Inferring Financial Sophistication: Evidence Using Credit Card Balance Transfers and the CARD Act

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Federal Reserve Board

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Motivation

"Well-informed consumers, who can serve as their own advocates, are one of the best lines of defense against the proliferation of financial products and services that are unsuitable, unnecessarily costly, or abusive."

– Chair of the Federal Reserve Board of Governors Ben Bernanke, 2011

- Financial knowledge is important to properly utilize complex financial products.
  - New technologies and service models increase complexity of consumer finance.
  - Financial products may incur additional costs if not used carefully.
  - When properly used, financial products could reduce borrowing costs and introduce new opportunities to save.
- Important to be able to measure **and** understand impacts of financial sophistication.

Measuring Financial Literacy

- What is Financial Literacy or Sophistication?
  - Difficult to define and measure financial literacy.
  - Lusardi et al (2009) draw a distinction between literacy, related to more basic finance understanding, and sophistication, composed of a more advanced understanding of financial topics.
  - Common tests include survey questions on fees, interest rates, diversification, and capital markets.
  - We focus on <u>one particular form</u> of financial sophistication: the *observed* use of a sophisticated, credit card maneuver that requires a complex understanding of credit card rules.

What we do

- We develop an observed measure of financial literacy based upon actual credit card usage using loan-level regulatory credit card data.
    - We find that the financially less sophisticated are at <u>higher risk of delinquency</u> and default, are more likely to pay unnecessary fees, and pay larger finance charges.
    - We find that prior to revealing their lack of sophistication in the data, their cost of borrowing and loan terms are statistically similar, indicating that this form of sophistication <u>is not initially priced</u>.
    - We find that The CARD Act <u>reduced the cost of being unsophisticated</u> and reduced their interest payments.
    - We find that the financially less sophisticated in this <u>particular dimension of credit card usage</u> is also correlated with increased risk in other consumer lending products such as auto, home, and personal loans.
    - We find that an area's proportion of financially less sophisticated is <u>also correlated with local education and unemployment rates</u>.

Related literature

- Financial literacy
  - Suboptimal financial decision (Lusardi and Mitchell 2014, Lusardi and Tufano 2015, Hastings et al. 2013, Bianchi 2017, Stolper and Walter 2017, Guiso and Viviano 2015, Agarwal et al. 2017), retirement planning (Lusardi et al. 2011), EITC knowledge (Chetty et al. 2013), portfolio choice (Christelis et al. 2008), day-to-day financial management (Hilgert et al. 2003)
- Credit card behaviors
  - Credit limit changes (Gross and Souleles 2002), present bias (Kuchler and Page 2018), minimum payment (Navarro-Martinez et al. 2019), debt allocation (Ponce et al. 2017), subprime cards (Han, et al. 2018), the effect on young borrowers (Debbaut, et al. 2016), balance transfer (Agarwal et al. 2009)
- CARD Act
  - Borrowing costs (Agarwal et al. 2014), card closures (Jambulati and Stavins 2014), personal loans (Elliehausen and Hannon 2018), credit card use (Jones et al. 2012)

