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

    $\rightarrow$ 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 $\rightarrow$ 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)

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.	*t*-stat	Coeff.	*t*-stat
ΔSpending	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.	*t*-stat	Coeff.	*t*-stat
ΔSpending	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

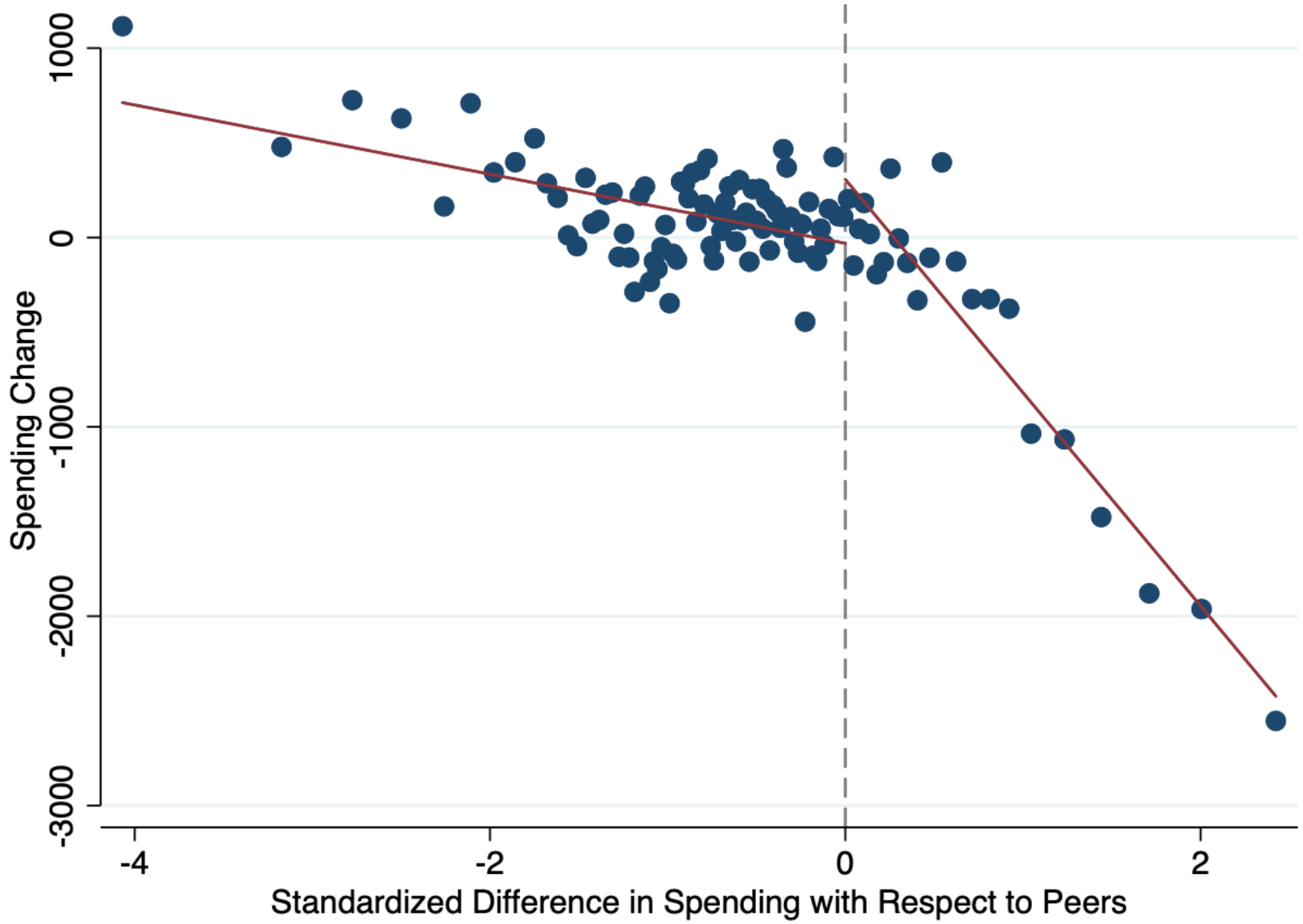
Baseline Results

Distance from Peers and Dollar Spending Changes

	Below Peers		Above Peers	
	Coeff.	*t*-stat	Coeff.	*t*-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	

