Payment Diaries: Innovative Measurement of Household Behavior

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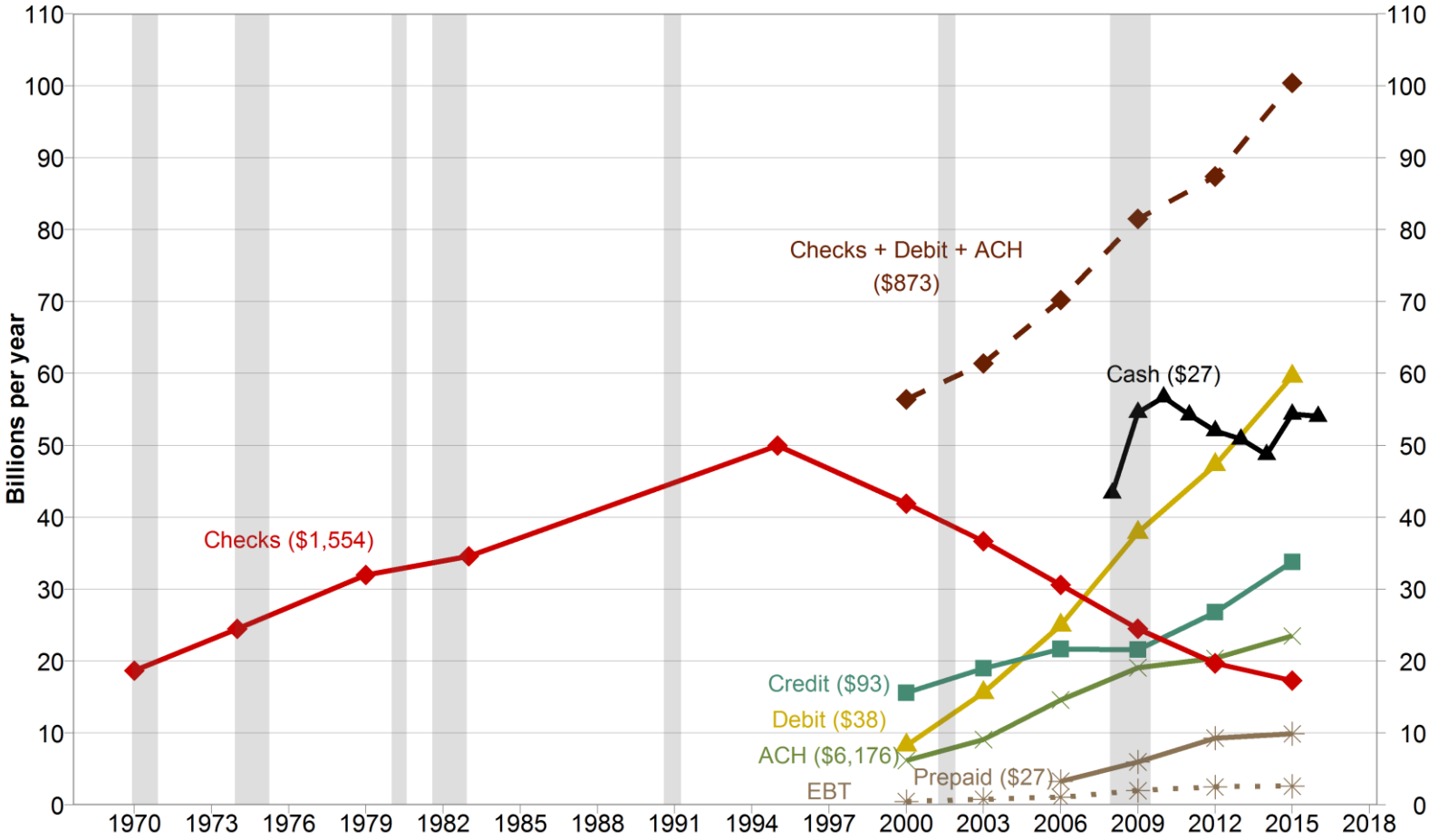
Overview

- Review of U.S. payment system
- Boston Fed payment survey and diary
- Innovations in measurement:
  1. More precision (recall vs. recording)
  2. Broader scope (income and consumption)
  3. Better integration (household financial accounting)
- Overview of research opportunities
- Implications for future data collection

Review of U.S. Payment System

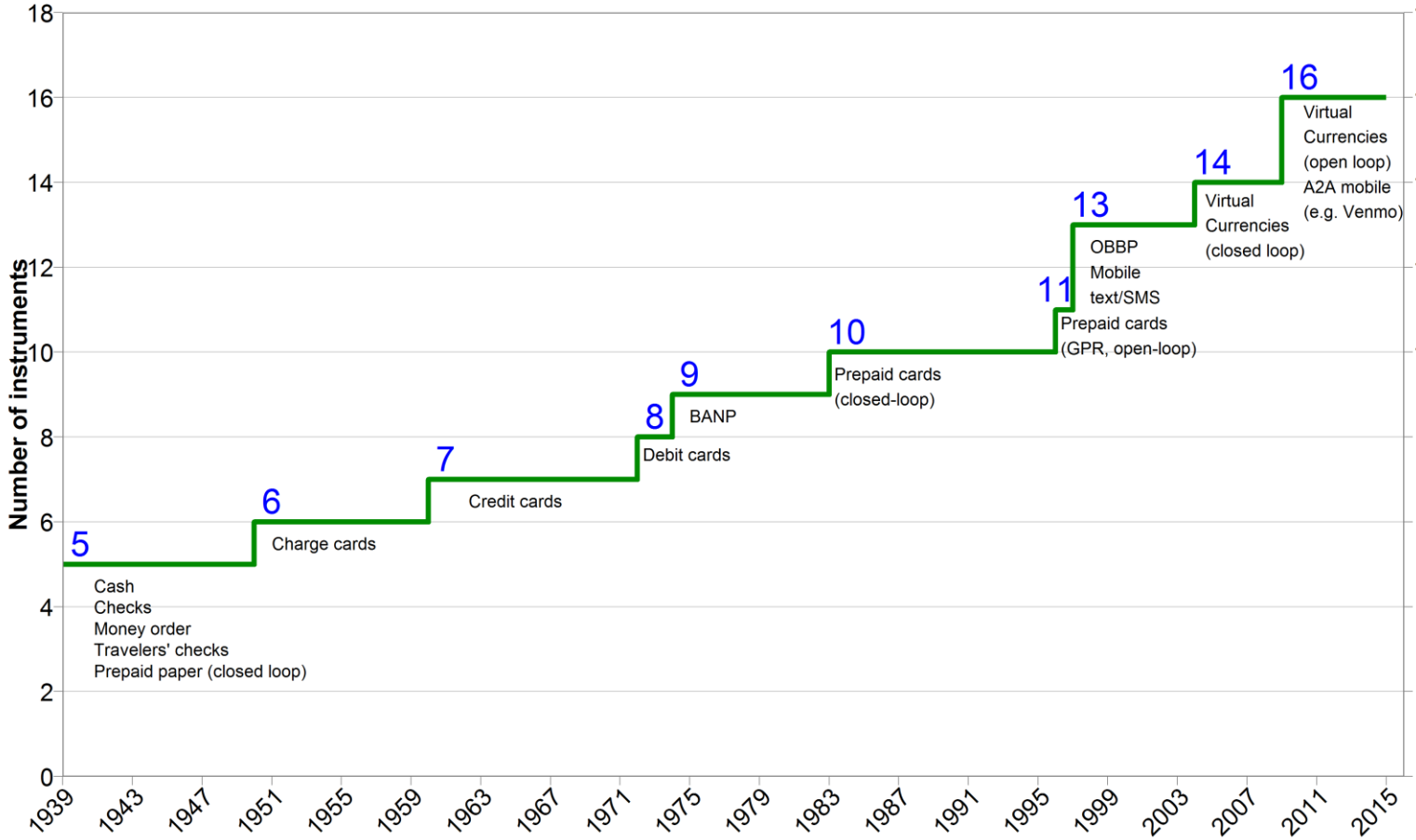
Transformation of U.S. Noncash Payments: From *checks* to electronics (#)



Source: Federal Reserve Payment Study (FRPS), Survey of Consumer Payment Choice (SCPC).
Cash numbers are consumer only, and Bitcoin numbers are worldwide based on blockchain.info.