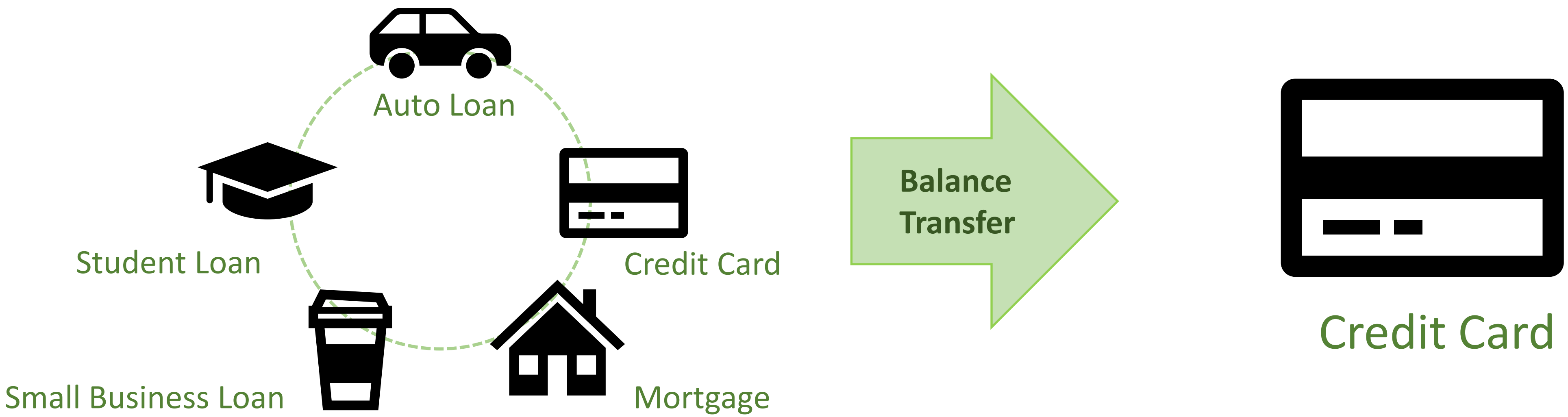
Outline

- Introduction
- Background
- Empirical Methodology
- Effect of Financial Literacy
- Conclusion

Background

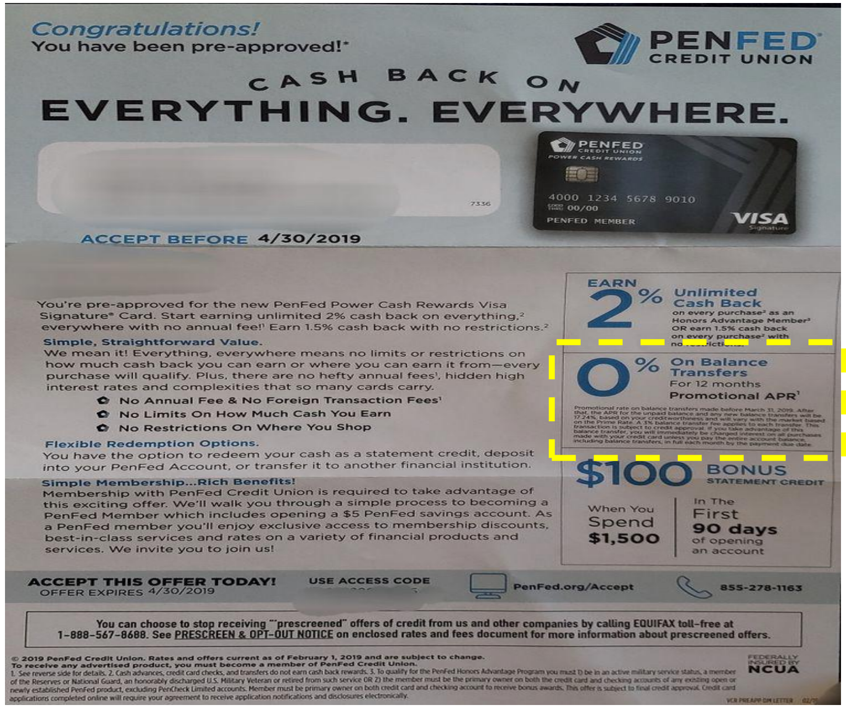
What is a Balance Transfer?

- A transaction that enables borrowers to move existing debt from other credit cards or other loans to a credit line.
- The credit card balance transfer fee is a small percentage (2-3%) of transferred amount or a fixed dollar amount.
- You generally need good or excellent credit to get a 0% balance transfer credit card.



Why do consumers use balance transfers?

- Consumers can consolidate multiple debts into a single account.
- Consumers can save interest expenses if interest rates on the new credit line is lower than interests on their existing liability.
  - A typical balance transfer offer has interest free introductory period of 12 to 18 months.



