Financial Literacy and Fraud Detection

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- Impostor scams – crooks pose as someone (or something) else to try to convince you to send them money. This is by far the most common form of fraud reported to the Federal Trade Commission (FTC). The agency logged 382,211 complaints in the first nine months of 2018, higher than the next six fraud types combined. Victims reported losses of nearly $356 million over that period.

In this paper

- Who is better at detecting fraud? Is there a significant link between financial knowledge, financial behavior and one's ability to detect fraud?
- Financial knowledge provides the ability to process economic information and make informed decisions (Lusardi and Mitchell, 2014).
  - disentangle genuine from fraudulent information.
  - more attentive to fraud risk.
  - recognise too-good-to-be-true deals (understanding risk-return trade-offs).
- Financial behavior refers to actions and behaviors that ultimately shape financial situations and well-being in both the short and longer-term (OECD, 2017).
  - help reduce exposure of being targeted for fraud.
- Contribute to recent studies examining the driving factors surrounding consumer fraud (DeLiema, Deevy, Lusardi and Mitchell, 2018).

Data and variables

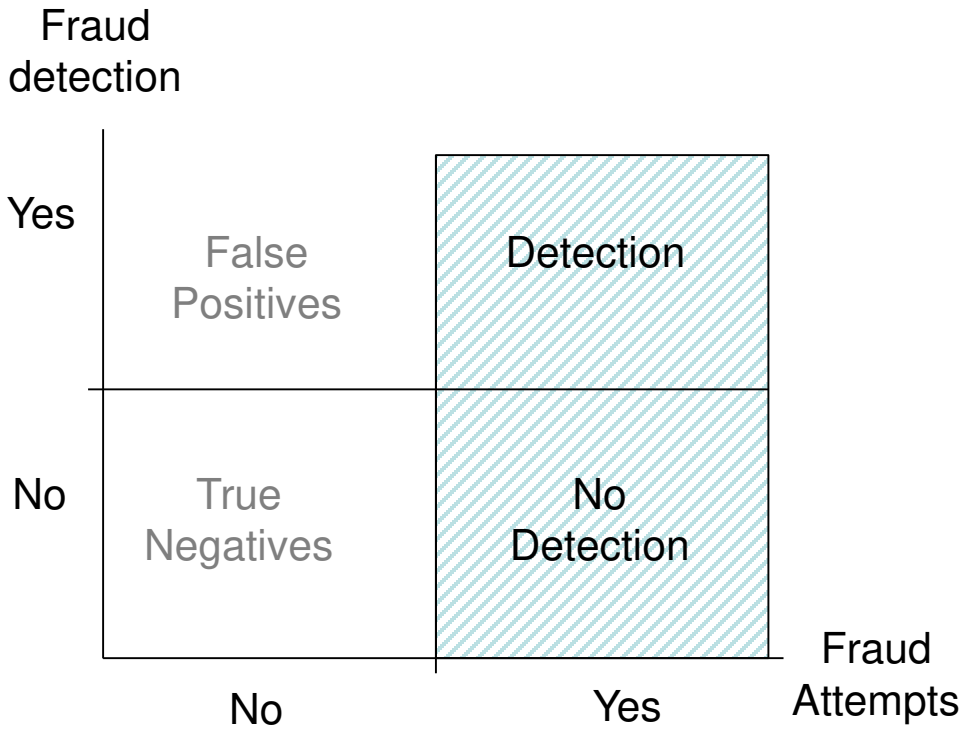
- National Financial Well-Being Survey (NFWBS), fielded by the Consumer Financial Protection Bureau (CFPB) in 2016.
- 6,394 respondents participated and forms a representative sample of the adult population (18 to >75) from all 50 US states.