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

Baseline Results



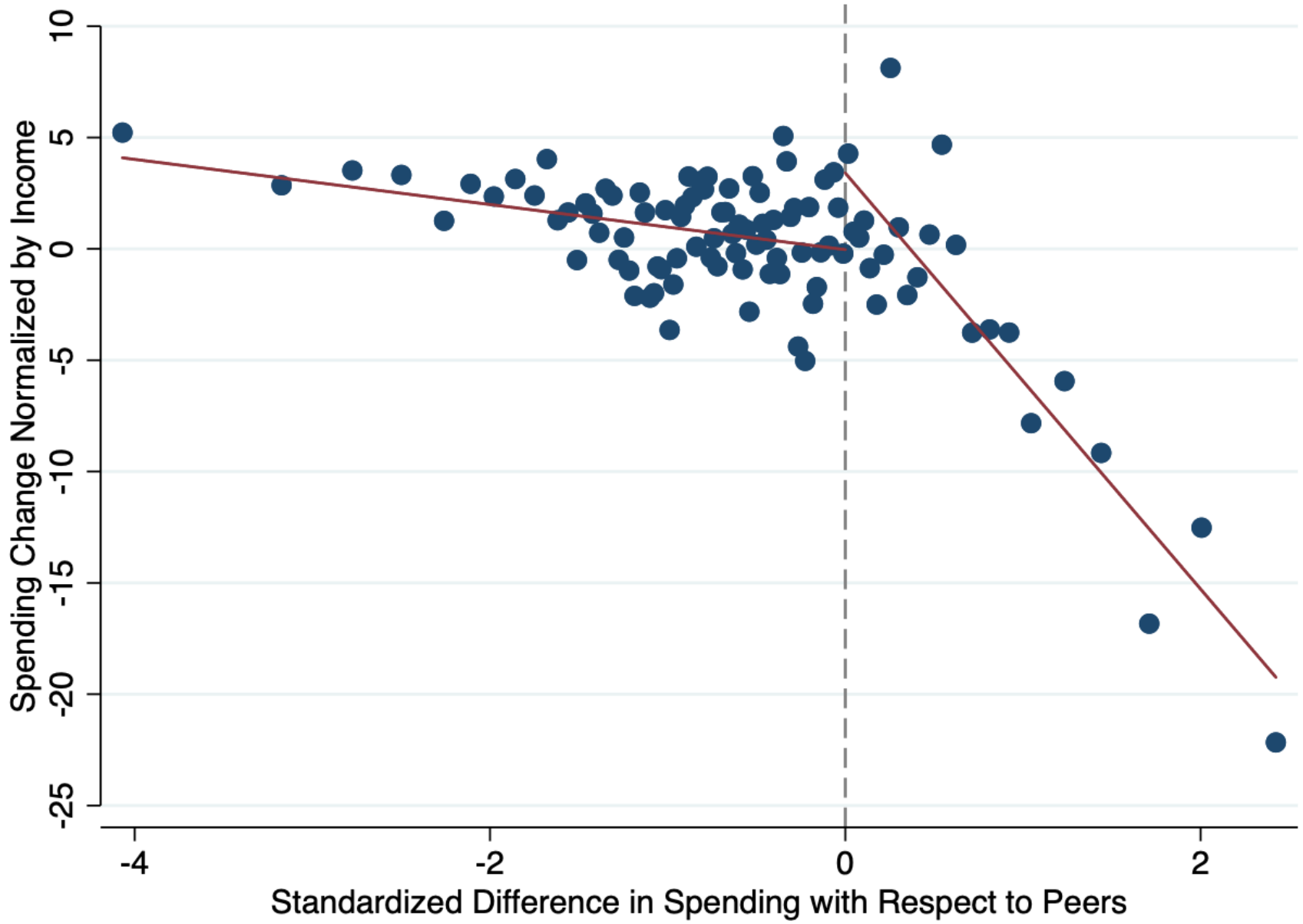
Baseline Results

Distance from Peers and Spending Changes
Scaled by Income

	Below Peers		Above Peers	
	Value	*t*-stat	Value	*t*-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	

