

Crowdsourcing Financial Information to Change Spending Behavior

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Motivation

- Low savings limit wealth accumulation for US households
- Many potential reasons:
 - liquidity constraints
 - hyperbolic discounting
 - limited attention
 - lack of financial literacy
 - ...

Motivation

Recent potential explanation—Han, Hirshleifer and Walden (2018)

- People can rely on **others'** consumption and saving decisions
 - Often conspicuous
- Can lead to severe over-consumption
- Best policy solution for Han, Hirshleifer and Walden (2018):
 - Disclose true consumption of others
 - VERY DIFFICULT to implement within traditional tools

This Paper

- Provide clients with:
 - crowdsourced information about their peers' spending
- Through a FinTech application (app) called *Status*
- *Status* continuously compares clients' consumption to peers
- We study how clients use and react to this information

Main Findings

- 1 Users who spend
 - more than peers reduce spending
 - less than peers increase their spending
- 2 Distance from peer spending affect reaction monotonically
- 3 Asymmetry: cuts are three times larger than increases
- 4 Lower-income users react more than higher income users
- 5 Discretionary spending drives the results

Difficult to reconcile findings with standard models

The STATUS APP

(INPUTS)

At Signup, individuals provide:

- Annual Income
- Age
- Homeownership status
- Location of residence
- Location type—Urban or Rural
- Social Security Number → STATUS obtains credit report

Users link their:

- Debit and credit account(s)
- Retirement and investment account(s)

The STATUS APP

(OUTPUTS)

Using the information provided, the STATUS APP:

- Constructs a peer group for each client
- Peers matched on 5 characteristics & $w > 5,000$ individuals
- STATUS purchases spending data for random US sample
- Compares the client's consumption to that of the peer group
- Information is easy-to-understand and salient

The STATUS APP

(OUTPUTS)

You



Your Peers

9.9K
people

Age
42

Age Range
40 – 49

Income
\$140K

Income Range
\$100K – \$150K

Location
New York, NY

Location
New York, NY

Location Type
Urban

Location Type
All

Credit Score
769

Credit Score Range
720 – 779

Housing Type
Pay Rent

Housing Type
Pay Rent

The STATUS APP (OUTPUTS)

Spending in October



Summary Statistics

	Observations	Mean	St. Dev.
Age	17,673	30	7
Credit Score	16,335	728	84
Home Ownership	17,676	0.38	0.49
Annual Income (\$)	17,598	90,055	61,796
Assets (\$)	15,325	42,462	68,066
Debts (\$)	12,332	29,971	64,637
Monthly Spending (Total) (\$)	17,676	4,334	4,073

Baseline Results

- Study change in consumption behavior around sign up
- Use two month prior and after signup
- Split sample into individuals spending above and below peers
- Seasonally-adjusted Δ spending: subtract average change

Baseline Results

Spending Changes after Signing up for *Status* (2 months)

Dollar-Value Changes

	Below Peers		Above Peers	
	Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat
Δ Spending	142.24***	(5.84)	-474.01***	(-7.81)
Observations	13,596		4,080	

- Overspenders cut consumption by \$237 per month
- Underspenders increase consumption by \$71 per month

Baseline Results

Spending Changes after Signing up for *Status* (2 months)

Changes Scaled by Income

	Below Peers		Above Peers	
	Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat
Δ Spending	0.924***	(4.27)	-3.079***	(-5.25)
Observations	13,596		4,080	

- Overspenders cut consumption by 3% of income
- Underspenders increase consumption by 1% of income