Fraud detection:

- "In the past 5 years, has someone without your permission used or attempted to use an existing account of yours, such as a credit or debit card, checking, savings, telephone, online, or insurance account?" - Response choices: Yes, No, I Don't Know

Data and variables

- A common limitation with survey-based consumer fraud research:



Data and variables

- **Financial knowledge:** we use the ability score based on 9 items of Knoll and Houts (2012):
  1. Understanding of long-term returns on investment
  2. Understanding of stocks vs bond vs savings volatility
  3. Understanding of benefits of diversification
  4. Understanding of possibility of stock market losses
  5. Understanding of life insurance
  6. Understanding of possibility of housing market losses
  7. Understanding of credit card minimum payments
  8. Understanding of relationship of bonds and interest rates
  9. Understanding of mortgage term length on total interest paid

  – Provides a more complete range of topics; Score captures a wide range of ability levels.

  – Ability scores are derived from the 9 items using Item Response Theory.

Data and variables

- **Financial behavior:** we use 10 Likert scale questions on money management:
  1. Active budgeting (consult my budget to see how much money is left)
  2. Active budgeting (actively consider the steps I need to take to stick to my budget)
  3. Set financial goals
  4. Pursue financial goals
  5. Bills paid on time
  6. Stayed within budget
  7. Paid off CC balance
  8. Check accounts for errors
  9. Saving habit
  10. Frugal spending

  – Composite FB score sums up the response choices, after mapping to integers.

Data and variables

Control variables

- **Traditional financial product usage:** # of traditional financial products and services currently hold (savings accounts, life insurance, health insurance, retirement accounts, pensions, non-retirement investments, education savings account, and student/education loans).
- **Alternative financial product usage :** # of alternative financial products and services currently hold (e.g. payday loans, pawn loan, re-loadable cards).
- **Demographics attributes:** Age, Gender, Civil status (Widowed, Married, Divorced, Single, Cohabiting), Ethnicity (White, Black, Hispanic, Other) , Education, Income, Residency area (metropolitan, non-metropolitan), Census region.

Descriptive analysis

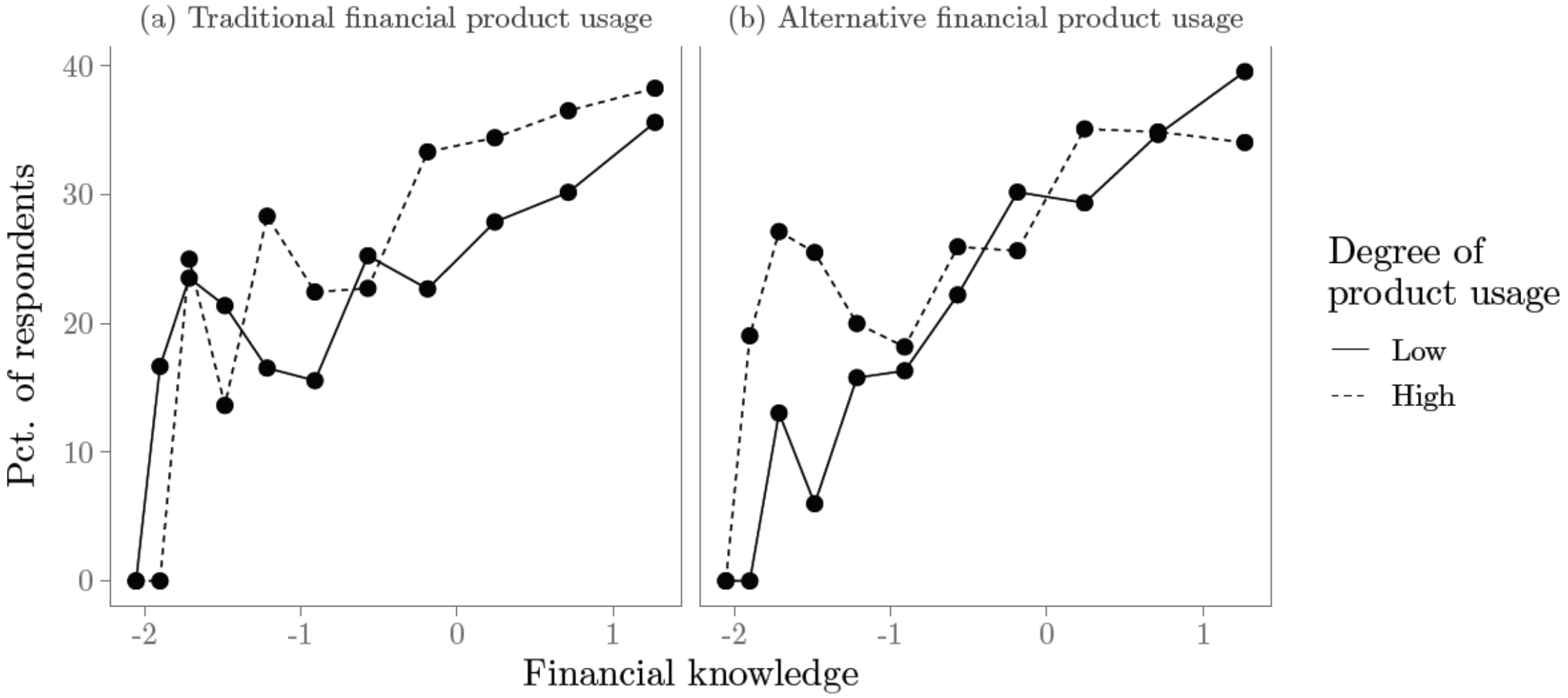
	Detected fraud			
	Yes		No	
	Count	Pct.	Count	Pct.
Panel A : Financial knowledge score				
-2.053	0	0.00	6	100.00
-1.900	3	14.29	18	85.71
-1.713	21	25.30	62	74.70
-1.485	38	20.77	145	79.23
-1.215	58	18.77	251	81.23
-0.909	92	17.97	420	82.03
-0.570	178	24.18	558	75.82
-0.188	261	28.00	671	72.00
0.242	372	32.10	787	67.90
0.712	394	34.99	732	65.01
1.267	231	36.61	400	63.39
Panel B: Financial behavior score				
$< 33^{th}$ percentile	391	27.13	1,050	72.87
33^{th} to 66^{th} percentile	889	29.58	2,116	70.42
$> 66^{th}$ percentile	368	29.39	884	70.61