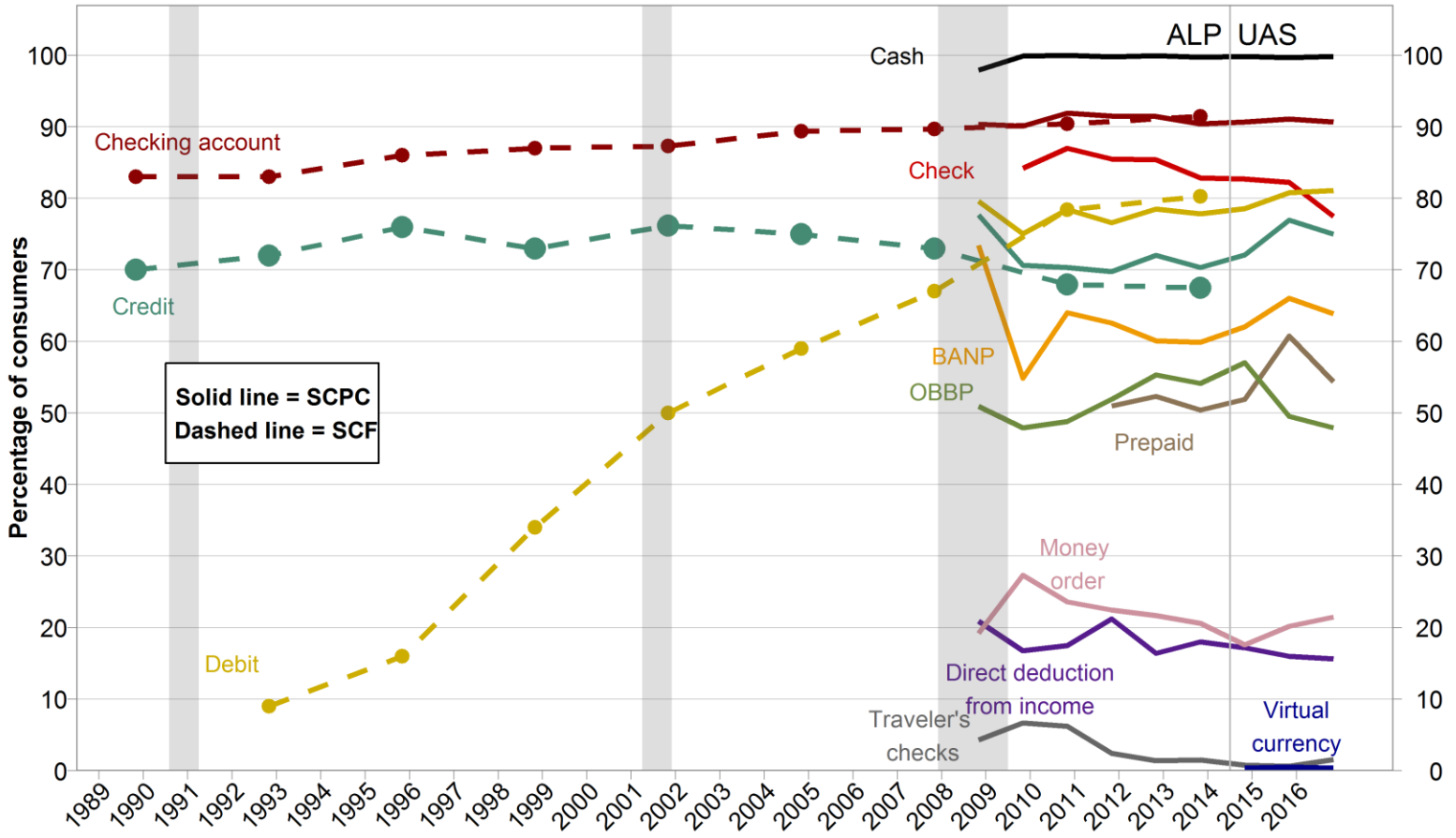
Availability of payment instruments

Increasingly, U.S. consumers have more payment instruments to choose



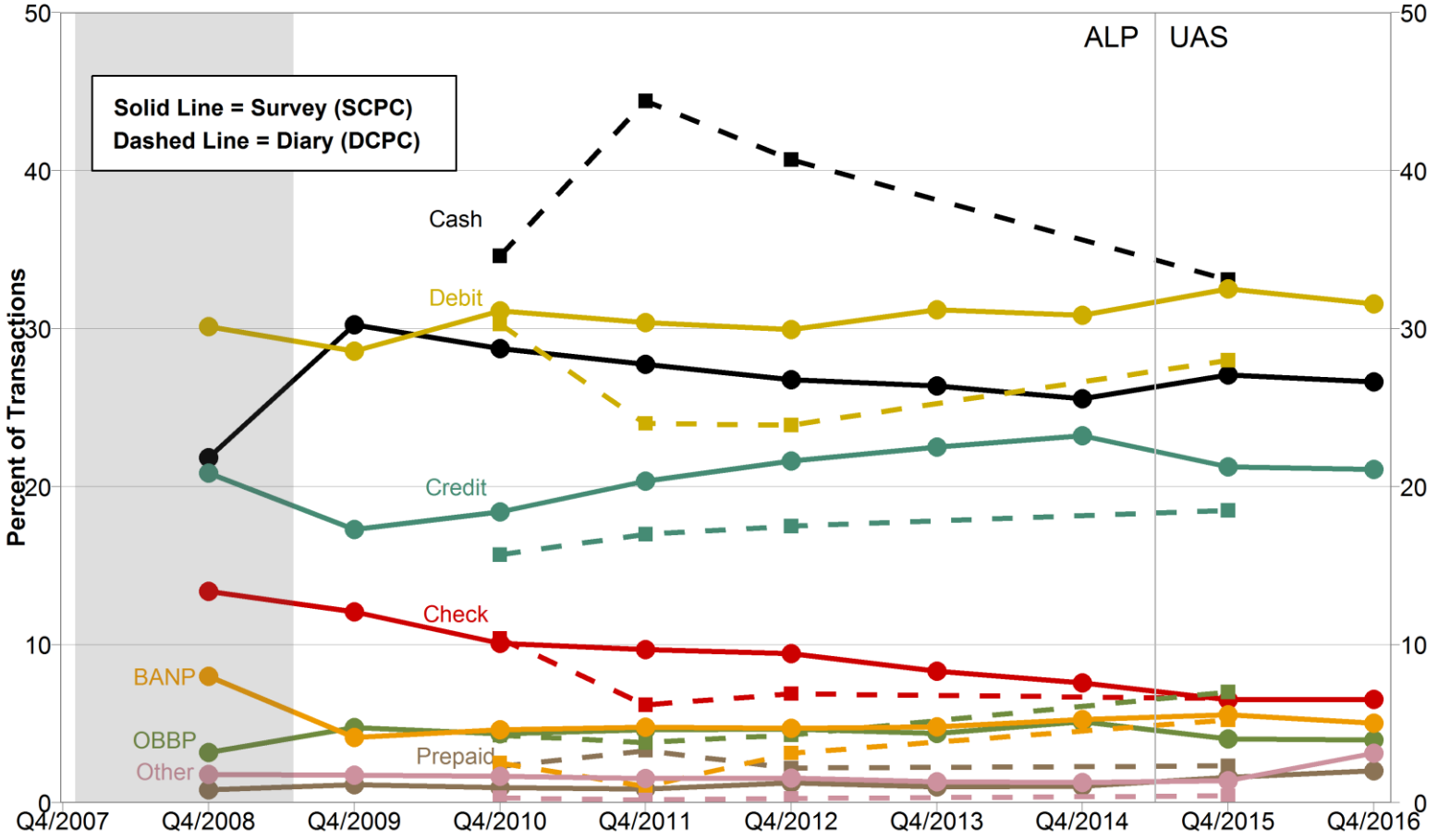
Source: Author's research.

Consumer adoption of payment instruments



Source: 2008-2016 Survey of Consumer Payment Choice (SCPC), 1989-2013 Survey of Consumer Finances (SCF).

Consumer use of payment instruments



Source: 2008-2016 Survey of Consumer Payment Choice (SCPC), 2010-2015 Diary of Consumer Payment Choice (DCPC).