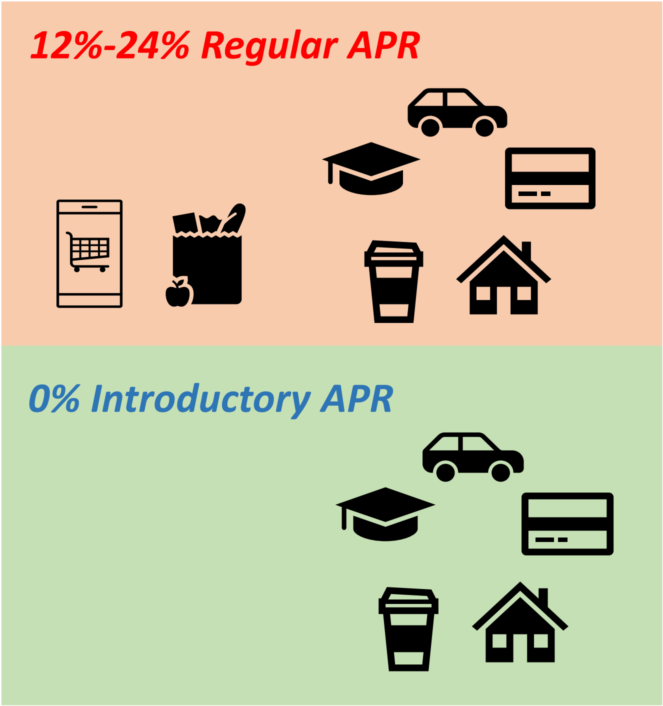
Credit Card Summary of Terms

Annual Percentage Rate (APR)	
Visa Gold	12.49%
Visa Platinum Rewards	13.99%
Visa Classic	13.99%
MasterCard Standard	13.99%
Other APRs	
Balance Transfer APR	5.99% for the life of the balance transfer
Platinum Balance Transfer APR	2.99% for the life of the balance transfer
Default APR*	17.99%
Annual Fees	
MasterCard Standard	NONE
Visa Classic	NONE
Visa Gold	NONE
Visa Platinum	NONE
Visa Platinum Rewards	NONE
Minimum Finance Charge	NONE
Transaction Fee for Purchase	NONE
Grace Period for Repayment of Balance on Purchases	25 days on average
Method of Computing the Balance for Purchases	Average daily balance including new purchases
Cash Advance Fee	NONE
Late Payment Fee	$39 per month
Over Credit Limit Fee	$15 per month
Balance Transfer Fee	2.5% (min. $10-max. $100)

Caveat

- Balance transfers must be completed within fixed periods of account opening.
- Introductory APR change to regular interest rates after the promotional period ends.
- This creates mixed balances with different interest rates on the same credit card.