Financially knowledge: Probit estimates

	(1)	(2)	(3)
Financial knowledge	0.104***	0.090***	0.104***
	(0.03)	(0.03)	(0.03)
Traditional financial product usage		0.064*	0.073**
		(0.03)	(0.03)
Alternative financial product usage			0.109***
			(0.02)
Age	0.036	0.028	0.036
	(0.02)	(0.03)	(0.03)
Female	0.017	0.012	0.019
	(0.04)	(0.04)	(0.04)
Widowed	-0.127	-0.117	-0.119
	(0.10)	(0.10)	(0.10)
Divorced	-0.032	-0.016	-0.017
	(0.07)	(0.07)	(0.07)
Single	-0.227***	-0.201**	-0.193**
	(0.07)	(0.07)	(0.07)
Cohabiting	0.078	0.094	0.088
	(0.10)	(0.10)	(0.10)
White	0.092	0.084	0.100
	(0.10)	(0.10)	(0.10)
Black	0.191	0.186	0.132
	(0.12)	(0.12)	(0.12)
Hispanic	0.206	0.216	0.198
	(0.11)	(0.12)	(0.12)
Education	0.150***	0.139***	0.143***
	(0.03)	(0.03)	(0.03)
Income	0.071**	0.055*	0.069**
	(0.02)	(0.03)	(0.03)
Metropolitan	0.021	0.020	0.019
	(0.06)	(0.06)	(0.06)
North-east	-0.053	-0.061	-0.057
	(0.06)	(0.06)	(0.06)
Midwest	-0.075	-0.084	-0.092
	(0.06)	(0.06)	(0.06)
South	-0.021	-0.025	-0.039
	(0.06)	(0.06)	(0.06)
Constant	-0.630***	-0.623***	-0.628***
	(0.12)	(0.12)	(0.12)
Observations	5,698	5,698	5,698
Pseudo R-squared	0.039	0.041	0.046

- + Financially knowledge ⟶ a higher propensity to detect fraud.
- A one SD increase in financial knowledge increases the fraud detection probability by **3 percentage points**.
- This is not because they hold more financial products.