Boston Fed Payment Survey and Diary

Table 1 – Overview of U.S. Surveys

	CE-S	CE-D	SCF	FCS	SCPC	DCPC
Sponsor	BLS	BLS	Federal Reserve Board	RAND Corp.	Boston Fed	Boston Fed
Frequency	Quarterly	Monthly	Triannual	Monthly	Annual	Irregular
Period	1980-present	1980-present	1983-present	2008-2014	2008-present	2012, 2015
Questionnaires						
Response units	Consumer units	Consumer units	Primary economic unit	Households	Consumers (ages 18+)	Consumers (ages 18+)
Mode(s)	Interview (CAPI)	Memory aid & interview	Interview (CAPI)	Internet (unaided)	Internet (unaided)	Memory aids & Internet
Data collection	Recall	Recording & recall	Recall	Recall	Recall	Recording & recall
Minutes	60	235 = (15/day x 14 days + 25)	85	30?	30	60 = 20/day x 3 days
Incentive	$0	$0	$50-$300	$20	$20	$60
Measurement						
Unit(s) of measure	$ amount per category	$ amount per item purchased	$ amount per category	$ amount per category	# of payments by instrument & category	$ amount per payment; # of payments
Measurement period	"Usual" week, month, or quarter (varies by category)	Daily expenditures	"Average" week for expenditures, past year for income	Past month or quarter (varies by category)	"Typical" week, month, or year (respondent chooses)	Daily payments
Real-time error checks	None[48]	N/A	Real-time reconciliation by interviewer	Reconciliation screen at end of survey	Selected range checks	Reconciliation screens for selected data entries
Sampling						
Population	Total Non-institutional	Total Non-institutional	Total Non-institutional	Age 18+ Non-institutional	Age 18+ Non-institutional	Age 18+ Non-institutional
Frame	Internal	Internal	Internal	ALP	ALP, UAS, GfK	ALP, UAS, GfK
Sample size	~7,000	~7,000	~6,000	~2,500	~2,000	~2,000
Rotation	1 survey per quarter	2 consecutive 1-week periods	1 survey per year	Voluntary longitudinal panel	1 survey per year	3 consecutive days, random assignment
Longitudinal panel	4 consecutive quarters	14 days	None	Voluntary ongoing participation	Voluntary participation since 2008	3-day waves tied to SCPC annual panel

CE-S: http://www.bls.gov/CE/capi/2015/cecapihome.htm
CE-D: http://www.bls.gov/CE/ced/2013/cedhome.htm
FCS: http://www.nber.org/papers/w17974
SCPC: http://www.bostonfed.org/economic/cprc/scpc/
DCPC: https://www.bostonfed.org/economic/cprc/data-resources.htm
SCF: https://www.federalreserve.gov/econresdata/scf/scfindex.htm

[48] BLS experimented with cash-flow reconciliation but did not implement it (Fricker *et al*, 2012).

Survey and Diary design, 2012 & 2015

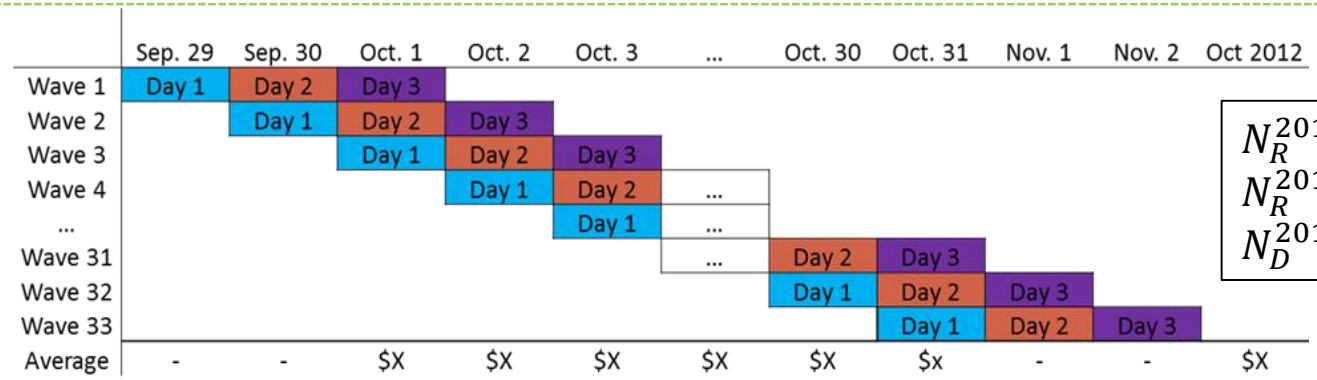
SCPC	Day Before 2015	Recording—3 Days	
		Payments	Accounts
Some complete SCPC before DCPC **All complete SCPC before DCPC** Assessment, adoption, use of payment instruments Adoption of bank & nonbank accounts Cash balances **Checking balances** **Underbanked** **Virtual currency**	**Account ownership** **Cash balances on person & elsewhere** **Checking, GPR prepaid, PayPal balances** **$ value & timing of income receipt** **Payment preferences (by transaction type)**	Date, time, $ value, payment instrument, in person/not in person, device, payee 45 payee types **9 payee categories with follow-ups to further classify** **Follow-up questions appropriate to payee** **More follow-up questions based on payment instrument** **Timeliness of bill payment**	Cash balances on person **& elsewhere** Cash deposits to checking account **Other deposits to checking account (including income)** Cash withdrawals **Other withdrawals** **Transfers between accounts**
	Night Before 2012	Special Modules 2015	
	Opening cash balance on person Timing of income receipt Payment preference (general)	**Day 1: Emergency savings** **Day 3: Bill payment (41 types)**	