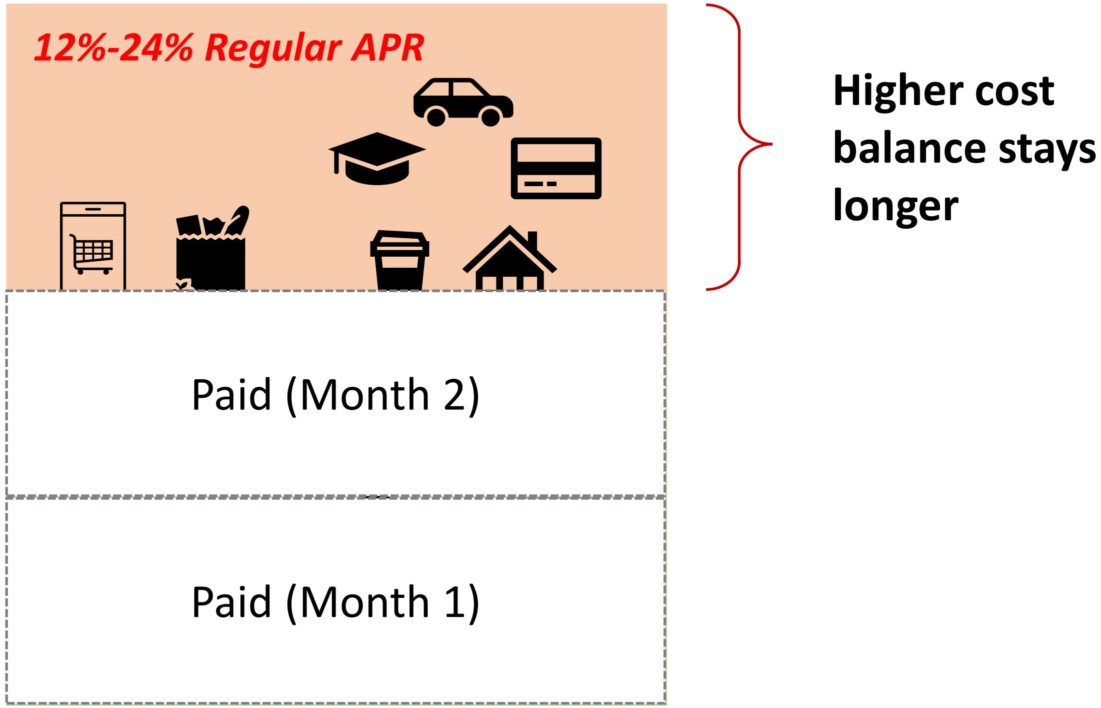
Dual Interest Balance



Pre-CARD Act of 2009

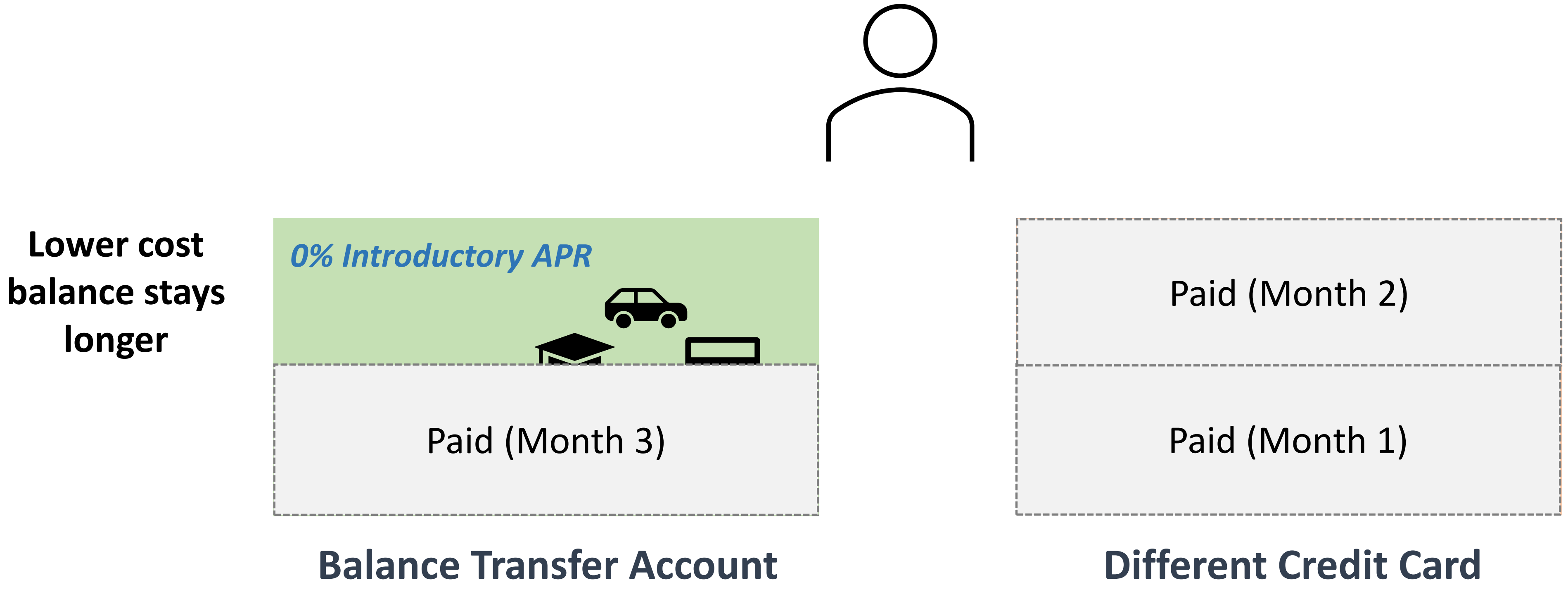
- The CARD Act created a set of enhanced consumer protection, disclosure, and prohibition statues into the credit card market.
- Prior to the CARD Act, credit card companies required cardholders to pay for the balances that have a lowest interest rate first in the event of dual interest balance.