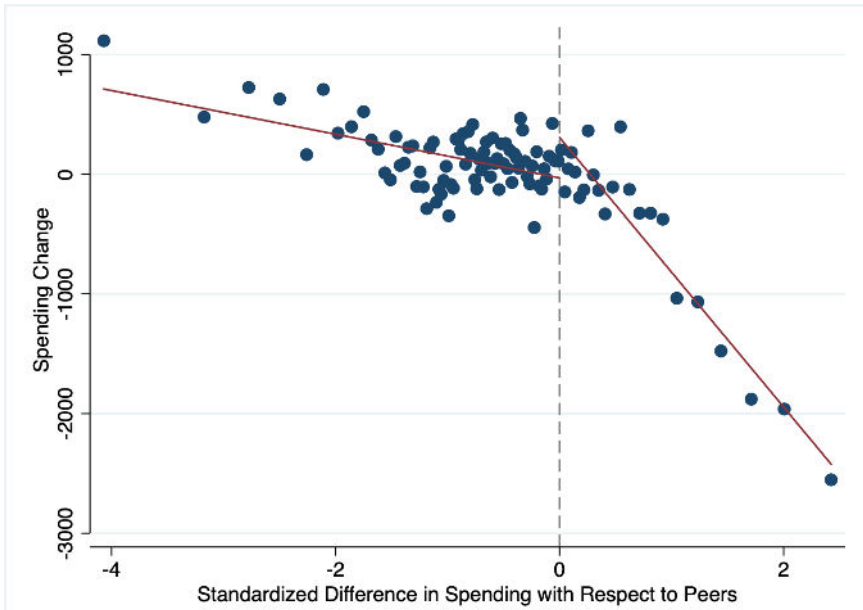
Baseline Results

Distance from Peers and **Dollar** Spending Changes

	Below Peers		Above Peers	
	Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat
Distance from Peers	-182.6***	(-5.56)	-1,126.4***	(-12.40)
Constant	-30.5	(-0.77)	307.4***	(3.54)
Observations	13,596		4,077	

$$\Delta \text{ Spending}_i = \beta_0 + \beta_1 \text{ Distance from Peers}_i + \epsilon_i,$$

Baseline Results



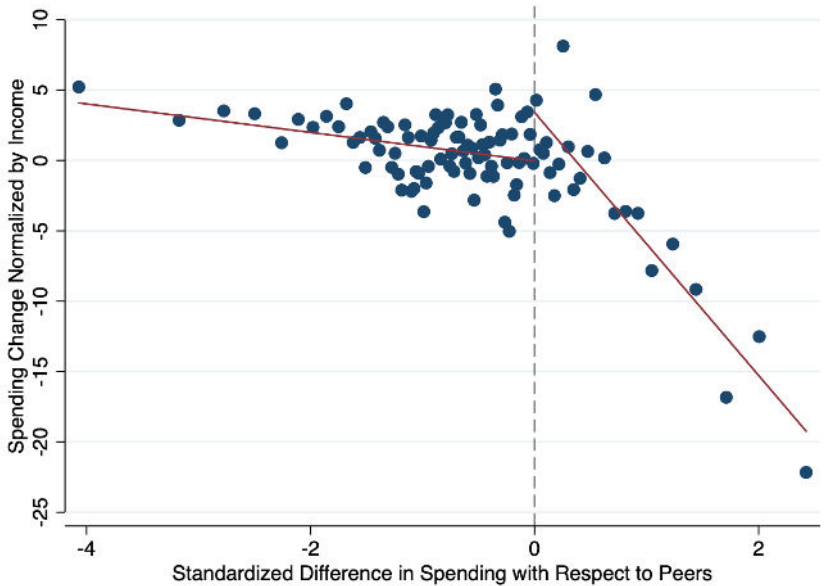
Baseline Results

Distance from Peers and Spending Changes Scaled by Income

	Below Peers		Above Peers	
	Value	<i>t</i> -stat	Value	<i>t</i> -stat
Difference from Peers	-1.01***	(-3.48)	-9.34***	(-10.57)
Constant	-0.03	(-0.10)	3.41***	(4.03)
Observations	13,596		4,077	

$$\Delta \text{ Spending}_i = \beta_0 + \beta_1 \text{ Distance from Peers}_i + \epsilon_i,$$

