Extracting Customer Demand: Credit Card Spending and Post-Earnings Returns

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Customer Information & Firm Value

- Customer demand is the source of a firm's cash flow
  - Subrahmanyam and Titman (1999): "a manager for a retailer such as JC Penney may obtain valuable information about the demand for the clothing line of a fledgling garment manufacturer."
- Customer experiences → subsequent firm revenue and stock prices (Ittner and Larcker, 1998; Froot et al., 2016; Huang, 2016)
- Technology firms are tracking and processing customer information: InfoScout; MKT MEDIASTATS LLC (Froot et al, 2016); Mint and Betterment, etc

Brand $ per Basket	% of Basket $ (median)	Total Basket $ (median)
$19.00	50.1%	$37.94

Apple Consumer Demographics

demographic	index
Female	96
Male	141
<24	148
25-34	108
35-44	99
45-54	93
55-64	85
65+	84
African American	102
Asian	215
Caucasian	87
Hispanic	116

demographic	index
Has Kids	96
No Kids	108
- $20k	104
$20k-40k	90
$40k-60k	93
$60k-80k	99
$80k-100k	98
$100k-125k	110
$125k +	117
No College	82
College	101
Adv. Degree	116

Customer Information & Firm Value

- Why care about detailed customer information when the firms are already reporting their sales?

- Does it conveys incremental value beyond the aggregated accounting numbers?

Two Sources of Additional Information

- Earnings/Sales reported by the firm may not accurately reflect actual purchases from customers
  - By the end of February 2013, Leap Wireless International Inc., a prepaid carrier contracted to purchase iPhones from Apple, warned its investors that customer demand for iPhones fell significantly short of its pre-committed level, leading to an expected loss
  - “Unsold IPhones Piling Up at Leap Wireless”; “For Leap Wireless, a big bet on the iPhone is becoming a big headache” (*The Wall Street Journal*, 27th Feb., 2013)

Two Sources of Additional Information

- Buyer characteristics and composition → sustainability of customer demand
  - Purchase capacity
  - Customer base diversity

Our Contribution

- The first paper to identify incremental information contained in customer spending
  - Customer spending is a persistent signal of future firm performance beyond firm's current accounting performance measures;
  - Prior literature use signals of customer interest to preempt released sales
- The first paper to measure customer demand by using granular consumer spending
  - More direct and accurate measure of customer demand: observe actual purchases Able to study a much larger sample of firms from multiple industries
- Trace out sources of customer spending return predictability
  - detailed financial and demographic information

Data

- Customer data
  - Credit card transaction-level consumption from a large US bank of more than 120,000 accounts: 2003.03.01-2003.10.31
    - Transaction amount, transaction date, merchant name
  - Monthly financial information
    - Consumer credit: *FICO score*, *internal behavior score*
  - Rich demographic characteristics
    - Age, property address
  - Spending Surprise: cross-sectional variation

$$SUS_{iknq} = \frac{Spending_{iknq} - Industry\ average\ spending_{kq}}{Industry\ average\ spending_{k1} + 1}$$

- Data representativeness

Data

- Firm-related data: Compustat, CRSP, IBES, Thomson Reuters, Fama-French data library, DGTW data library