Dual Interest Balance



Credit Card Strategy

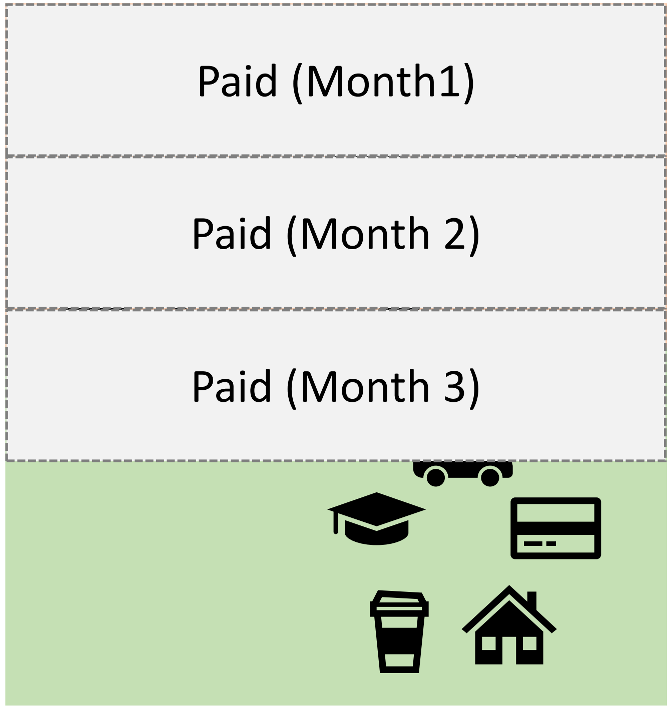
- Financially sophisticated strategy is to split spending and balance transfers onto separate cards and pay off high interest rate balances first.



Post-CARD Act of 2009

- The updated payment rules prioritized higher interest yielding balances before lower interest yielding balances.
- Balance transfer balances would be paid off only after regular purchase balances are depleted.

Dual Interest Balance



Empirical Methodology

Data

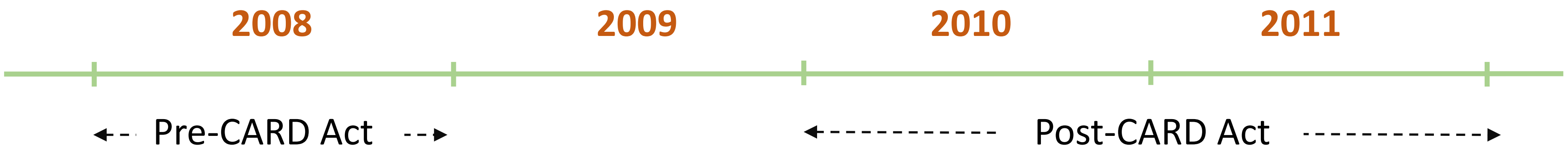
- Federal Reserve’s Y-14M Regulatory Credit Card Collection
  - Loan level collection from 2008 to 2022 at monthly frequencies. Our sample covers 2008-2011.
  - Covers the largest issuers of U.S. Credit Cards, 80% of the entire credit card market.
  - Only loan level dataset that has promotional balance and balance transfer information
  - Y-14M allows us to restrict to accounts with multiple credit cards *at the same bank* so our loan sample are all able to separate purchases onto another card.

- 2011 American Community Survey
  - Social and economic characteristics (ex. unemployment rate, college graduation rate, average income, etc.) at the zip-code level

- Equifax Consumer Credit Panel
  - Credit bureau data containing loan-level records of mortgage, auto, student, credit card, and other consumer lending.
  - We match, at the loan-level, between the Y-14M and Equifax to investigate spillovers to other loan types

Timeline of CARD Act

- The CARD Act was introduced in the House of Representatives in January 2009, signed into law in May 2009.
- The major amendments, including the payment rules regarding high APR balances, took effect in February 2010. Credit card companies had the option to begin implementing changes prior to February 2010.
- We defined pre CARD Act period to be 2008 and post CARD Act period to be 2010-2011. We exclude 2009 from the sample.



