How Firm-Driven Shocks Impact Consumer Behavior

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- Shocks to individuals' employers are an important source of income and wealth volatility
- Both first and second stage are of interest; implications for role of government in calming markets and translating financial market shocks into the 'real' economy

VARIABLES	(1) Log(Spending)	(2) Log(Durables)	(3) Log(NonDurables)	(4) Log(Service)	(5) Log(Wealth)
Income Growth	0.0163***	0.00932**	0.00692***	0.00991***	0.00429***
	(0.00139)	(0.00376)	(0.00195)	(0.00225)	(0.000742)
Cohort Income Dispersion	-2.29e-06	0.00799	-0.00302	0.00226	0.000784
	(0.00258)	(0.00690)	(0.00363)	(0.00422)	(0.00138)
Unemployed	-0.000177	-0.159	0.0475	0.00392	-0.0299
	(0.0378)	(0.0981)	(0.0524)	(0.0609)	(0.0202)
Equity Wealth	0.00183	-0.00975*	0.00395	0.00608*	0.201***
	(0.00213)	(0.00572)	(0.00303)	(0.00348)	(0.00114)
Observations	11,090,754	11,090,754	11,090,754	11,090,754	11,090,754
R^2	0.348	0.221	0.284	0.223	0.905
Week FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
User FE	YES	YES	YES	YES	YES

- Data useful for individual panel analysis and also matches national aggregates and trends
- No evidence of predictability of firm shocks or returns by individuals
- OLS approach significantly underestimates effects of income and wealth on spending
- Generally stronger effects of income on durables, weaker effects on wealth
- Relatively weak effects of equity wealth on spending
- Somewhat larger effects for older users and more liquidity constrained users
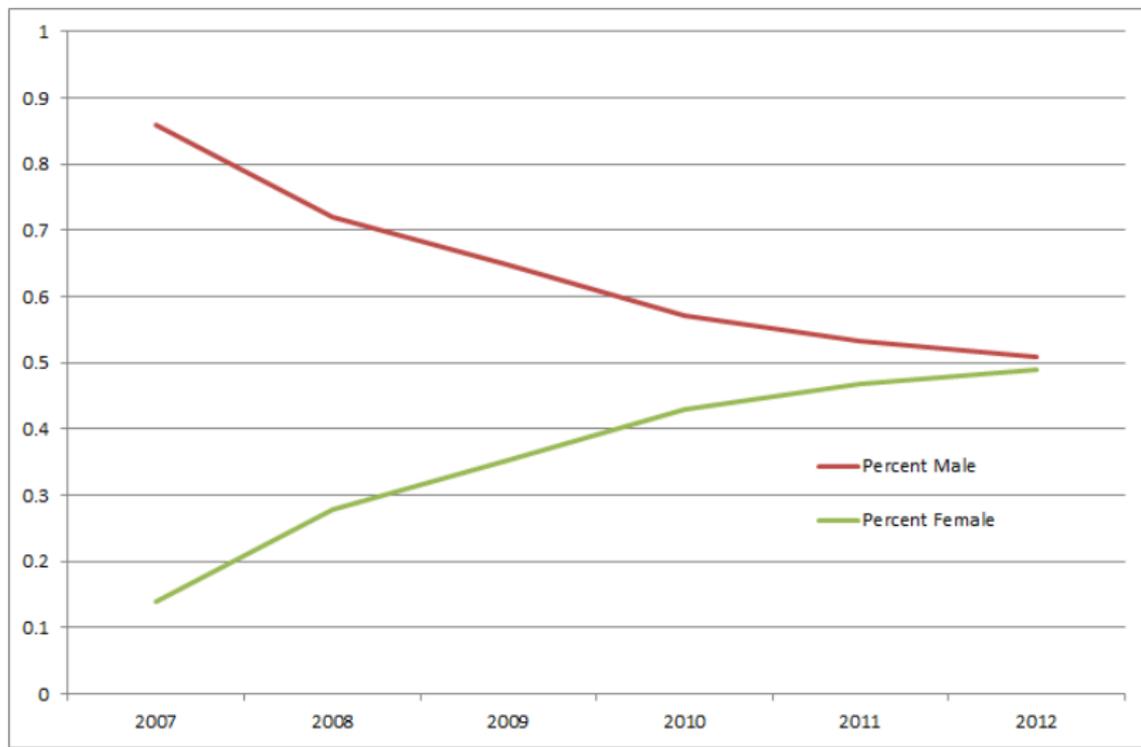
- From an online personal financial website
- Connects users' financial accounts to a single location for:
    - Centralization
    - Better UI
    - Features
    - Categorization
    - Budgeting