Do financially knowledgeable individuals hold more financial products and services, exposing them to more fraud?



Is it prudent financial behavior?: Probit estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Financial knowledge	0.104***	0.104***	0.104***	0.105***	0.102***	0.104***	0.107***	0.104***	0.104***	0.102***	0.106***	0.105***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Traditional financial product usage	0.073**	0.073**	0.072**	0.076**	0.076**	0.072**	0.077**	0.071**	0.072**	0.073**	0.082**	0.076**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Alternative financial product usage	0.109***	0.109***	0.108***	0.109***	0.109***	0.109***	0.106***	0.109***	0.109***	0.109***	0.107***	0.108***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Active budgeting 1		0.003										
		(0.02)										
Active budgeting 2			0.020									
			(0.02)									
Set financial goals				-0.027								
				(0.02)								
Pursue financial goals					-0.040							
					(0.02)							
Bills paid on time						0.007						
						(0.02)						
Stayed within budget							-0.051*					
							(0.02)					
Paid off CC balance								0.014				
								(0.02)				
Check accounts for errors									0.010			
									(0.02)			
Frugal spending										0.016		
										(0.02)		
Saving habit											-0.049*	
											(0.02)	
Financial behaviour score												-0.018
												(0.02)

Can prudent financial behavior deter fraud?: Probit estimates

FB=1 if the respondent chooses the highest Likert response to the various financial behavior questions, exhibiting the highest financial behavior.
FB=0 otherwise.

FK=1 if financial knowledge score is greater than the sample average.
FK=0 otherwise.

	Active budgeting 1	Active budgeting 2	Set financial goals	Pursue financial goals
	(1)	(2)	(3)	(4)
FB=0 × FK=1	0.197***	0.187***	0.188***	0.199***
	(0.05)	(0.05)	(0.05)	(0.05)
FB=1 × FK=0	0.068	0.006	-0.027	-0.006
	(0.07)	(0.08)	(0.08)	(0.10)
FB=1 × FK=1	0.237***	0.229***	0.193**	0.127
	(0.07)	(0.08)	(0.08)	(0.09)
Product usage variables	Yes	Yes	Yes	Yes
Individual and household-level controls	Yes	Yes	Yes	Yes
Observations	5,698	5,698	5,698	5,698
Pseudo R-squared	0.046	0.046	0.046	0.046

	Bills paid on time	Stayed within budget	Paid off CC balance	Check accounts for errors
	(5)	(6)	(7)	(8)
FB=0 × FK=1	0.161*	0.195***	0.231***	0.232***
	(0.09)	(0.05)	(0.06)	(0.07)
FB=1 × FK=0	-0.040	-0.102	-0.000	-0.026
	(0.07)	(0.07)	(0.07)	(0.06)
FB=1 × FK=1	0.165**	0.086	0.147**	0.131**
	(0.07)	(0.07)	(0.06)	(0.06)
Product usage variables	Yes	Yes	Yes	Yes
Individual and household-level controls	Yes	Yes	Yes	Yes
Observations	5,698	5,698	5,698	5,698
Pseudo R-squared	0.046	0.047	0.047	0.047