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

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	

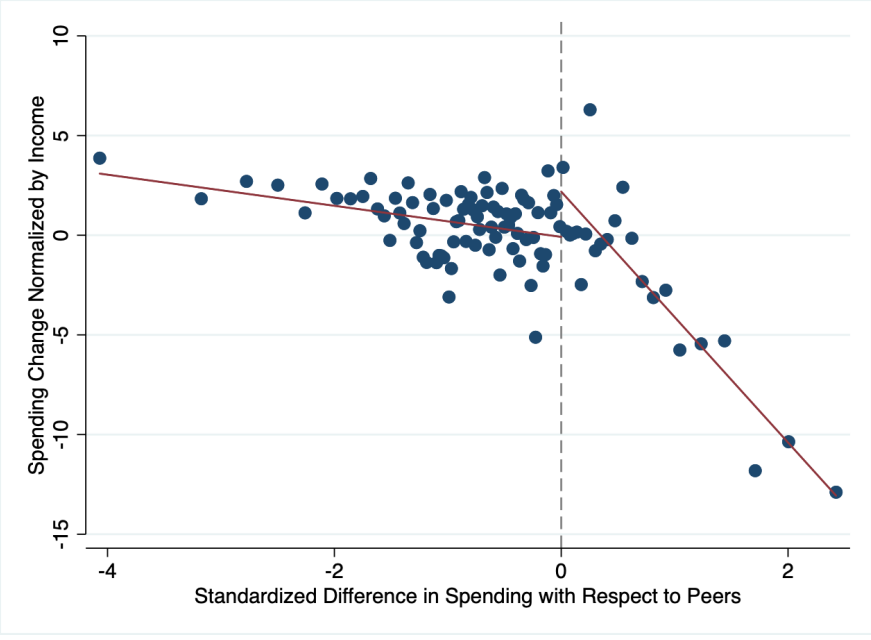
$$\Delta\ \textit{Spending}_i = \beta_0 + \beta_1\ \textit{Distance from Peers}_i + \boldsymbol{\gamma}'\boldsymbol{x}_i + \epsilon_i,$$

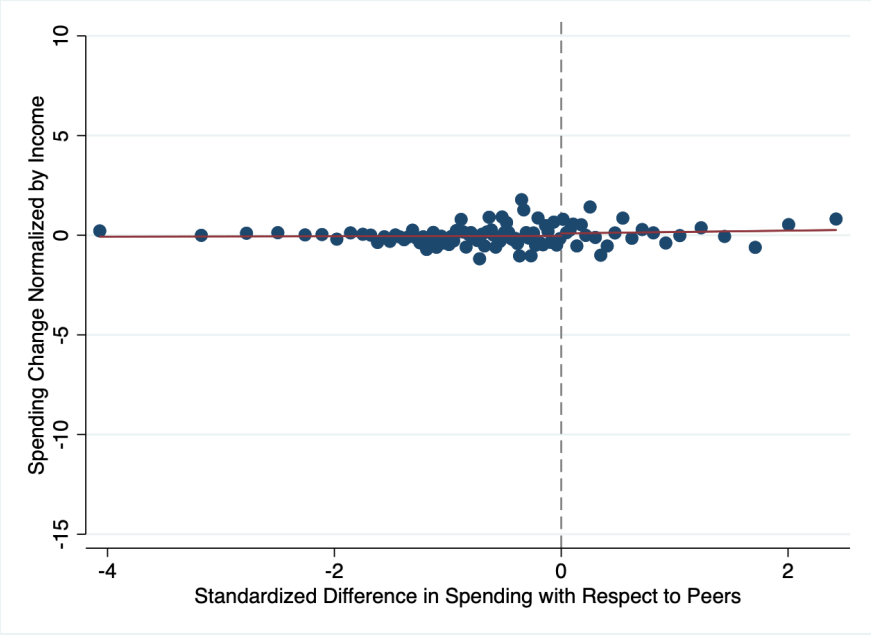
Extension II—Heterogeneity Across Income Groups

	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	

$$\Delta\ Spending_i = \beta_0 + \beta_1\ Distance_i + \sum_{j=1}^{3} \delta_j\ Distance_i \times Income_{i,j} + \gamma' \boldsymbol{x}_i + \epsilon_i,$$