  - Earnings and sales surprise: Seasonal Random Walk

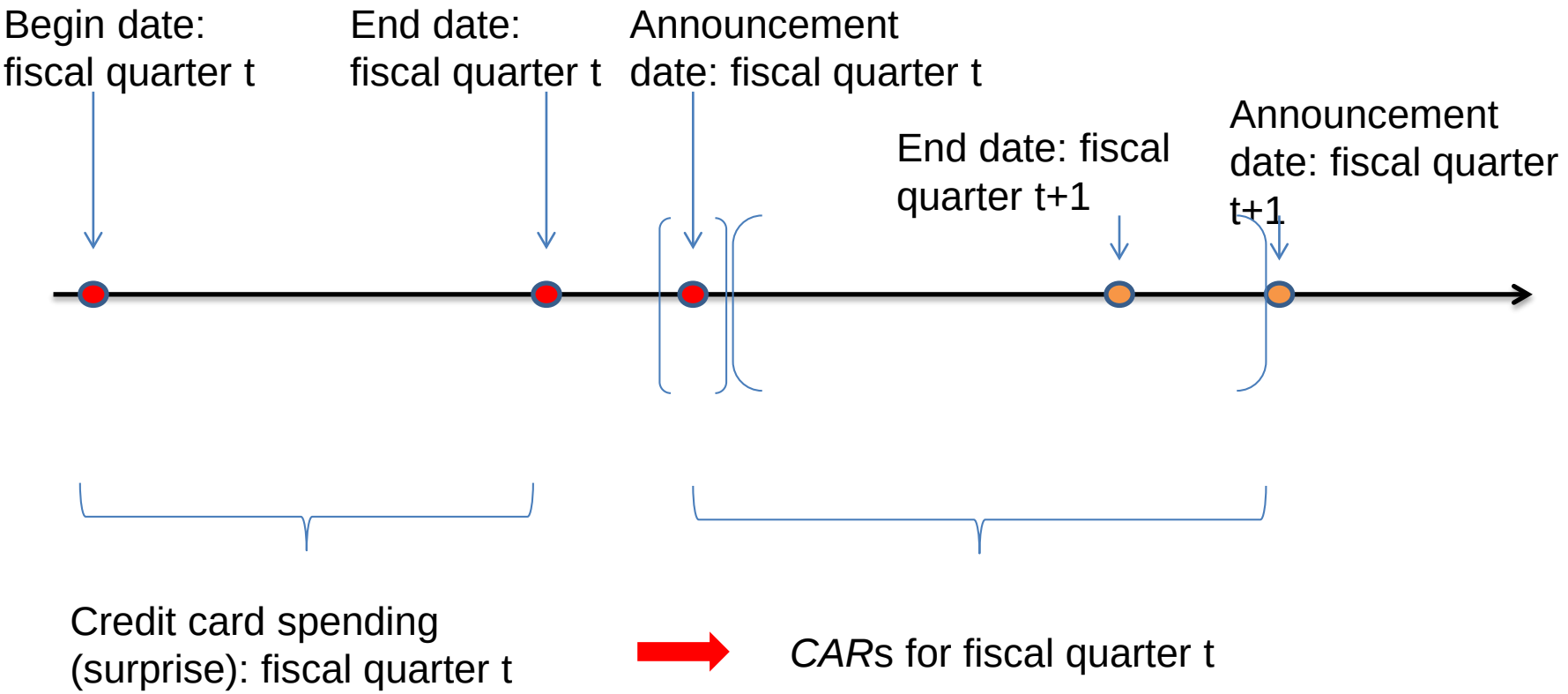
$$SUE_{in} = \frac{EPS_{in} - EPS_{in-4}}{P_{in}}$$

  - *CAR*s: buy-and-hold *CAR* using 6 Size×B/M benchmark portfolio returns

$$CAR[+2,+61]_{in} = \prod_{k=t+2}^{t+61}(1+R_{ik}) - \prod_{k=t+2}^{t+61}(1+R_{pk})$$

Time Frame

- Speed of price adjustment
  - Direct access → fast
  - Imperfect and indirect signals → costly & slow



Customer Spending & Firm Cash Flows

	Sale ($thousand)	Net income ($thousand)
	(1)	(2)
Total credit card spending	25.096***	1.239***
	(4.98)	(3.57)
Constant	506,913***	31,081***
	(5.28)	(4.13)
Industry FE	Y	Y
Year-quarter FE	Y	Y
Observations	1,510	1,510
R-squared	0.45	0.27

Methodology

- Regression

$$CAR_{ikq} = \beta QSUS_{ikq} + \theta QSUE_{ikq} + \varphi QSU\_Sale_{ikq} + \phi X_{ikq} + \delta_k + \upsilon_q + \epsilon_{ikq}$$

  – Controls:
    - Firm size (market capitalization), book-to-market ratio, number of analysts following, and reporting lag;
    - Industry fixed effect & Year-quarter fixed effect

  – Expect:
    - β> 0

Spending Surprise and *CAR*s

	CAR[-1,+1] (1)	CAR[+2,+61] (2)
QSUS	0.224*	1.161***
	(1.68)	(3.36)
QSUE	0.890***	2.413***
	(5.81)	(4.70)
QSU_Sale	0.635***	-0.284
	(3.64)	(-0.70)
Controls	Y	Y
Industry FE	Y	Y
Year-quarter FE	Y	Y
Observations	1,472	1,472
R-squared	0.08	0.13

Customer Demand Sustainability

- More sustainable customer demand → stronger return predictability

- Customers with high purchase power → stronger profit-generation potential

- High-spending capacity customers: Higher (quarter-beginning) consumer credit
  - *FICO score*, or *internal behavior score*

Customer Spending Capacity

	More spending from High credit customers		Less spending from High credit customers	
High *FICO score* as high spending capacity				
	(1) CAR[-1,+1]	(2) CAR[+2,+61]	(3) CAR[-1,+1]	(4) CAR[+2,+61]
QSUS	0.434*	1.489**	-0.042	0.574
	(1.71)	(2.66)	(-0.18)	(0.75)
High *internal behavior score* as high spending capacity				
QSUS	0.277	1.505**	0.029	1.107
	(1.12)	(2.52)	(0.13)	(1.60)

Customer Demand Sustainability

- Diversified customer base → better endure demand shocks & more stable cash flows