- Grew from <100,000 active users in 2007 to >1,000,000 by 2012

- Individual-level information on:
  - Age, Sex, Children, Marital Status
  - Location, Home Ownership, Profession, Education, Income
- Tracks each transaction from bank and credit card accounts
- Automatic categorization of transactions into over 100 income and spending categories
- Daily balances of equity, retirement, property, and loan accounts
- Currently restrict to a sample of users who have demographic information, 'complete' accounts, and can be matched to employers from 2010 onwards

Income	National	Users 2007	Users 2011
$0-$25,000	28.22%	3.60%	21.51%
$25,001-$50,000	26.65%	15.33%	27.63%
$50,001-$75,000	18.27%	22.65%	20.15%
$75,001-$100,000	10.93%	18.6%	12.82%
$100,001-$150,000	9.90%	21.07%	10.87%
$150,001+	6.04%	15.69%	6.91%

Coverage of Relevant Income and Spending

- Best coverage of checking and credit card accounts, as most people sign up in order to track income and spending
- Number of individuals with linked equity accounts is comparable to SCF averages

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- By 2011, users had relatively complete profiles (% of users reporting having linked all or almost all of various types of accounts):
  - Checking - 95%
  - Savings - 93%
  - Credit Cards - 91%
  - Brokerage/Equity - 75%

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- Exclude users who only have single accounts linked or transfers going to missing accounts
- Data is internally consistent, with self-reported income and demographic characteristics highly correlated with observed income and spending patterns

Categorization Coverage

- No automatic categorization with cash or check transactions

- 3% of observed spending by users is done with cash (ATM withdrawals and manually entered cash transactions)

- 15% with checks (primarily bills, rent, and mortgage)

- 80% of employees in the United States receive direct deposit paychecks (NACHA 2010 Survey)
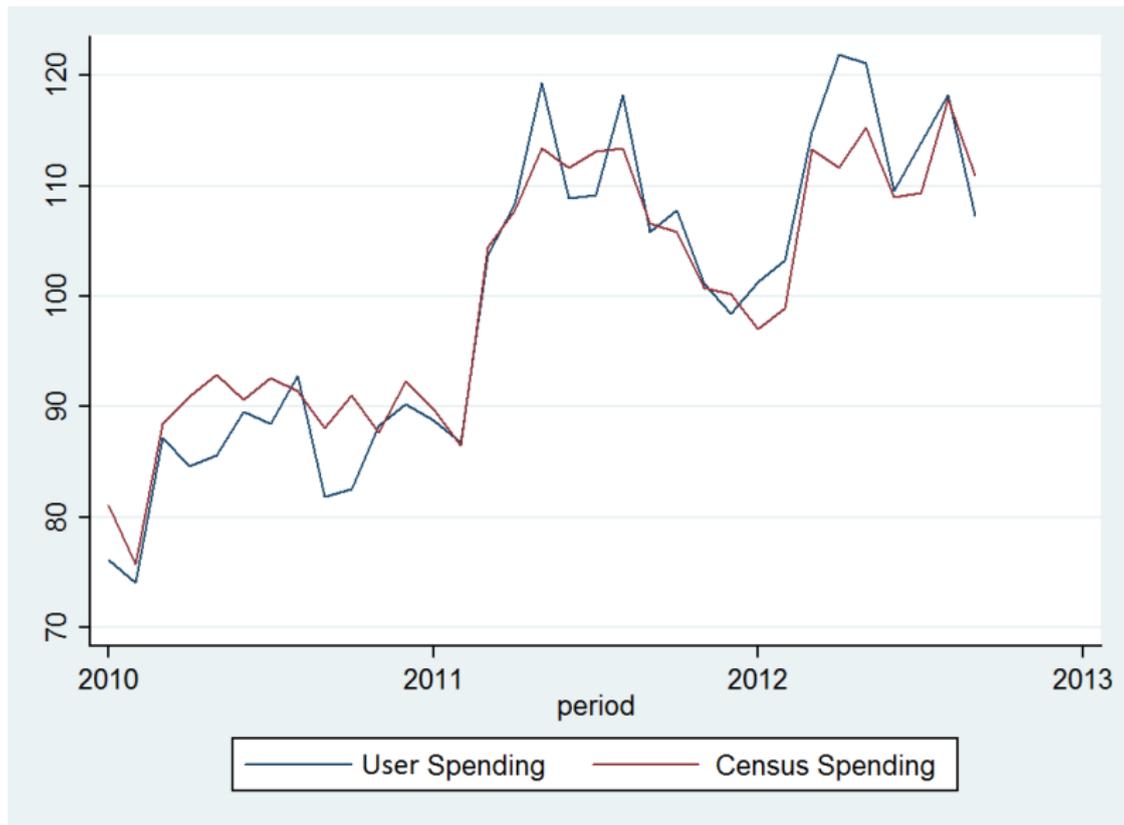
Census Retail Sales:

- Monthly survey of all (3,000) large retailers and large sample (9,000) of small retailers
- Organized by type of retailer
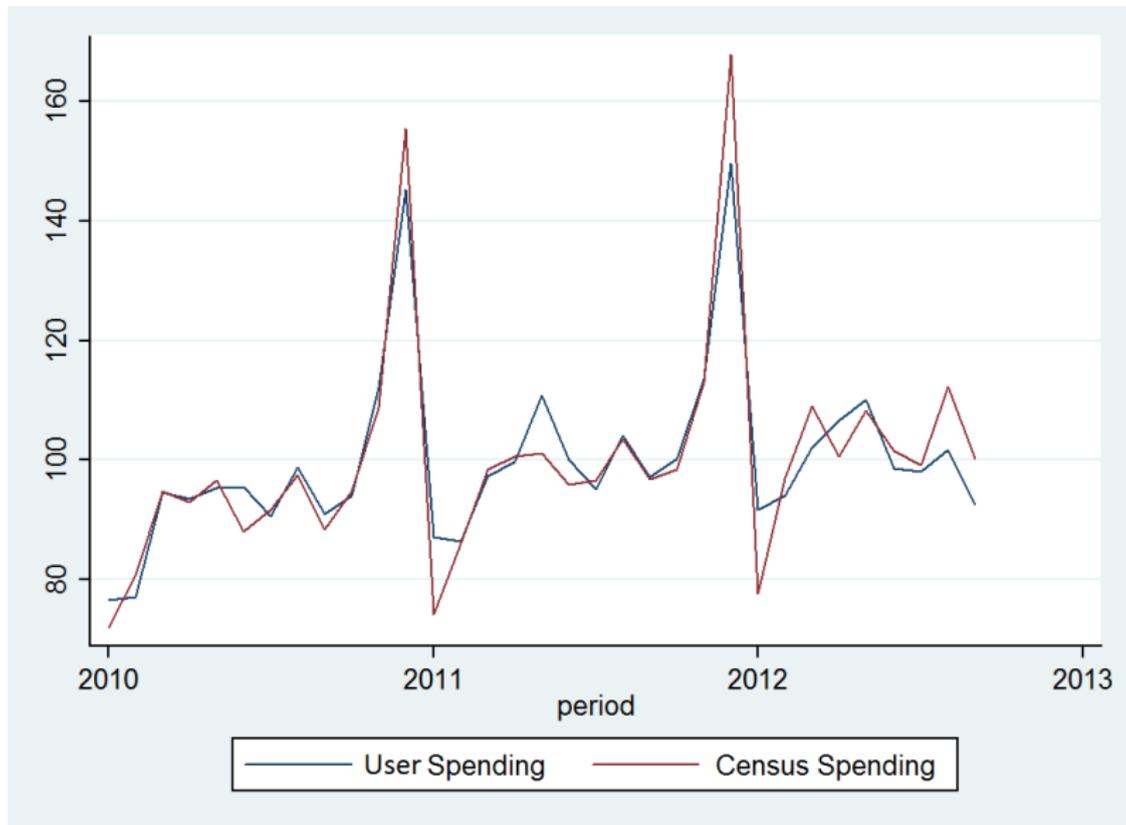- Match observed category to Census Retail category

NIPA:

- National aggregate durables spending, nondurables spending, and paycheck income