Extension III
Discretionary and Non-Discretionary Spending



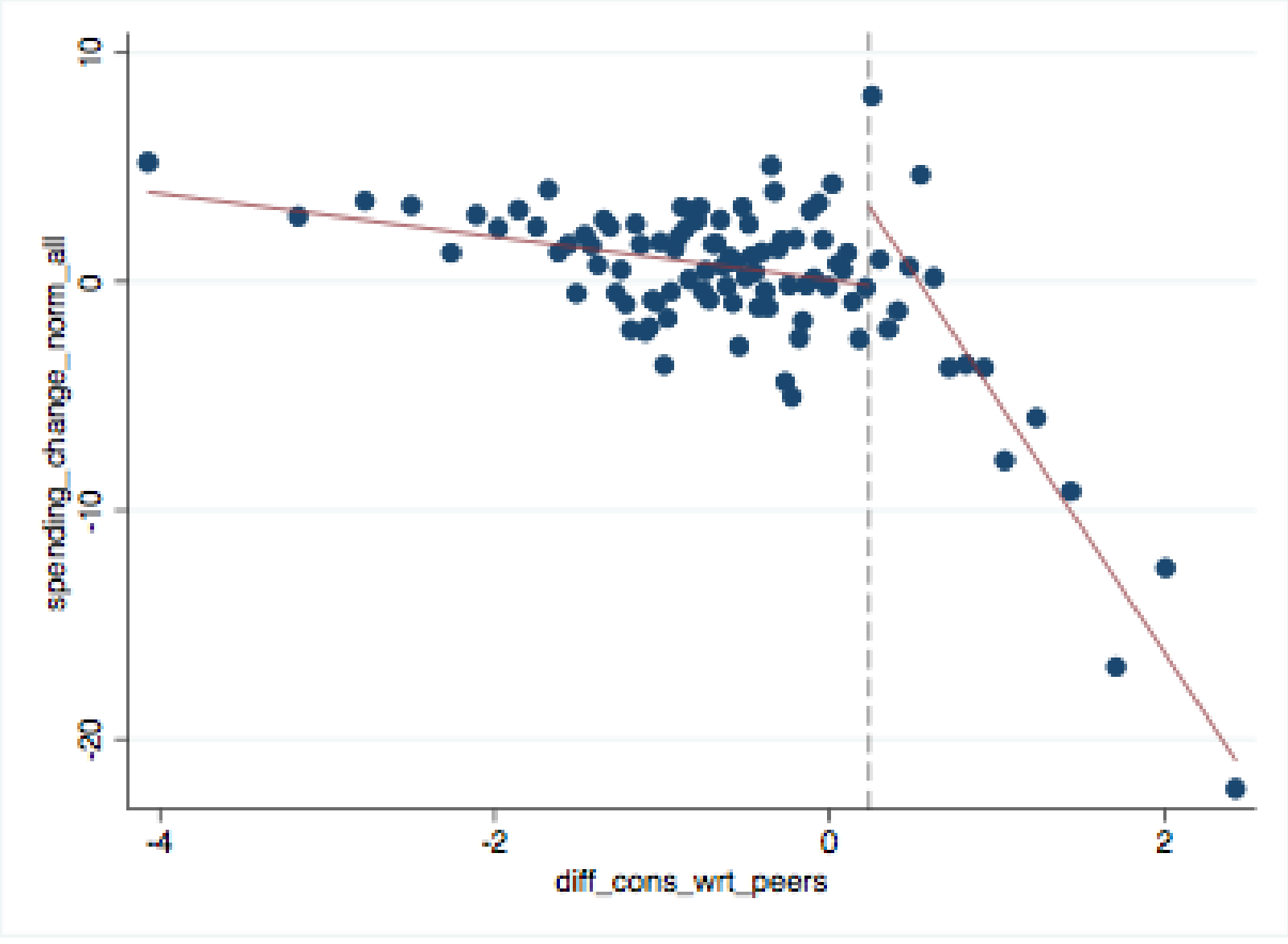


- Discretionary: outside food & drinks, clothes, entertainment, travels, cash withdrawals
- Non-discretionary: groceries, fees, mortgage payments, tuition

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
- $\rightarrow$ 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:

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

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

Identification Strategy

First-Stage Estimates

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

Second-Stage Estimates

	$3K Thresh	**$4K Thresh**	**$5K Thresh**
$\widehat{Peer\_Spending\_i}$	0.984**	0.825***	0.769***
	(2.53)	(2.64)	(2.66)
Constant	-6473.8**	-5323.6***	-4921.1***
	(-2.51)	(-2.66)	(-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

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