Recap

- Prior to the CARD Act, the financially sophisticated maneuver is to use different credit cards and split spending for purchase.
- In post-CARD Act, no such strategy is necessary.
- We define *Comingle* to be accounts that continue to purchase while there is a promotional balance with a lower interest rate.

Separating	Comingling
Account that use different credit cards to purchase	Account that use the same credit card to purchase

Identification

- Naïve comparison: Comparing those that comingle with those that separate.
  - Many other factors contribute to the decision to separate vs comingle. Unobserved endogeneity could be from convenience, hyperbolic discounting, short attention span bias, liquidity constraints and other behavioral factors.
  - Identifying assumption: Conditional on the rich set of loan-level controls, the CARD Act changed the propensity for the sophisticated to comingle but is orthogonal to the other factors that contribute to comingling.
  - For example, conditional on loan terms, the kind of borrowers that comingled due to convenience prior to The Card Act will continue to do so after The Card Act.

Separating	Comingling
Sophisticated about the payment rules **and people that do not comingle for other reasons**	Unsophisticated about the payment rules **and people that comingle for other reasons**

Empirical Strategy

- Restrictions
  - We restrict only to cardholders with multiple credit cards.
  - Promotional balance must have a lower interest rate than their regular purchase rate.
  - We restrict each account to their *first* instance of a balance transfer.
  - Accounts with a balance transfer.
- Pre-Card Act (2008), sophisticated users switch to another card (unobserved) and do not continue purchasing (Separating) while unsophisticated users continue purchasing (Comingling)
- Post Card Act (2010-2011), there is no longer the same incentive to separate due to sophistication

	Separating	Comingling
Pre Card Act	Sophisticated about the payment rules and people that do not comingle for other reasons	Unsophisticated about the payment rules and people that comingle for other reasons
Post Card Act	Unsophisticated and sophisticated about payment rules and the people that do not comingle for other reasons	Unsophisticated and sophisticated about payment rules and the people that comingle for other reasons

Quasi-Difference-in-Difference

- Not a standard diff-in-diff, the Card Act is not a treatment effect for financial literacy

$$Y_{it} = \alpha + \beta Comingle_i + \theta Pre\ CardAct_t + \delta(Comingle_i \times Pre\ CardAct_i) + X_i + \epsilon_{i,t}$$

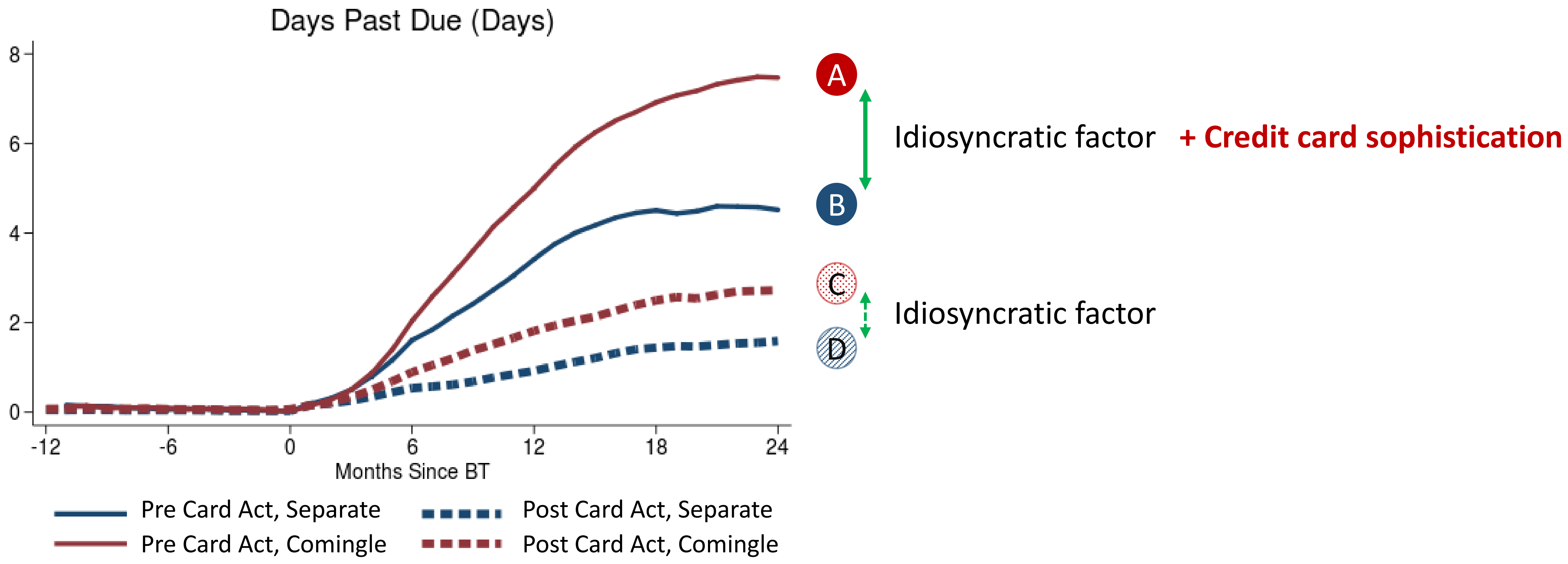
- $Comingle_i$ is an indicator for customers who continue purchasing
- $Pre\ CardAct_t$ is an indicator for whether BT occurred pre-Card Act in 2008
- δ is the parameter of interest
- Y_{it} are the credit card usage outcomes
- X_i are other observed card characteristics (ex. card type, issuing bank, cycle date, age of account, balance transfer volume, utilization, credit limit, balance, APR, FICO, income, total fees, etc.)