Measure monthly average per-user categorical spending and paycheck income using CPS weights on age, sex, income
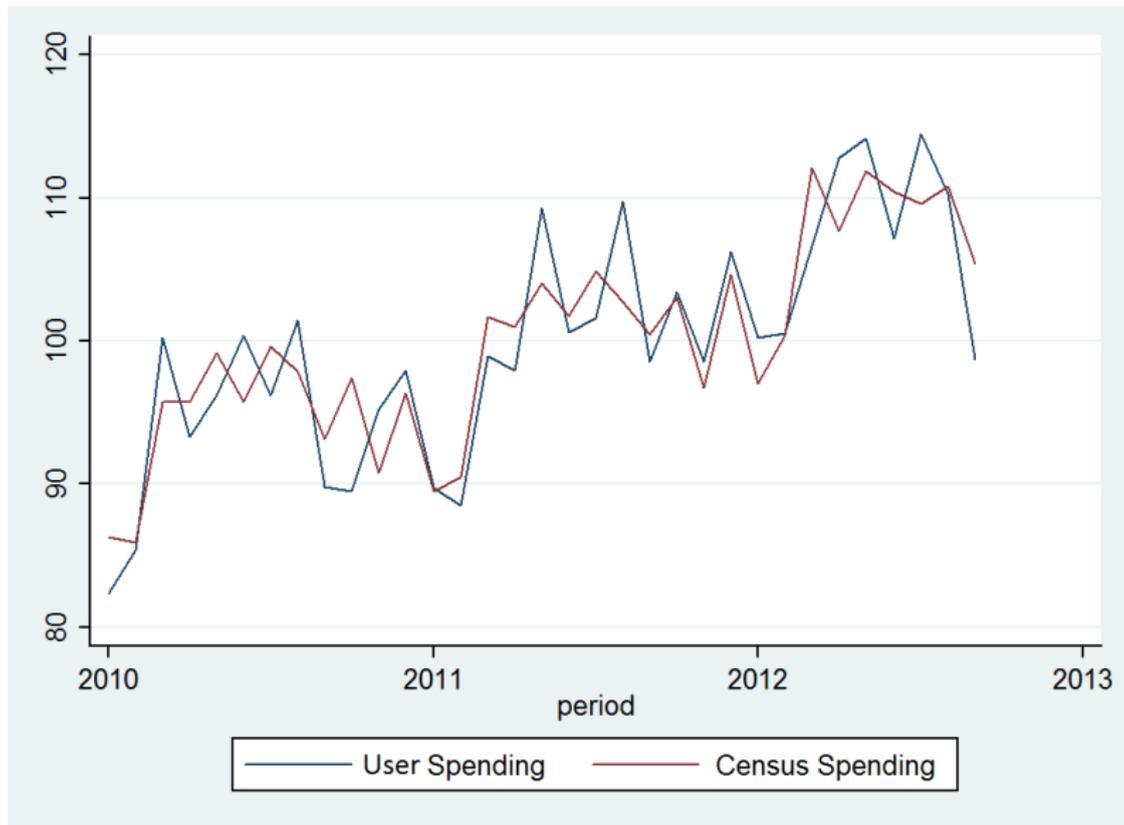
EMPIRICAL STRATEGY