- Three dimensions of customer base diversity
  - Age, region, or rural-urban

$$HHI\ age_{inq} = spending\ percent\_young_{inq}^2 + spending\ percent\_middle_{inq}^2 + spending\ percent\_old_{inq}^2$$

Customer Base

	Diversified customer base		Concentrated customer base	
	(1) CAR[-1,+1]	(2) CAR[+2,+61]	(3) CAR[-1,+1]	(4) CAR[+2,+61]
Age diversity				
QSUS	-0.175	1.982***	0.388*	0.773
	(-0.92)	(3.43)	(1.77)	(1.01)
Region diversity				
QSUS	0.188	2.073***	0.506**	0.435
	(0.82)	(3.46)	(2.44)	(0.84)
Rural-urban diversity				
QSUS	0.030	2.162***	0.427*	0.413
	(0.15)	(3.95)	(1.72)	(0.50)

Consumer vs. Non-consumer-oriented

- Customer credit card spending should be more informative if retail customers are more pertinent

- Consumer-oriented firms
  - Retail Trade division (two-digit SIC: 52-59), Service division (two-digit SIC: 70-89), Transportation & Public Utilities division (two-digit SIC: 40-49)

Consumer vs. Non-consumer-oriented

	Consumer-oriented firms		Non-consumer-oriented firms	
	(1) CAR[-1,+1]	(2) CAR[+2,+61]	(3) CAR[-1,+1]	(4) CAR[+2,+61]
QSUS	0.207	1.812***	0.233	0.564
	(1.08)	(3.33)	(1.24)	(1.21)
QSUE	0.800***	2.281***	1.074***	2.805***
	(3.35)	(5.06)	(4.78)	(3.15)
QSU_Sale	0.955***	-0.189	0.281	-0.629
	(3.65)	(-0.44)	(1.32)	(-0.93)
Observations	752	752	720	720
R-squared	0.08	0.11	0.10	0.16

Predicting Earnings/Sales Surprise

	QSUE in quarter t+1	*QSU_Sale* in quarter t+1
	(1)	(2)
QSUS	0.058**	0.039*
	(2.27)	(1.86)
QSUE	0.328***	-0.046**
	(9.67)	(-2.01)
QSU_Sale	0.027	0.619***
	(1.16)	(22.96)
Observations	1,482	1,482
R-squared	0.24	0.45

COMPUSTAT Customer Data

- To what extent are the return predictability attributable to the proprietary nature of our data?

- Customer-segment data in COMPUSTAT
  - SFAS No.14 & No.131, end of 1976: US firms are required to report sales to large customers if ≥ 10% sales
  - Observe sales by the large customers and some (limited) information about their characteristics
  - Less granular and not ideal, but purely public information

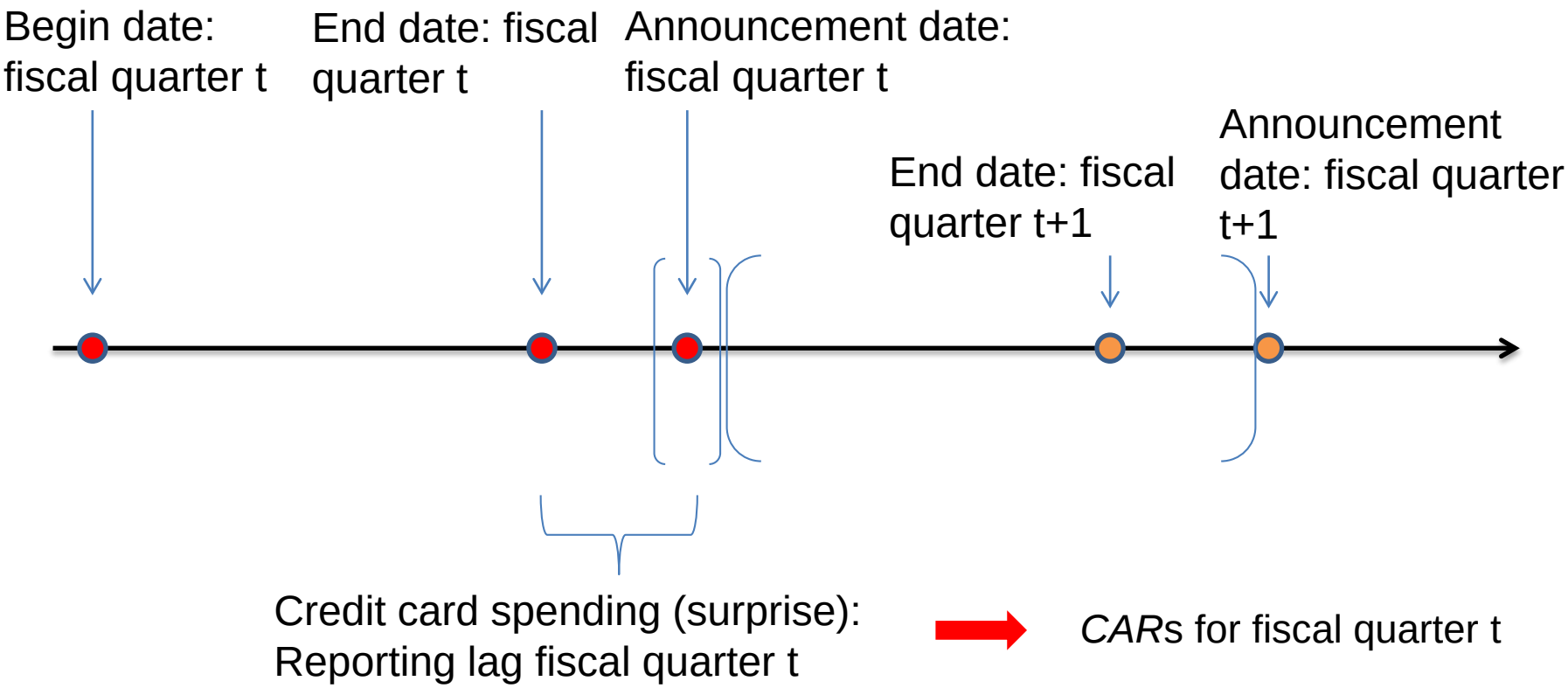
- We focus on:
  - Non-consumer-oriented firms in 1977-2014, annual
  - Do not observe actual end customer purchases, so rely on customer characteristics
    - Diversity: proportion of sales to large customers
    - Quality: sales to government or repeated large customers