SCPC 2012

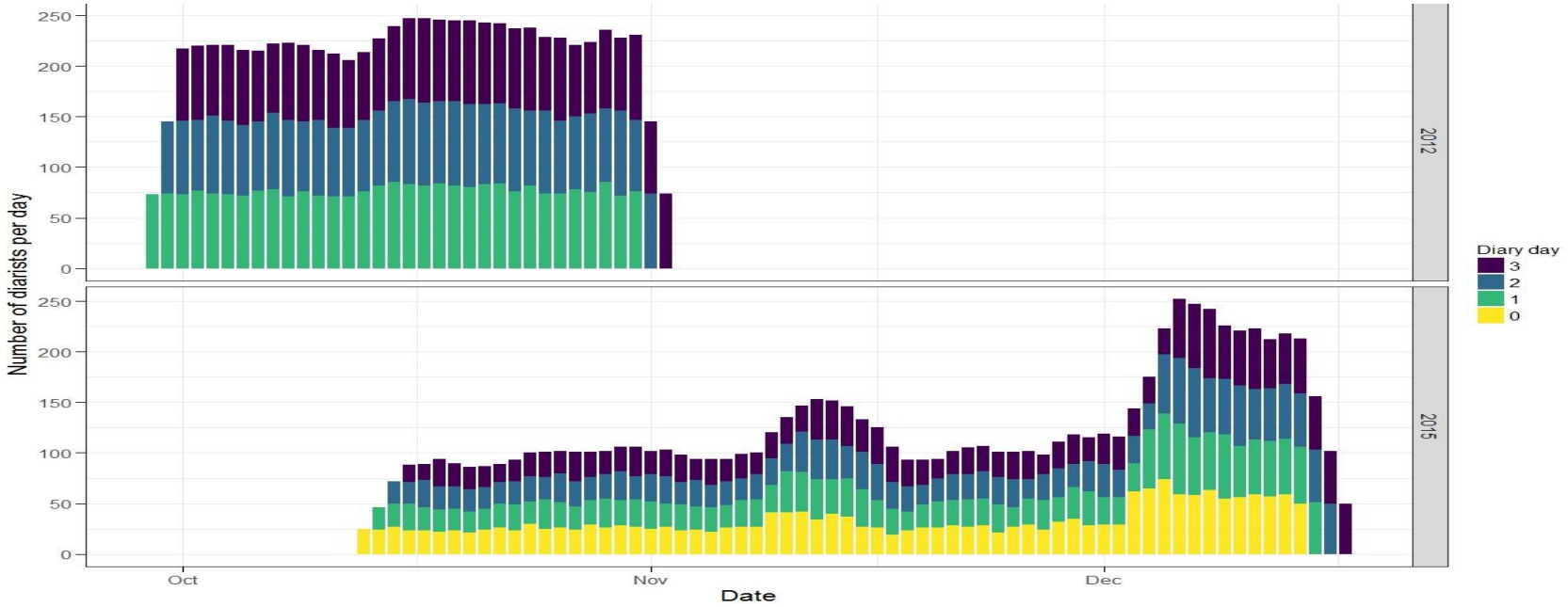
Some complete SCPC after taking DCPC

2015 additions and enhancements in **bold.**

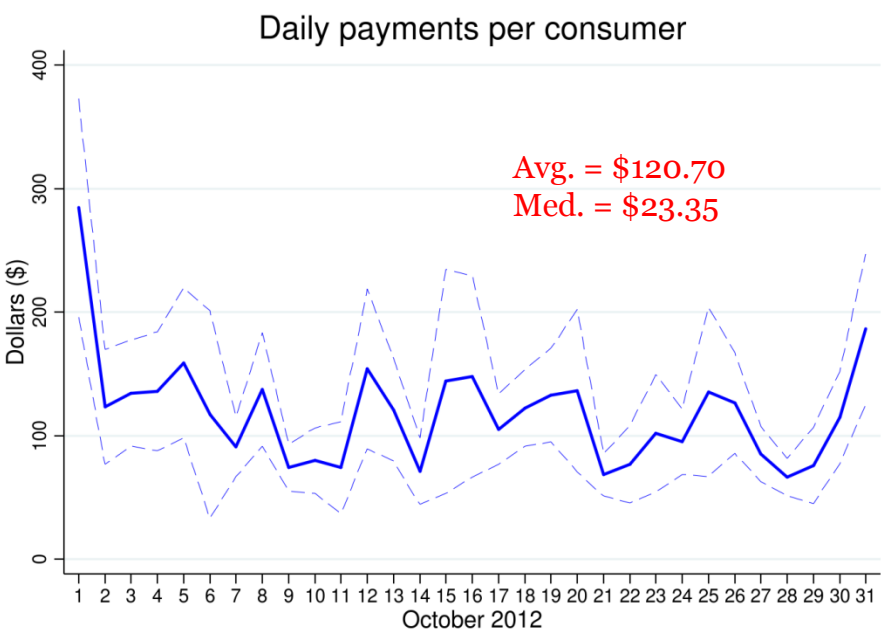
Diary implementation, 2012 & 2015

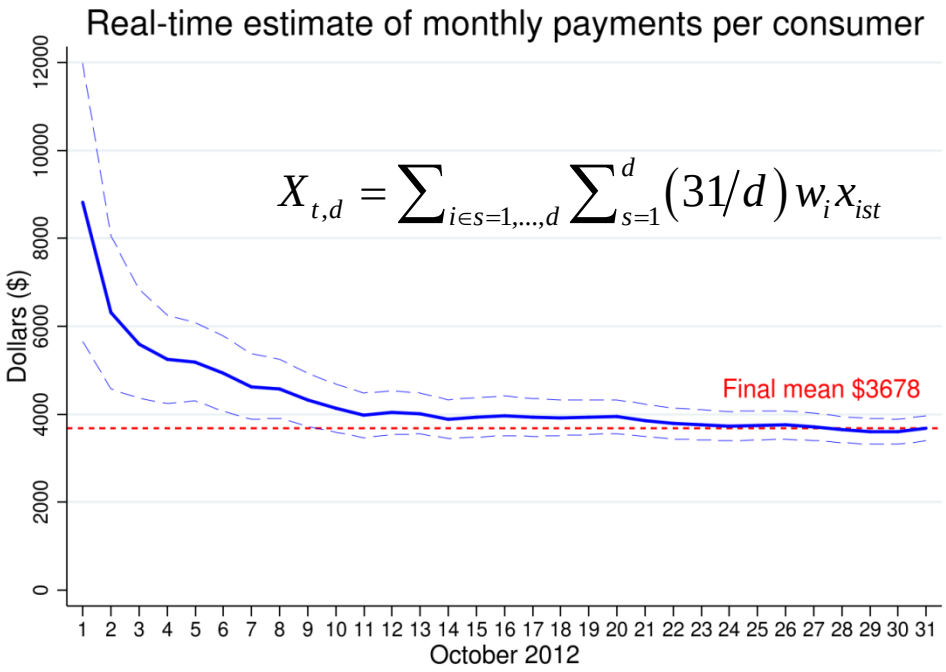


$$N_R^{2012} = N_D^{2012} = 2{,}468$$
$$N_R^{2015} = 1{,}392$$
$$N_D^{2015} = 1{,}901$$



Diary payments data, Oct 2012



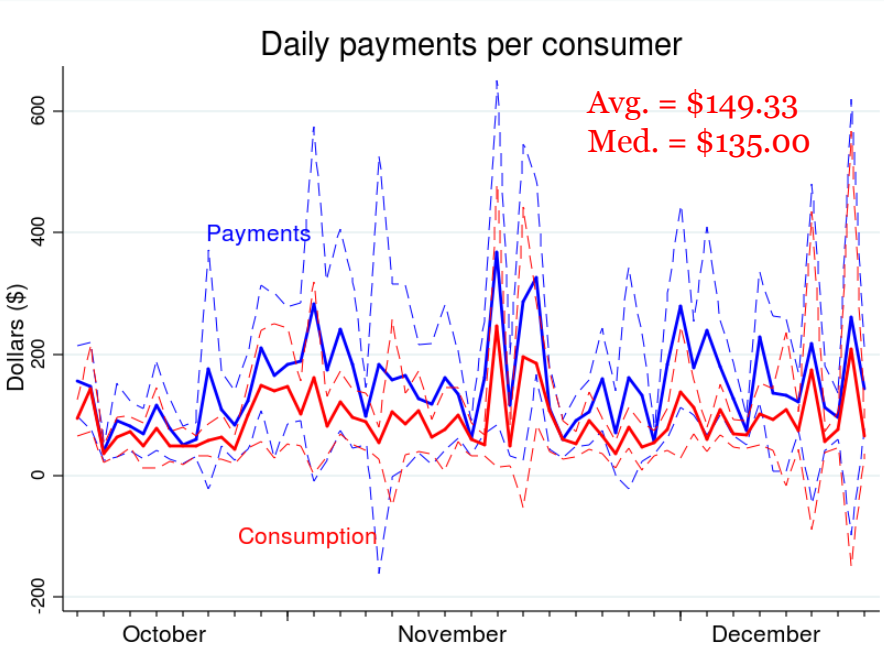


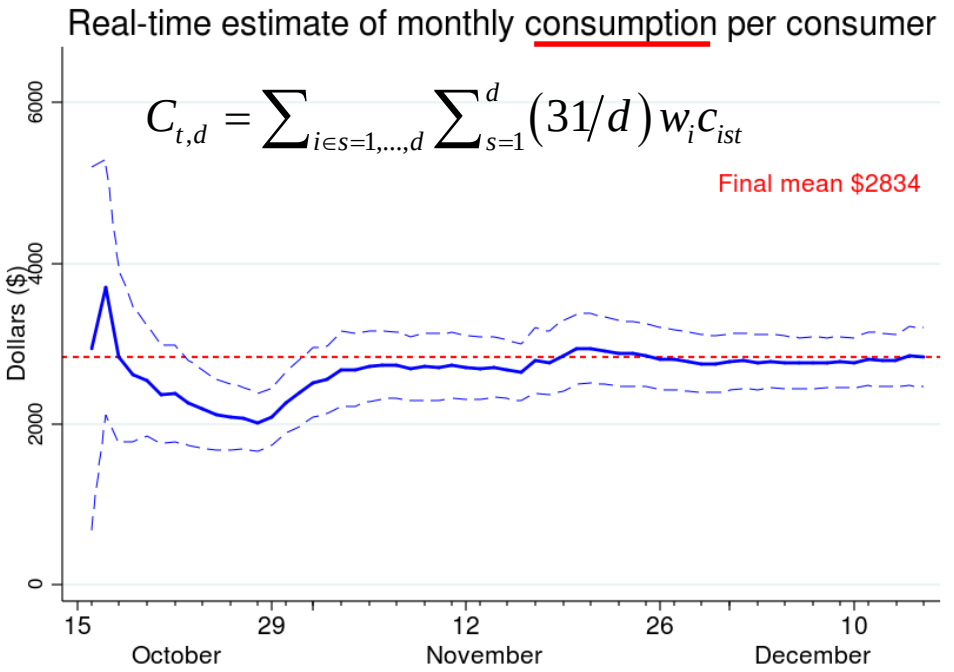
Rough calculations of *average* annual income:

- 12 x $3,678 = $44,136 = per *consumer*
- 2.01 x $44,136 = $88,713 = per *household* (SCF = $84,200)

Source: Schuh (2017) and author's calculations.