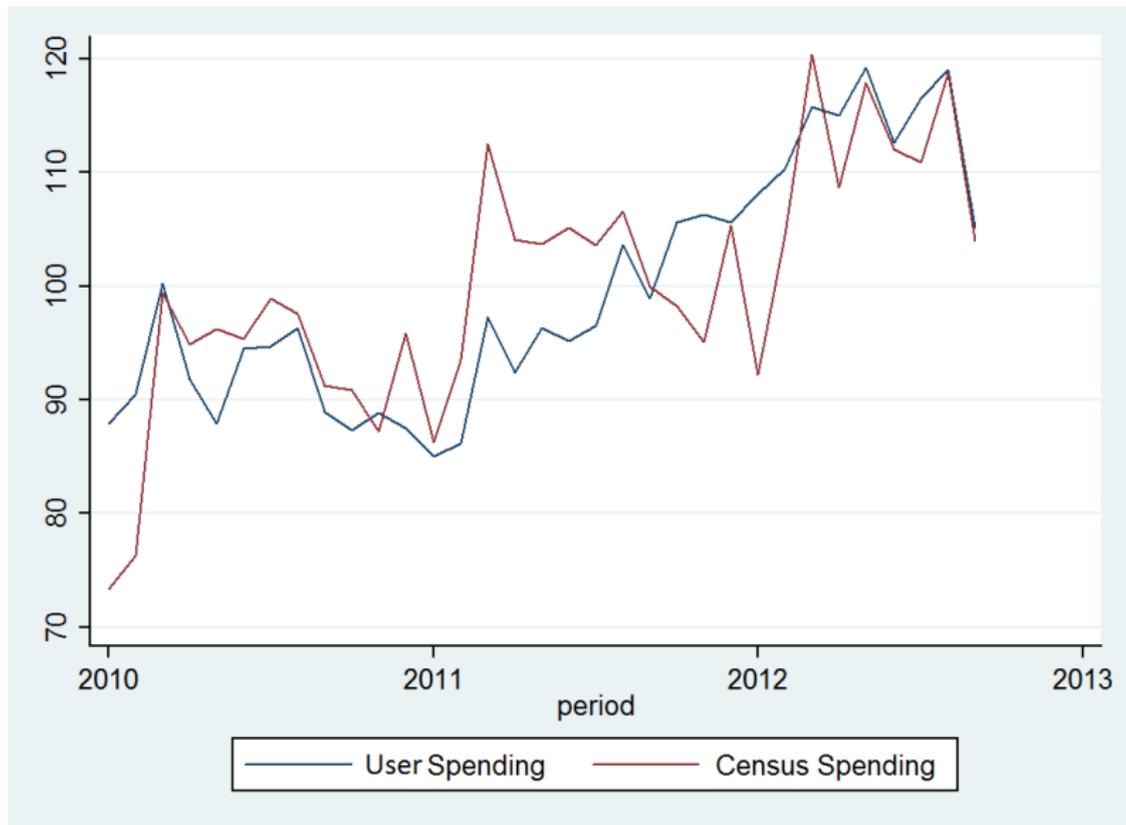- Individuals and households shift consumption, savings, income, and wealth in response to unobservable foresight

- Desire common exogenous shifters of income and wealth to determine causal effects on consumption and savings

- One such source are shocks to one's employer; plausibly exogenous at an individual level and can drive:
  - Equity wealth
  - Income and bonuses
  - Income uncertainty
  - Labor market expectations and outcomes

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- Leverage variety of firm shocks that have different 'bundles' of effects to jointly identify exogenous changes in income, wealth, labor market expectations, and uncertainty over future income

LARGEST EMPLOYERS ON PLATFORM

- Use universe of NYSE and NASDAQ firms
- Match to individuals using paycheck descriptions

Table 2: Largest Employers in Sample

Firm	# Employees	Firm	# Employees
Technology	16464	Retailer	5608
Banking	15656	Retailer	4836
Banking	13920	Media	4669
Professional Services	11259	Technology	3819
Tech Firm	11063	Technology	3817
Retailer	9719	Retailer	3723
Retailer	8779	Media	3598
Technology	6972	Manufacturer	3498
Banking	6842	Manufacturer	3440
Manufacturer	6775	Media	3427
Manufacturer	6553	Professional Services	3421
Technology	6355	Retailer	3389
Manufacturer	6237	Retailer	3271
Professional Services	6064	Retailer	3071
Retailer	5998	Retailer	2980

Overall, these employers make up about 35% of those employed in the sample. Full sample contains 1948 employers employing over 500,000 individuals. All employers are in NASDAQ and NYSE.