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FB=1 if the respondent chooses the highest Likert response to the various financial behavior questions, exhibiting the highest financial behavior.
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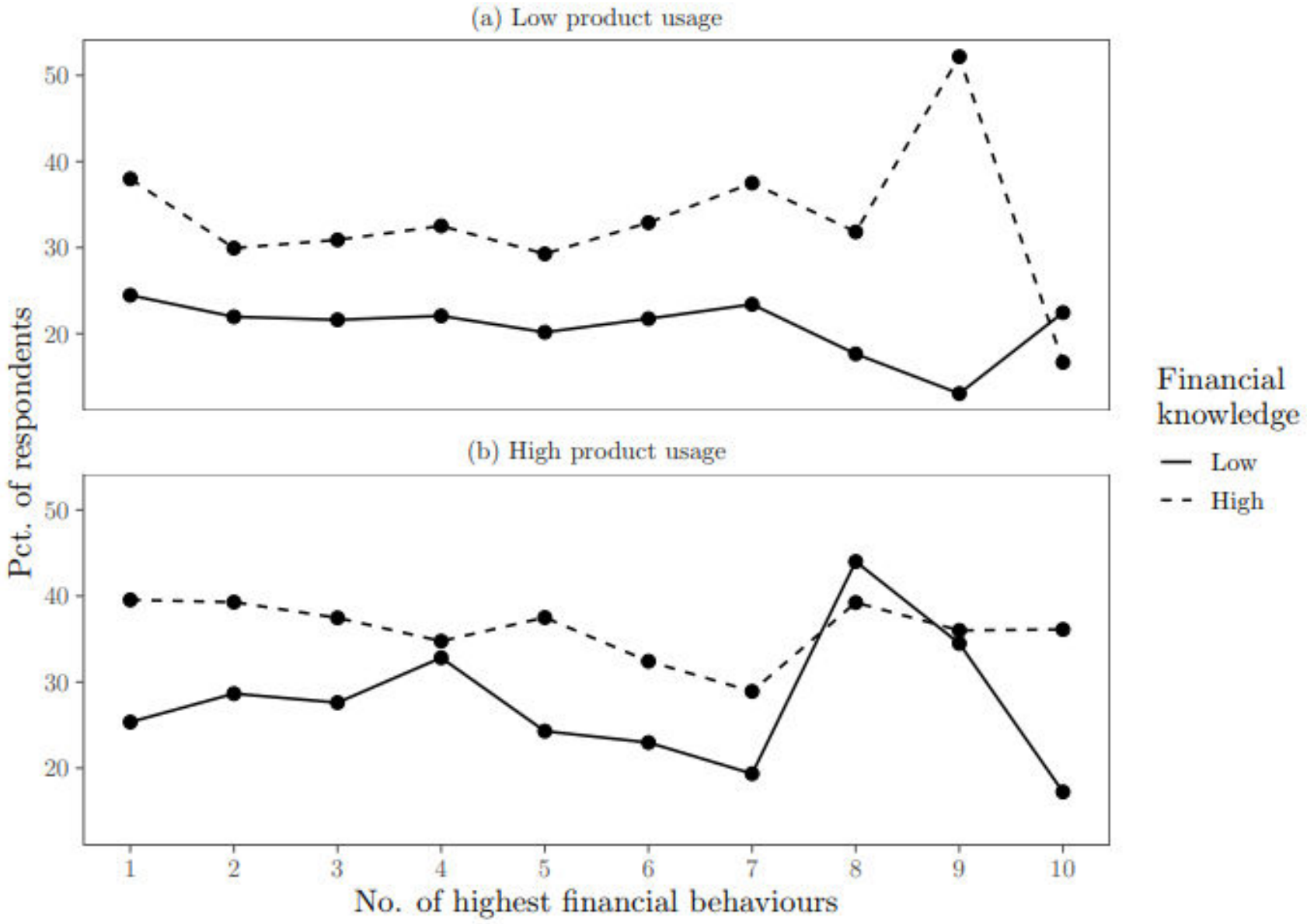
	Saving habit	Frugal spending	Overall
	(9)	(10)	(11)
FB=0 × FK=1	0.188***	0.129**	0.211***
	(0.05)	(0.06)	(0.06)
FB=1 × FK=0	-0.085	-0.038	-0.025
	(0.07)	(0.06)	(0.06)
FB=1 × FK=1	0.131*	0.227***	0.149**
	(0.07)	(0.06)	(0.06)
Product usage variables	Yes	Yes	Yes
Individual and household-level controls	Yes	Yes	Yes
Observations	5,698	5,698	5,698
Pseudo R-squared	0.047	0.047	0.046

- Individuals with highest self-reported financial behavior detect fraud only when their financial knowledge is also high.
- So financial behavior related to money management is insufficient when it comes to deterring fraud.

Can prudent financial behavior deter fraud?



- Detection rates are flat across the various number of highest financial behaviors.
- We observe an upward shift in detection rates for high financial knowledge individuals.
- Similar pattern is observed, whether it is for individuals with high product usage or with low product usage.