Diary payments data, Oct-Dec 2015





Rough calculations of *average* annual income:

- 12 x $2,834 = $34,008 = per *consumer*
- 2.01 x $34,008 = $68,356 = per *household* (CE 2015 = $55,978)*
- Average MPC ($68,356/$84,200)** = 81.2% (NIPA 2015 = 79.3%)

Source: Schuh (2017) and author's calculations.

*CE reports consumer units, which are roughly comparable to a household

** Income estimate from 2013 SCF

Measurement Innovation #1: More precision

Data collection – surveys

CE-S Method of Collecting Consumer Expenditures

Section 20, Part A asks for expenditure estimates for groceries, cigarettes, alcoholic beverages, and meals away from home.

IMPORTANT: The Census Bureau does not release to the Bureau of Labor Statistics any confidential information such as names and addresses. This information is only used during the course of the interview.

Now I am going to ask about expenses for food, beverages and other items you and/or your household have/has purchased since the first of the reference month.

What has been your or your household usual WEEKLY expense for grocery shopping?

Include grocery home delivery service fees and drinking water delivery fees. [enter value] _____

About how much of this amount was for nonfood items, such as paper products, detergents, home cleaning supplies, pet foods, and alcoholic beverages? [enter value] _____

Other than your regular grocery shopping already reported, have you or any members of your household purchased any food or nonalcoholic beverages from places such as grocery stores, convenience stores, specialty stores, home delivery, or farmer's markets?
Yes
No

(Continued…)

Source: Schuh (2017)

FCS Method of Collecting Consumer Expenditures

Food, beverages and gasoline

Please provide your best estimate of how much in total your household spent in the following categories. Please include spending by all members of your household, that is, by you and anyone living with you. Even if the amount your household spent last calendar month was unusual, please report that amount.

	Amount spent last month		No money spent on this last month
Food and beverages: *food and drinks, including alcoholic, that you buy in grocery or other stores*	$ .00	**OR**	☐
Dining and/or drinking out: *items in restaurants, cafes, bars and diners, including take-out food*	$ .00	**OR**	☐
Gasoline	$ .00	**OR**	☐
Other transportation expenses: *parking, tolls, public transport, taxi and similar (please exclude spending on trips and vacations)*	$ .00	**OR**	☐

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RAND American Life Panel

Data collection – diaries

CE-D Method of Collecting Consumer Expenditures

EXAMPLE | SUN | MON | TUE | WED | THU | FRI | SAT

1. Food and Drinks Away from Home

Examples: breakfast buffet, carry-out lunch, dinner & cocktails at restaurant; pizza delivery, Chinese takeout, child's school lunch; beer at happy hour, pretzels at ballgame, wine at tavern; croissant from café, ice cream from truck, wedding reception caterer; soda from vending machine, hot dog from convenience store, popcorn and soda at movies

Please unfold the LEFT FLAP to see Additional Examples

Include tax & tip for part 1 only.

	Mark (X) one that best describes the type of meal: breakfast	lunch	dinner	snack/other	Description (See examples above and on the flap)	Mark (X) one that best describes where you made this purchase: Fast Food Take-out Delivery Concession	Full Service Places	Vending Machines or Mobile Vendors	Employer or School Cafeteria	Total Cost with tax & tip	If alcoholic beverages included, mark (X) all that apply: wine	beer	other	Enter the total cost of the alcohol
101	X				bagel, juice				X	2 79				
102		X			pizza	X				5 57				
103				X	coffee	X				1 35				
104		X			sandwich, soda				X	5 15				
105				X	chips			X		70				
106		X			elem.school lunch - month				X	45 00				
107				X	soda			X		65				
108			X		buffet		X			62 23	X			12 00
109				X	drinks from cash bar		X			15 00		X	X	15 00
110			X		caterer - Family Reunion		X			350 00	X	X	X	95 00
111														
112														
113														
114														
115														

Level of detail needed: briefly describe the meal.

If alcohol was included in the purchase, mark whether it was wine, beer, and/or other and enter the total cost of the alcohol.

EXAMPLE

Source: Schuh (2017)

DCPC Method of Collecting Consumer Expenditures

DAY 1 – DAILY PAYMENTS AND CASH ACTIVITY

- It's OK if you don't make any purchases today. Just tell us when you go online tonight. We're interested in all types of payment behavior, even 0 purchases.
- We will ask you about any bills and cash deposits online.
- Please write today's date in the space provided

10 / 15 / 2012

Please circle the Payment Method codes to tell us what you carried out of the house today.	P1 P2 P3 P4/P5 P6 P9 P10	I did not leave the house today. ☐

Time	Amount Spent	Payment Method	Location	Device	Merchant Type	Merchant Name
am/pm	$_____.__	P	L	D	M	
am/pm	$_____.__	P	L	D	M	
am/pm	$_____.__	P	L	D	M	

Payment Method Codes

P1: Cash	P7: Bank account number payment
P2: Check	P8: Online banking bill payment
P3: Credit card	P9: Money order
P4: Debit card (Used PIN)	P10: Traveler's check
P5: Debit card (Did not use PIN)	P11: Text message payment
P6: Prepaid/Gift/EBT card	P12: Other payment method

Location Codes

L1: Payment in person	L2:Payment not in person

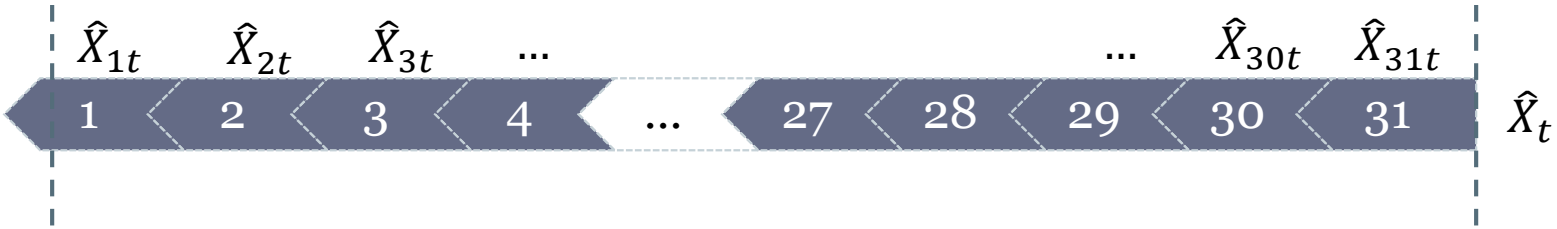
Device Codes

D1: Computer (laptop or desktop)	D4: Landline phone
D2: Tablet (e.g., iPad, Kindle)	D5: Mail or delivery service
D3: Mobile phone	D6: None of the above

Recall vs recording, Oct 2012

- **TTMS (2001 to present):** *"Since the last interview* [one month ago]*, have you or members of your household made any cash purchases any* [sic] *of the items in this category? If yes, what is the total amount that you and members of your household have spent on the items in this category since the last interview."*

DCPC (October 2012)



Recall ***Recording***

$$\hat{X}_t \leq \sum_{d=1}^{31} \hat{X}_{dt}$$

- **TTMS (2017 and beyond):** Efforts to implement daily cash recording are in progress….