- Large earnings surprises
  - $|\frac{(EPS - E[EPS])}{SharePrice}| > .01$

- Layoffs/Closures

- Leadership Changes

- Coming soon:
  - Bankruptcies
  - Other adverse events

Firm	Month	Day	Year	Layoffs	Firm	Month	Day	Year	Layoffs
AT&T	1	1	2010	160	MEDTRONIC	2	19	2011	2000
LOCKHEED	1	1	2010	1200	NORTHROP GRU.	2	26	2011	500
FOOT LOCKER	1	8	2010	120	WELLS FARGO	3	19	2011	400
NYSE	1	8	2010	350	CISCO	4	9	2011	550
UPS	1	8	2010	1800	LOCKHEED	6	11	2011	1200
HOME DEPOT	1	22	2010	1000	CISCO	7	9	2011	6500
VERIZON	1	22	2010	13000	BOSTON SCI.	7	23	2011	1400
WALMART	1	22	2010	11200	BANK OF AMER.	8	13	2011	3500
HUMANA	2	12	2010	1400	NORTHROP GRU.	8	20	2011	500
BOEING	2	19	2010	1000	BANK OF AMER.	9	10	2011	30000
IBM	2	26	2010	1518	LOCKHEED	9	24	2011	670
CHEVRON	3	5	2010	2000	LOWE'S	10	15	2011	1950
NETFLIX	5	14	2010	160	WHIRLPOOL	10	22	2011	5000
PFIZER	5	14	2010	6000	AMD	10	29	2011	1400
HEWLETT PACK.	5	28	2010	9000	ADOBE	11	5	2011	475
NATIONWIDE	7	2	2010	2070	MORGAN STAN.	12	10	2011	1600
WELLS FARGO	7	2	2010	3800	ARCHER D.M.	1	8	2012	1000
WINN DIXIE	7	23	2010	120	METLIFE	1	8	2012	2575
FEDEX	9	10	2010	1700	KRAFT	1	15	2012	1600
ABBOTT	9	17	2010	3000	ABBOTT	1	22	2012	700
AON	10	8	2010	1800	AMERICAN AIR.	1	29	2012	13000
NORTHROP GRUM.	11	12	2010	380	MICROSOFT	1	29	2012	200
STATE STREET	11	26	2010	1400	NATIONWIDE	2	5	2012	625
AMERICAN EXP.	1	15	2011	550	SUPERVALU	2	5	2012	800
BOEING	1	15	2011	900	IBM	2	26	2012	1100
ABBOTT	1	22	2011	1900	GOODRICH	3	4	2012	500
PFIZER	1	29	2011	1100	LEVIS	3	4	2012	500

- Effects on wealth are measured through total equity wealth holdings
  - Cannot directly observe composition of equity
  - Test sensitivity of daily equity holdings to employer stock returns prior to shocks
  - Predict change in wealth based on firm stock price
- Income growth, labor market outcomes, and income uncertainty are measured at a firm level (individuals can forecast mean and std dev of future income stream as well as probability of becoming unemployed)
- Use 6-month period following shock

First Stage:

$$Wealth_{it} = \gamma_0 + \gamma_1 PosEarnings_{ft} + \gamma_2 NegEarnings_{ft} +$$
$$\gamma_3 Layoffs_{ft} + \gamma_4 Leadership_{ft} + \gamma_5 W_{it} + FE_{it} + e_{it}$$
$$Income_{ft} = \gamma_0 + \gamma_1 PosEarnings_{ft} + \gamma_2 NegEarnings_{ft} +$$
$$\gamma_3 Layoffs_{ft} + \gamma_4 Leadership_{ft} + \gamma_5 W_{it} + FE_{it} + e_{it}$$
$$Uncert_{ft} = \gamma_0 + \gamma_1 PosEarnings_{ft} + \gamma_2 NegEarnings_{ft} +$$
$$\gamma_3 Layoffs_{ft} + \gamma_4 Leadership_{ft} + \gamma_5 W_{it} + FE_{it} + e_{it}$$
$$Unemp_{ft} = \gamma_0 + \gamma_1 PosEarnings_{ft} + \gamma_2 NegEarnings_{ft} +$$
$$\gamma_3 Layoffs_{ft} + \gamma_4 Leadership_{ft} + \gamma_5 W_{it} + FE_{it} + e_{it}$$

Second Stage:

$$Spending_{it} = \beta_0 + \beta_1 \widetilde{Wealth}_{it} + \beta_2 \widetilde{Income}_{ft} + \beta_3 \widetilde{Uncert}_{ft} +$$
$$\beta_4 \widetilde{Unemp}_{ft} + \beta_5 W_{it} + FE_{it} + u_{it}$$

- Assumption: the only effect of leadership changes, layoffs, or earnings surprise on consumption is through income, wealth, uncertainty, and unemployment probabilities

	Mean	Std Dev
Num Users	131,405	-
Num Firms	321	-
Num Earnings Rep.	61	-
Num Layoffs	54	-
Num Leadership Changes	254	-
Income (Weekly)	1515.07	2205.51
Spending (Weekly)	1220.96	1681.43
Equity Wealth	10,478.71	61,638.22
Total Wealth	87,881.64	163,127.5