Y14M Summary Statistics

	Count	At Balance Transfer			
		Mean	1st Percent	99th Percent	StD
Observations					
Pre Card Act	885,064				
Post Card Act	630,985				
Comingle	748,929				
Pre Card Act Comingle	405,555				
Account Characteristics					
Account Age (Months)	1,516,049	77	0	347	76
Credit Score	1,516,049	738	596	850	65
Borrower Income ($)	1,516,049	$36,638	$0	$250,000	$118,917
Cycle Ending APR (%)	1,516,047	14.0%	5%	30.0%	5.2%
Credit Limit ($)	1,516,049	$13,499	$1,000	$46,800	$9,692
Risk Drivers					
BT Volume ($)	1,516,049	$5,522	$74	$30,000	$6,568
Promotional Balance ($)	1,516,049	$6,841	$34	$32,790	$7,206
Cycle Balance ($)	1,516,049	$5,403	$0	$29,391	$6,407
Card Utilization (%)	1,516,044	54.8%	0%	100.2%	53.9%
Payment Amount ($)	1,516,049	$405	$0	$7,092	$1,688
Purchase Volume ($)	1,516,049	$245	$0	$3,649	$869

Average days past due after Balance Transfer

- Higher delinquency risk after balance transfer
- Delinquency rates were higher prior to 2009 than after 2009 due to the financial crisis.



Effect of Financial Literacy

Estimated δ

$$Y_{it} = \alpha + \beta Comingle_i + \theta Pre\ CardAct_{\ t} + \boldsymbol{\delta}(\boldsymbol{Comingle_i} \times \boldsymbol{Pre\ CardAct_i}) + X_i + \epsilon_{i,t}$$