Consumer expenditure estimates, Oct. 2012

Category	DCPC	CE			FCS
		Total	Diary	Survey	
Total (million $) **[95% CI], (percent of DCPC)**	**10,770** **[8699, 12842]**	**6,400** **(.59)**	**1,626** **(.15)**	**4,774** **(.44)**	**4,863** **(.45)**
Food, general merchandise, personal care supplies and services	**3,039** [2781, 3269]	**1,241** (.41)	**1,024** (.34)	217 (.07)	1,080 (.36)
Housing and home services	2,950 [2514, 3386]	2,101 (.71)	136 (.05)	1,965 (.67)	2,267 (.77)
Transportation	1,347 [967, 1727]	1,120 (.83)	140 (.10)	979 (.73)	755 (.56)
Entertainment and recreation	249 [188, 310]	318 (1.28)	94 (.38)	224 (.90)	174 (.70)
Healthcare	341 [233, 448]	442 (1.30)	212 (.62)	230 (.68)	242 (.71)
Financial services	1,095 [710, 1480]	696 (.64)	0 (.00)	696 (.64)	84 (.08)
Education	110 [60, 160]	150 (1.37)	6 (.06)	144 (1.31)	155 (1.41)
Charity, personal contributions	406 [121, 690]	238 (.59)	0 (.00)	238 (.59)	105 (.26)
Other/unknown goods and services	1,243 [927, 1542]	94 (.08)	13 (.01)	81 (.07)	0 (.00)

Source: Schuh (2017)

Measurement Innovation #2: Broader scope

Theory: income vs. payments

Income $Y = C + T + S$

Payments $X = X^C + X^T + X^S$

1. Sales tax $X^C = \left(1 + \tau^c\right) C \qquad X^T = T - T^c = T$

2. Saving payments
(from income or deposits) $X^S = S - S$

Difference $Y - X = S =$ unmeasured ΔNet worth

Measurement issues

(1) Income (NIPA), payments (DCPC) estimated differently

$$Y = Y - \mu^y \qquad X = X - \eta^x \qquad \left|Corr(\mu^y, \eta^x)\right| < 1$$

(2) Income omits undocumented payments

$$Y = \left(Y - X^u\right) - \mu^y \quad \text{and} \quad Y - X = \left(S - X^u\right) + \left(\eta^x - \mu^y\right)$$

(3) Payments (*Recorded*) omit 3rd party expenditures

$$X^{C_R} = X^{C} - X^{C_3} \quad \text{and same for} \quad X^{T_R}, X^{S_R}$$

(4) Bill payments are poorly estimated

(1) Undercounted (8 in DCPC vs. 22 in SCPC)

(2) Total spending, not components (e.g. PITI)….*but still included*

Measurement: disposable income vs. payments

$$Y^d = Y - T \qquad Y^d = Y^d + T^c - Y^{X_3}$$

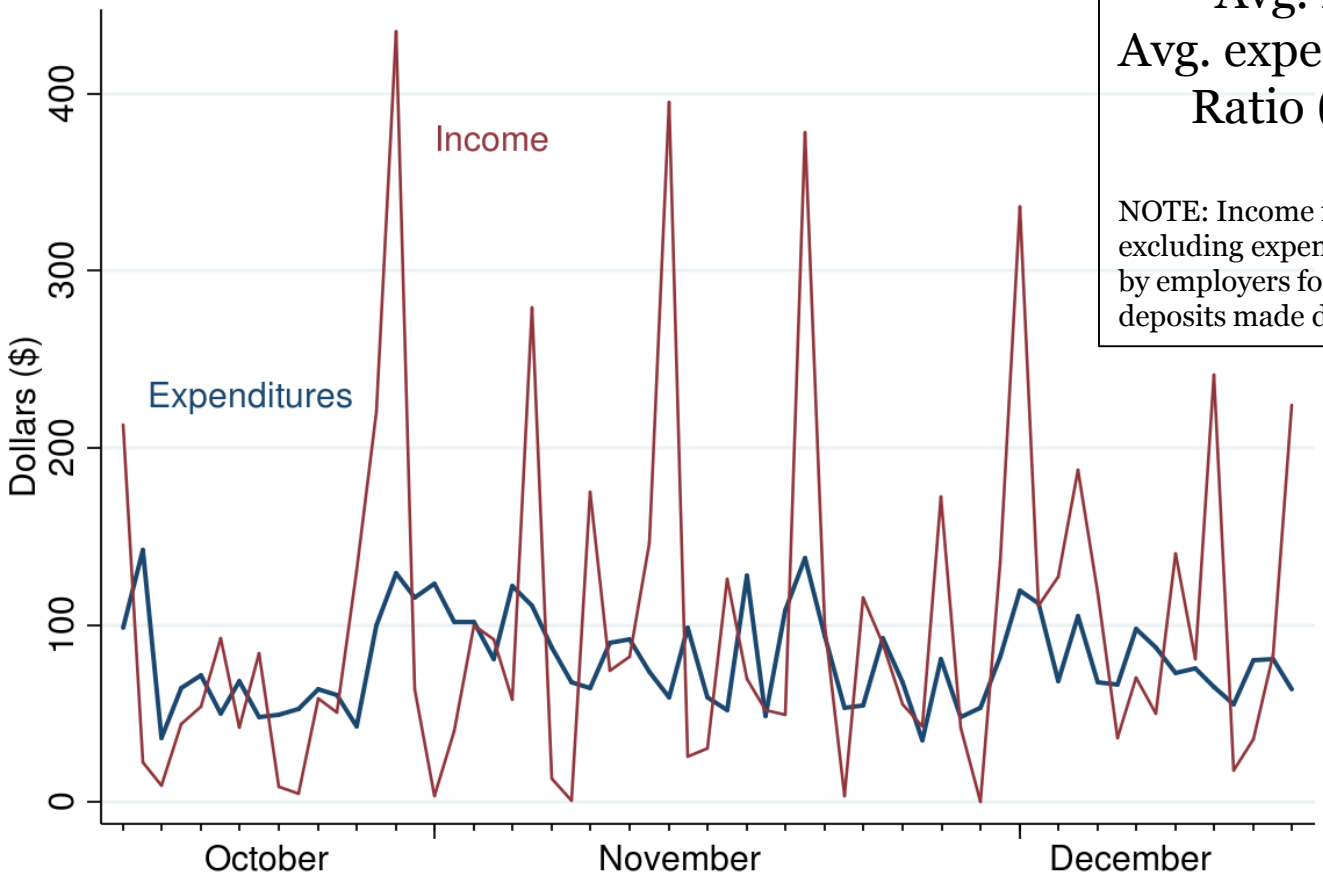
$$X^d = X - X^T \qquad X^d = X^d - X^{T_R} - X^u$$

(Adjusted for comparability)

Source	$ trillions
Disposable personal income (NIPA, 2012 Q4)	12.4
Excl. Supplements to wages and salaries	1.7
Excl. Medicare and Medicaid	1.0
Incl. Sales Taxes	0.5
Adjusted disposable personal income (ADPI)	**10.2**
Consumer payments, October 2012 (annualized)	11.2
Less: Taxes/fees/other payments made to government	0.2
Less: Person-to-person payments	0.3
Adjusted DCPC payments (2012)	**10.7**
Percent of ADPI	(105)

Source: Schuh (2017)
Note: numbers may not sum properly due to rounding.

Direct measurement of income, 2015



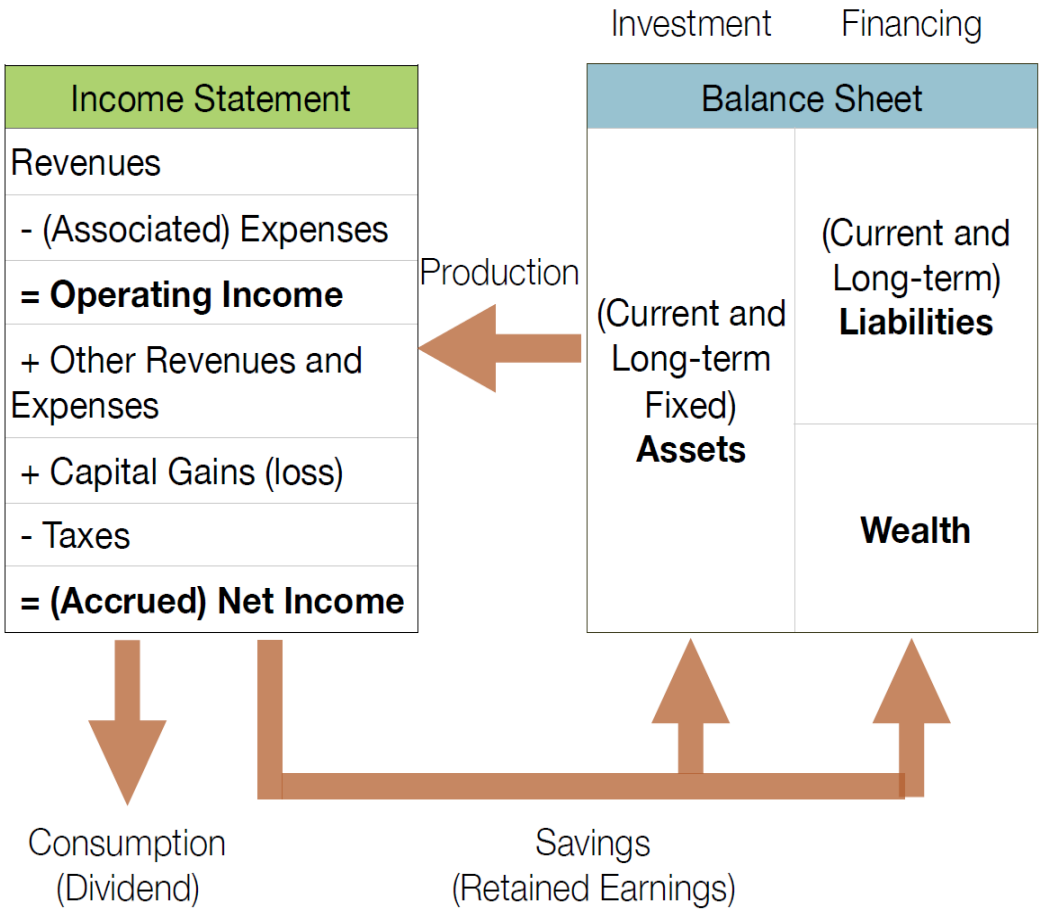
Avg. income: $104
Avg. expenditure: $80
Ratio (~MPC): 0.77