VARIABLES	(1) Firm Returns	(2) Layoffs	(3) Pos Earnings	(4) Neg Earnings	(5) Exec Deps
Lagged Income	4.85e-06	0.000176	9.65e-05	-0.000418	-0.000232
	(0.000145)	(0.000309)	(0.000831)	(0.00103)	(0.00162)
Lagged Wealth	-0.000175*	-0.000102	-0.000580	0.00136	-0.000484
	(9.82e-05)	(0.000245)	(0.00100)	(0.00102)	(0.000769)
Lagged Spending	-0.000261	-0.000563	-0.00114	-0.00178	0.00182
	(0.000161)	(0.000398)	(0.00170)	(0.00187)	(0.00115)
Observations	10,577,511	10,577,511	832,948	832,948	10,577,511
R^2	0.140	0.040	0.391	0.266	0.034
Week FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
User FE	YES	YES	YES	YES	YES

VARIABLES	(1) Cohort Income Growth	(2) Cohort Income Dispersion	(3) Job Loss	(4) Equity Wealth
Postive Earnings Surprise	0.0187***	0.0746***	-0.00145***	0.0386**
	(0.00473)	(0.00869)	(0.000366)	(0.0110)
Negative Earnings Surprise	-0.0586***	-0.0575***	-0.00249***	-0.0253**
	(0.00363)	(0.00644)	(0.000282)	(0.0106)
Layoffs	-0.0977***	-0.0913***	0.00405***	-0.0394***
	(0.00204)	(0.00364)	(0.001235)	(0.00922)
Executive Departures	0.00820***	-0.00276*	-0.000709***	0.0215***
	(0.000913)	(0.00165)	(7.26e-05)	(0.00407)
Observations	10,093,009	10,093,009	10,093,009	10,093,009
R^2	0.275	0.233	0.304	0.804
Week FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
User FE	YES	YES	YES	YES

VARIABLES	(1) Log(Spending)	(2) Log(Durables)	(3) Log(NonDurables)	(4) Log(Wealth)	(5) Liq. Cons.	(6) Age>50
Cohort Income Growth	0.546***	0.809**	0.420**	0.259*	0.593***	0.542***
	(0.135)	(0.359)	(0.180)	(0.137)	(0.185)	(0.252)
Cohort Income Dispersion	-0.277***	-0.563**	-0.269***	0.164*	-0.162**	-0.187***
	(0.0975)	(0.269)	(0.073)	(0.0934)	(0.091)	(0.084)
Cohort Unemployed Fraction	-0.072***	-0.089**	-0.037*	-0.051*	-0.203***	-0.109**
	(0.030)	(0.032)	(0.019)	(0.028)	(0.052)	(0.054)
Investment Wealth	0.064**	0.128**	0.037	0.183***	0.233***	0.248***
	(0.029)	(0.061)	(0.029)	(0.082)	(0.095)	(0.078)
Observations	10,988,278	10,988,278	10,988,278	10,988,278	2,324,709	1,023,925
Week FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
User FE	YES	YES	YES	YES	YES	YES

- Data useful for both individual and aggregate analysis
- No response of individuals' spending habits to future shocks to their employers
- Strong effects on income, especially durables expenditures
- Relatively weak effects of equity wealth on spending
- Larger effects of wealth for older users and more liquidity constrained users

- More firms, private firms

- Add additional shocks from SEC's 8-K data

- Additional heterogenous effects analysis and robustness

- Model individual and aggregate responses

Common Euler equation for consumption:

$$u'(c_{it-1}) = (1+\delta)^{-1}E_{t-1}[(1+r_t)u'(c_{it})]$$

Under assumption that $r = \delta$ and quadratic preferences, this becomes:

$$c_{it} = c_{it-1} + \epsilon_{it}$$

ϵ_{it} reflects a consumption innovation driven by new information to the consumers.

This leads to:

$$\Delta c_{it} = \beta_j \sum x_{it-1-j} + \epsilon_{it}$$

where the Permanent Income model gives a null of $\beta_j = 0$ for all j. That is, no variables in period t-1 or before should be associated with changes in consumption between t-1 and t.

A common representation of the income process describes permanent and temporary shocks:

$$y_{it} = P_{it} + v_{it}$$

$$P_{it} = P_{it-1} + u_{it}$$

With this formulation, the change in consumption is given by:

$$\Delta c_{it} = \frac{r}{1+r} v_{it} + u_{it}$$

For small r, we see that consumption responds weakly to temporary shocks but 1:1 to permanent shocks.
Similarly, we see that savings behave in the opposite manner, responding almost 1:1 to temporary shocks:

$$s_{it} = \frac{1}{1+r} v_{it}$$

SAVINGS RATIO