Limits to financial knowledge: low subjective well-being

- Low subjective well-being ⟶ imposes high cognitive load.
- High cognitive costs ⟶ scarce willpower to exert attention, low bandwidth, insufficient deliberations (Mullainathan and Shafir, 2013, Mani et al., 2013).
- Reduces attention capacities to fraud risk, worsening economic decision-making abilities.
- We expect subjective well-being to moderate the relationship between financial knowledge and fraud detection.

We elicit respondents' subjective well-being from 3 prominent well-being items (on a 7-point Likert scale):

1. I am satisfied with my life.
2. I am optimistic about my future.
3. If I work hard today, I will be more successful in the future.

Limits to financial knowledge: low subjective well-being

(1) I am satisfied with my life.
(2) I am optimistic about my future.
(3) If I work hard today, I will be more successful in the future.

Probit results:

- Financially knowledgeable individuals with low subjective well-being do not detect fraud.
- When it comes to fraud detection, overly optimistic individuals do not detect fraud.

	(1)	(2)	(3)
1 × Financial knowledge	-0.007	-0.031	0.093
	(0.13)	(0.15)	(0.13)
2 × Financial knowledge	-0.001	0.003	-0.162
	(0.14)	(0.13)	(0.15)
3 × Financial knowledge	-0.011	0.068	0.066
	(0.09)	(0.10)	(0.11)
4 × Financial knowledge	0.095	0.081	0.117
	(0.07)	(0.07)	(0.06)
5 × Financial knowledge	0.149**	0.127**	0.111*
	(0.05)	(0.05)	(0.05)
6 × Financial knowledge	0.122**	0.161***	0.138**
	(0.04)	(0.04)	(0.04)
7 × Financial knowledge	0.096*	0.076	0.097*
	(0.04)	(0.04)	(0.04)
Financial behaviour score	-0.018	-0.019	-0.018
	(0.02)	(0.02)	(0.02)
Traditional financial product usage	0.077**	0.076**	0.075**
	(0.03)	(0.03)	(0.03)
Alternative financial product usage	0.107***	0.107***	0.107***
	(0.02)	(0.02)	(0.02)

IV Probit regression estimates

- Endogeneity of financial knowledge: Unobserved attributes could simultaneously affect both fraud detection and financial knowledge. So we use ‘if the parent who raised the respondent attended graduate school’ as an instrument for FK:

	Financial knowledge	Detected fraud
	(1)	(2)
Graduate parents	0.162***	
	(0.04)	
Financial knowledge		0.564*
		(0.31)
Traditional financial product usage	0.215***	-0.034
	(0.02)	(0.08)
Alternative financial product usage	-0.080***	0.138***
	(0.01)	(0.03)
Kleibergen-Paap rk LM test	17.564***	-
Wald test of exogeneity	1.70	
P-value	0.192	

To summarize

- The paper studies the importance of financial literacy for fraud detection.
- Financial knowledgeable individuals are better at detecting fraud and this result is not driven by their potentially more intense financial product usages.
- As individuals' subjective well-being deteriorates, financial knowledge becomes less and less of a significant factor for fraud detection.
- Prudent financial behavior, relating to careful money management, has negligible effects on fraud detection.
- Training for cultivating prudent money management skills is not sufficient when it comes to detecting fraud. Training should incorporate applications of financial literacy concepts (such as risk-return trade-offs) to real-world fake scenarios/examples to learn skills of detecting fraud.

Thank you

Durham University

Tips for consumers

- Some tips to reduce the risk of identity fraud:
  1. Turn on two-factor authentication wherever possible. If that's not available, use strong passwords or a password manager to secure accounts.
  2. Secure your online and mobile devices by using a screen lock, encrypting data stored on the devices, avoiding public Wi-Fi and/or using a virtual private network (VPN) and installing anti-malware software.
  3. Place a security freeze on credit reports to prevent strangers from opening an account in your name.
  4. Sign up for account alerts from banks, credit card issuers and brokerages to receive notifications of suspicious activity.

source: AARP's Fraud Watch Network