Public Large Customer Information

	Customer Diversity		Customer quality			
	(1)	(2)	(3)	(4)	(5)	(6)
	CAR[-1,+1]	CAR[+2,+61]	CAR[-1,+1]	CAR[+2,+61]	CAR[-1,+1]	CAR[+2,+61]
Q_Diversity	0.046**	0.132**				
	(2.40)	(2.38)				
Q_Government sale pct			0.075***	0.316***		
			(2.67)	(4.20)		
Q_Repeat sale pct					0.075***	0.326***
					(3.46)	(5.10)
Large customer sale (%)			-0.524***	-2.204***	-0.653***	-2.770***
			(-4.08)	(-5.89)	(-4.59)	(-6.72)

Alternative Explanations

- Sales during the reporting lag?



Sales During Reporting Lag

	(1) CAR[-1,+1]	(2) CAR[+2,+61]	(3) CAR[-1,+1]	(4) CAR[+2,+61]
QSUS			0.239	0.980**
			(1.49)	(2.24)
QSUS (reporting lag)	0.084	0.837**	-0.031	0.368
	(0.50)	(2.10)	(-0.15)	(0.76)
QSUE	0.885***	2.382***	0.890***	2.404***
	(5.74)	(4.60)	(5.73)	(4.65)
QSU_Sale	0.629***	-0.316	0.636***	-0.290
	(3.62)	(-0.78)	(3.66)	(-0.71)
Observations	1,472	1,472	1,472	1,472
R-squared	0.08	0.12	0.08	0.13

Alternative Explanations

- Spending surprise might capture the effect from known factors associated with *PEAD*
  - Earnings quality (Francis et al., 2007; Hung, Li, and Wang, 2014)
    - Earnings properties: earnings persistence and earnings volatility
  - Institutional investors (Bartov, Radhakrishnan, and Krinsky, 2000)
    - Percentage of institutional ownership
  - Distraction (Francis, Pagach, and Stephan, 1992; DellaVigna, and Pollet, 2009; Hirshleifer, Lim, and Teoh, 2009)
    - Number of concurrent earnings announcements

Robustness

- Alternative definitions of spending, sales, and earnings surprises
  - Asset-scaled spending surprise
  - Control for industry-level adjusted sales
  - Other definitions of earnings surprise:
    - Analyst forecast-based earnings surprise
    - Regression residual of EPS in quarter *t* on EPS in quarters *t-1, t-4*, and *t-8*
    - 3-day *CAR* as earnings surprise

- Alternative benchmarks to calculate *CARs*
  - FF 25 size×B/M portfolio return (Hirshleifer, Lim, and Teoh, 2009)
  - Value-weighted market return (Hung, Li, and Wang, 2014)
  - 125 size×B/M×Momentum DGTW portfolio return

- Alternative industry definitions
  - NAICS (3-digit)
  - Fama-French 48 industries

Summary & Conclusion

- Customer spending surprise within a fiscal quarter conveys additional value-relevant information about a firm's profitability and growth potential

- The information is attributable to two sources:
  - Direct customer spending is a precise measure of customer demand
  - Indicators for customer demand sustainability

- Predictive of future earnings and sales surprises

- Return predictability for both consumer-oriented and non-consumer-oriented firms

Thank You

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