NOTE: Income is net deposits received excluding expenditures made directly by employers for consumers and saving deposits made directly from income

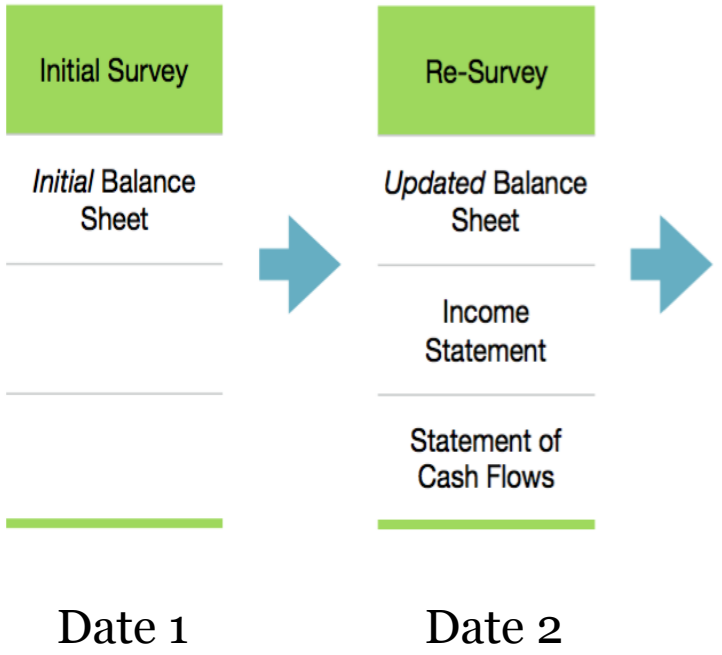
Source: Author's calculations. Note that some outlier payments are excluded.

Measurement Innovation #3: Better integration

ST integration framework

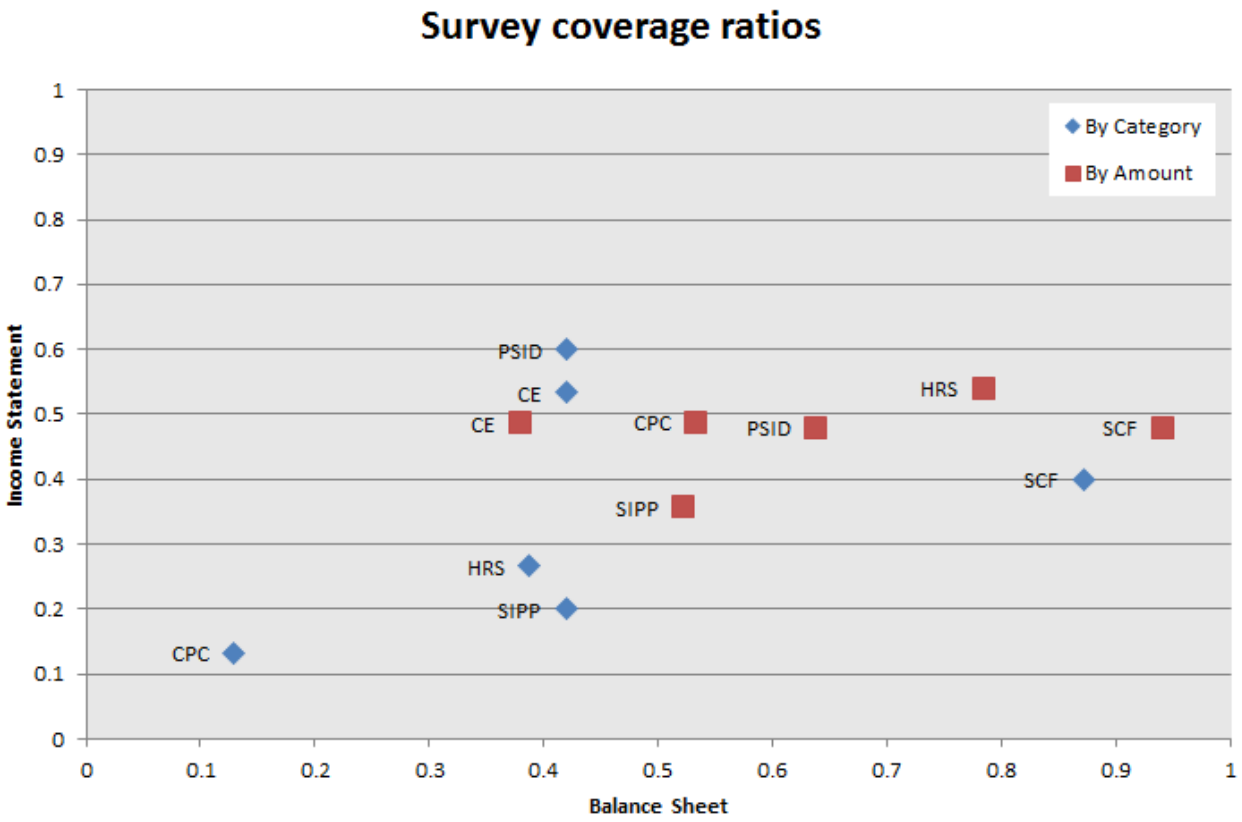


TTMS measurement



Source: Sampranathak, Schuh, and Townsend (2017)

Integration by line-item coverage $\left(\frac{\widehat{X_S}}{X^*}\right)$



CE: Consumer Expenditures Survey/Diary
CPC: Survey/Diary of Consumer Payments Choice
HRS: Health and Retirement Survey

PSID: Panel Study of Income Dynamics
SCF: Survey of Consumer Finances
SIPP: Survey of Income and Program Participation

Source: Sampranathak, Schuh, and Townsend (2017)

Full integration by dynamics

$$\hat{X}_t = \hat{X}_{t-1} + \sum_{d=1}^{31} \hat{D}_{dt} - \sum_{d=1}^{31} \hat{W}_{dt}$$

- $\hat{X}_t$ = Account balance at end of period t
- $\hat{D}_{dt}$ = Deposits on day d of period t
- $\hat{W}_{dt}$ = Withdrawals on day d of period t
- *Incomplete integration = not all variables are measured or recall estimates substitute for daily recording*

Statements of cash flows, part 1

TABLE 4
U.S. Surveys: Statements of Cash Flows

(Cash defined as Current Assets)	PSID 2010-2012	CES 2011-2012	SCF 2010-2013	HRS 2010-2012	SIPP 2010-2011
Net income (+)	65,350	60,971	81,856	79,779	38,944
Adjustments:					
Depreciation (+)	0	0	0	0	0
Change in Account Receivables (-)	0	0	0	0	0
Change in Account Payables (+)	0	0	0	0	0
Change in Inventory (-)	0	0	0	0	0
Change in Other (not Cash) Current Assets (-)	0	0	0	0	0
Consumption of Household Produced Outputs (-)	0	0	0	0	0
Cash flows from Production	65,350	60,971	81,856	79,779	38,944
Consumption expenditure (-)	-43,766	-44,849	-28,850	-45,073	-22,487
Capital (durable goods) expenditure (-)	0	0	0	0	0
Cash flows from Consumption and Investment	-43,766	-44,849	-28,850	-45,073	-22,487
Transfers to/from Long-Term Investments	-362	0	1,231	0	0
Lending (-)	0	-151	1,359	50	4,452
Borrowing (+)	4,230	8,089	-4,349	-3,757	-8,988
Net Gifts Received (+)	0	0	0	0	0
Cash flows from Financing	3,868	7,938	-1,759	-3,707	-4,536
Change in Cash Holding (from Statement of Cash Flows)	25,452	24,060	51,247	31,000	11,921
Change in Cash Holding (from Statement of Balance Sheet)	3,091	17,770	3,843	1,678	-18,622
Cash flows error	22,362	6,290	47,404	29,322	30,543
Internal Error	25%	13%	37%	24%	25%
External Error	30%	8%	61%	39%	42%