Baseline Results



Extension I — Adding Demographic Controls

	All		Below Peers		Above Peers	
	Value	t-stat	Value	t-stat	Value	t-stat
Distance	-4.24***	(-10.85)	-1.20**	(-2.14)	-11.95***	(-5.87)
Asset Balance	0.97***	(3.39)	0.87***	(2.73)	2.38**	(2.42)
Income	-0.40	(-0.40)	-0.77	(-0.63)	3.00	(1.21)
Home Ownership	1.95*	(1.94)	2.63**	(2.15)	-0.20	(-0.07)
Credit Score	0.00	(0.29)	-0.00	(-0.17)	-0.01	(-0.28)
Age	0.04	(0.09)	-0.45	(-1.02)	1.19	(0.95)
Age ²	-0.00	(-0.04)	0.01	(1.13)	-0.01	(-0.88)
Debt Balance	0.42**	(2.46)	0.42**	(2.30)	0.25	(0.46)
Constant	-11.52	(-0.88)	6.79	(0.50)	-70.59*	(-1.82)
Observations	9,597		6,826		2,771	

$$\Delta \text{ Spending}_i = \beta_0 + \beta_1 \text{ Distance from Peers}_i + \gamma' \mathbf{x}_i + \epsilon_i,$$

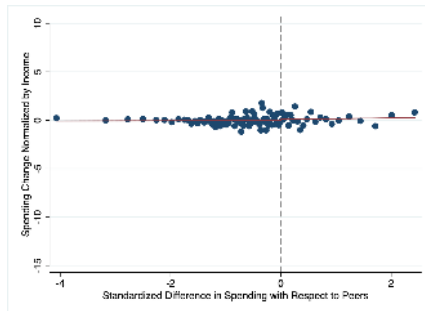
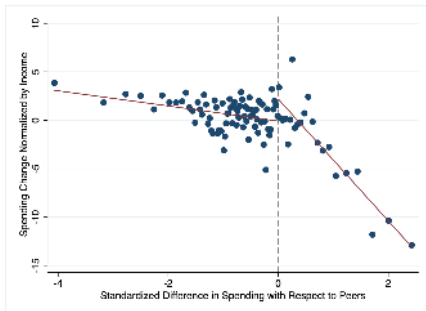
Extension II—Heterogeneity Across Income Groups

	All		Below Peers		Above Peers	
	Value	t-stat	Value	t-stat	Value	t-stat
Distance	-2.282***	(-7.19)	-0.884*	(-1.89)	-5.196**	(-2.56)
Distance × Income_1	-6.319**	(-2.20)	2.239	(0.72)	-29.591***	(-2.69)
Distance × Income_2	-4.662***	(-4.25)	0.500	(0.32)	-7.257*	(-1.65)
Distance × Income_3	-2.735***	(-3.99)	-0.094	(-0.10)	-5.379	(-1.64)
Constant	-4.742	(-0.65)	6.186	(0.87)	-22.891	(-0.88)
Other Controls	✓		✓		✓	
Observations	12,256		9,247		3,009	

$$\Delta \text{ Spending}_i = \beta_0 + \beta_1 \text{ Distance}_i + \sum_{j=1}^3 \delta_j \text{ Distance}_i \times \text{ Income}_{i,j} + \gamma' \mathbf{x}_i + \epsilon_i,$$

