safe and affordable financial services" for low-income HHs specifically as claimed in bill H.R.3299 currently pending in U.S. Senate.