Source: Sampranathak, Schuh, and Townsend (2017)

Statements of cash flows, part 2

TABLE 7

TTMS and DCPC: Statements of Cash Flows, October 2012

(Cash defined as Currency)	TTMS	DCPC
Net income (annual basis) (+)	8,750	69,207
Net income (monthly basis) (+)	729	5,767
Adjustments:		
Depreciation (+)	94	0
Change in Account Receivables (-)	-37	0
Change in Account Payables (+)	0	0
Change in Inventory (-)	80	0
Consumption of Household Produced Outputs (-)	-6	0
Net Capital Gains (+)	-1	
→ **Cash flows from Production**	**859**	5,767
✚ Consumption expenditure (-)	-245	-6,767
Capital (durable goods) expenditure (-)	-77	0
→ **Cash flows from Consumption and Investment**	**-327**	-6,767
✚ Change in Demand Deposits (-)	-67	*-421*
Change in NFDA deposits (-)	na	*59*
Change in Foreign Currency (-)	na	*-2*
Change in Credit Card Balance (-)	na	*1,292*
Change in Long-term Assets (-)	76	*-669*
Change in Other Debts (-)	4	na
→ **Cash flows from Financing**	13	*259*
→ Change in Currency Balance (from Statement of Cash Flows)	*544*	*-741*
Change in Currency Balance (from Statement of Balance Sheet)	*544*	*164*
Cash flows error	0	*905*
Internal Error	na	*135%*

Source: Sampranathak, Schuh, and Townsend (2017)

Payment instruments & the balance sheet

Balance Sheet Accounts	Payment Instruments
Assets (money)	
Currency	U.S. currency Foreign currency Private currency (e.g., Bitcoin)
Traveler's check	Traveler's check
Checking accounts owned by consumers (demand and other checkable deposits)	Checks (personal or certified) Debit card OBBP BANP Venmo
Checking accounts owned or managed by financial institutions or non-financial payment service providers (but may have pass-through deposit insurance for consumers)	Cashier's check Prepaid card Money order
Savings accounts owned by consumers ("non-transactions" accounts in the non-M1 part of M2 with direct payment capability)	Checks Debit card OBBP BANP
Liabilities (credit)	
Revolving credit	Credit card
Non-revolving credit	Charge card Text/SMS

Sources: Greene, Schuh, and Stavins (2016); also Sampranathak, Schuh, and Townsend (2017)

Statement of account flows

	Flows associated with accounts							
	Currency	DDA	NFDA	Foreign currency	LTFA	Revolving debt	Other debt	All
A. Production (inflows)	*388*	*5,379*	**na**	**na**	**na**	**na**	**na**	**5,767**
B. Consumption and investment (outflows)	**-1,038**	**-4,422**	**-58**	**na**	-	**-1,249**	**na**	**-6,771**
B.1 Consumption expenditure	-1,038	-4,422	-58	na	-	-1,249	na	-6,771
B.2 Capital (durable goods) expenditure	na	na	na	na	-	na	na	na
C. Financing	**-91**	**-536**	**-1**	**2**	**na**	**-43**	**669**	**0**
C.1 Deposits (inflows)	**498**	**564**	**20**	**2**	**na**	**na**	**669**	**1,753**
From currency	-	564	*15*	2	na	na	*8*	589
From demand deposits	455	-	2	na	na	na	*643*	1,100
From non-financial deposit accounts	21	na	-	na	na	na	0	21
From foreign currency	0	na	na	-	na	na	na	0
From long-term financial assets	na	na	na	na	-	na	na	0
From revolving accounts	22	na	3	na	na	-	*18*	43
From other debt	na	na	na	na	na	na	-	0
Addendum: Total deposits (inflows)	*886*	*5,943*	*20*	*2*	na	na	*669*	*7,520*
C.2 Withdrawals (outflows)	**-589**	**-1,100**	**-21**	**0**	**na**	**-43**	**na**	**-1,753**
To currency	-	-455	-21	0	na	-22	na	-498
To demand deposits	-564	-	na	na	na	na	na	-564
To non-financial deposit accounts	*-15*	-2	-	na	na	-3	na	-20
To foreign currency	-2	na	na	-	na	na	na	-2
To long-term assets	na	na	na	na	-	na	na	0
To revolving accounts	na	na	na	na	na	-	na	0
To other debt	*-8*	-643	0	na	na	-18	-	-669
Addendum: Total withdrawals (outflows)	*-1,627*	*-5,522*	*-79*	na	na	*-1,292*	na	*-8,524*
D. Change in account balance (from Statement of Account Flows)	-741	421	-59	2	na	-1,292	669	-1,004
E. Change in account balance (from Balance Sheets)	164	na	na	na	-4,501	-673	9,489	-8,816
F. Flow error	905	na	na	na	na	-619	-8,820	7,812
G. Error (% lagged account balance)	135%	na	na	na	na	92%	93%	-89%

NOTE: DDA are demand deposit accounts; NFDA are nonfinancial deposit accounts; LTFA are long-term financial assets.

Research Opportunities

Selected research using DCPC/SCPC

- ECONOMICS AND FINANCE
  - ***Demand for currency and payment instruments*** – Koulayev et al (RAND 2016), Bagnall et al (IJCB, 2016), Burdett et al (2013), Briglevics and Schuh (WP, 2014, 2015), Schuh and Stavins (JBF, 2010), Cole (WP, 2016)
  - ***Supply-side effects on consumer payment choices*** – Kahn et al (2016), Stavins and Shy (2014, 2015), Briglevics and Shy (2012)
  - ***Money and (revolving) credit*** – Fulford (JME, 2016), Fulford and Schuh (WP, 2015, 2017), Schuh et al (WP, 2010)
  - ***Measurement of economic and financial concepts*** – Schuh (EI, 2017), Samphantharak et al (EI, 2017)
  - ***Retail banking*** – Greene and Shy (2015)
  - ***Potential research topics*** – consumption, income, saving, budgeting/financial planning
- PUBLIC POLICY
  - ***Payment/network design, regulation, judgments and settlements*** – Schuh et al (JCLE, 2011), Shy (2014)
  - ***Speed & security of payment networks*** – Schuh and Stavins (CEP, 2016), Greene and Stavins (2016)
  - ***Regulation of bank pricing and services*** – Greene and Luo (2015), Cole and Greene (2016)
- SURVEY METHODOLOGY
  - ***Questionnaire design and measurement of concepts*** – Angrisani et al (NBER volume, 2012), Hitcenko (WP 2015, 2013a, 2013b), Cole and Schuh (WP, 2017)

Implications for Future Data Collection

Key principles for household data design

- **Draw representative samples**
  - Compensate respondents and minimize selection biases
  - Build longitudinal panels but minimize respondent burdens
  - Benchmark results to best national data
- **Integrate questionnaires, financial statements**
  - Obtain complete item coverage for each statement
  - Ensure exact stock-flow identities for all concepts
    - Record daily wherever possible, minimize recall dependence
- **Use mixed-mode strategies**
  - Use commercial/administrative data where possible
  - Exploit technologies to reduce costs and respondent burden

Citations

Greene, Claire, Scott Schuh and Joanna Stavins. 2016. The 2014 Survey of Consumer Payment Choice: Summary of Results. Federal Reserve Bank of Boston Working Paper No. 16-3.

Samphantharak, Krislert, Scott Schuh, and Robert Townsend. 2017. "Integrated Surveys and Household Financial Accounting." Working Paper.

Schuh, Scott. "Measuring Consumer Expenditures with Payment Diaries." 2017. *Economic Inquiry*, forthcoming.

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