Extension III

Discretionary and Non-Discretionary Spending

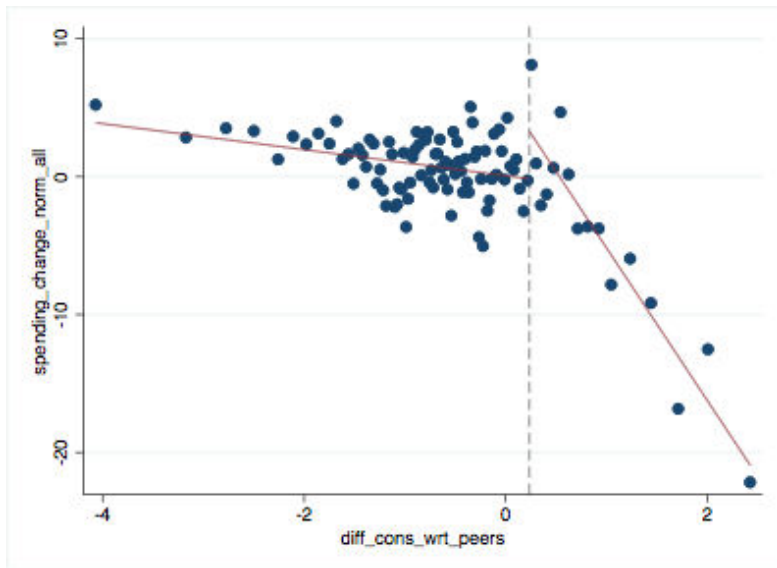


- Discretionary: outside food & drinks, clothes, entertainment, travels, cash withdrawals
- Non-discretionary: groceries, fees, mortgage payments, tuition

Extension IV—Endogenous Threshold Models

- So far: exogenous threshold for above and below peers
- But: users also observe own income, average US spending, ...
- Reaction so far possibly driven by these pieces of information
- Solution: estimate threshold non-parametrically
- → Obtain threshold estimates very close to zero

Extension IV—Endogenous Threshold Models



Identification Concerns

- Individuals might enroll to enjoy account aggregation feature
- Individuals who sign-up for STATUS may *know* they are:
 - Over-spending
 - Under-spending
- The change in spending may have nothing to do with the APP

Identification Strategy

- Exploit the structure of the APP
- Individuals' peer groups are based on buckets
- Most important are Income Buckets:
\$35K, \$50K, \$65K, \$75K, \$100K, and \$150K
- Clients don't know them when entering income at Sign-up
- Exploit these discontinuities at each income threshold

Identification Strategy

- User w income of \$99K virtually identical to user w \$100K
- But is exposed to a peer group with much lower consumption
- We keep only clients within \$3K of the threshold and estimate:

$$\text{Peer Spending}_i = \alpha + \beta \text{ Dummy Above}_i + \epsilon_i, \quad (\text{First Stage})$$

$$\Delta \text{Spending}_i = \alpha + \beta \overbrace{\text{Peer Spending}_i} + \epsilon_i, \quad (\text{Second Stage})$$

Identification Strategy

First-Stage Estimates

	<u>\$3K Thresh</u>	<u>\$4K Thresh</u>	<u>\$5K Thresh</u>
Above_dummy	2068.9*** (18.67)	2087.4*** (22.77)	2064.3*** (24.39)
Constant	5145.1*** (56.31)	5126.6*** (73.73)	5149.7*** (84.04)

Second-Stage Estimates

	<u>\$3K Thresh</u>	<u>\$4K Thresh</u>	<u>\$5K Thresh</u>
<i>Peer_Spending_i</i>	0.984** (2.53)	0.825*** (2.64)	0.769*** (2.66)
Constant	-6473.8** (-2.51)	-5323.6*** (-2.66)	-4921.1*** (-2.70)

Economic Mechanism

- *Wisdom-of-the-crowd* channel:
 - Clients are Bayesian updaters & take peer spending as signal
 - Can explain convergence of consumption and monotonic effect
 - Cannot explain asymmetry between over- and under-spenders
- *Conformism* channel:
 - Non-Bayesian updating, also cannot explain asymmetries
- *Peer-Pressure* channel:
 - Cannot explain that under-spenders increase spending
- *Over-reaction to negative news* channel:
 - Would imply clients react to the most negative news received

Economic Mechanism

Spending in October



Economic Mechanism

- Compute reaction with respect to:
 - Peer consumption
 - National average
 - Individuals' income
- Individuals react the most to peer consumption
- Even if other information sources are more negative

Conclusions

- 1 Users who spend
 - more than peers reduce spending significantly
 - less than peers keep constant or increase their spending
- 2 Distance from peer spending affect reaction monotonically
- 3 Asymmetry: cuts are three times larger than increases
- 4 Lower-income users react more than higher income users
- 5 Discretionary spending drives the results

Difficult to reconcile findings with standard models