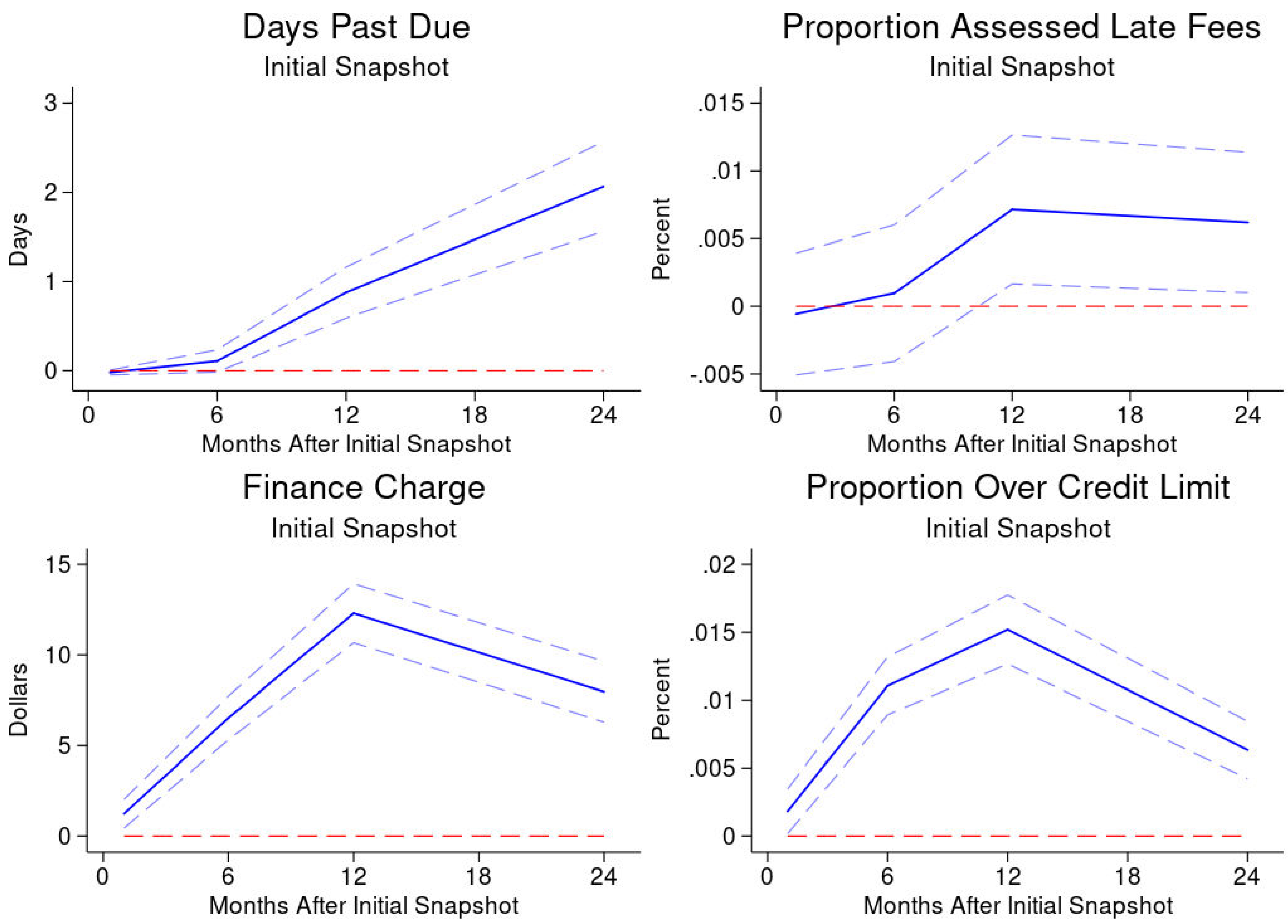
- δ can be plotted through time for different outcome variables
  - Measures of Risk: Days past due, Late fees, finance charges, and over limit fees

Days Past Due

- Delinquency increases soon after initial snapshot

	3 Months Ahead	6 Months Ahead	12 Months Ahead	18 Months Ahead	24 Months Ahead
Pre Card Act	0.118***	0.444***	1.861***	3.571***	4.272***
	(0.0194)	(0.0431)	(0.0942)	(0.139)	(0.163)
Comingle	0.0125	0.0304	0.221***	0.138	-0.0528
	(0.0136)	(0.0287)	(0.0577)	(0.0883)	(0.106)
Pre Card Act x Comingle	-0.0365	0.110*	0.877***	1.785***	2.065***
	(0.0240)	(0.0638)	(0.146)	(0.215)	(0.256)
Additional Controls	✓	✓	✓	✓	✓
Observations	150,211	150,193	149,491	147,363	144,210
R^2	0.147	0.129	0.150	0.158	0.166

Estimated δ – Credit Risk (Regression Plot)

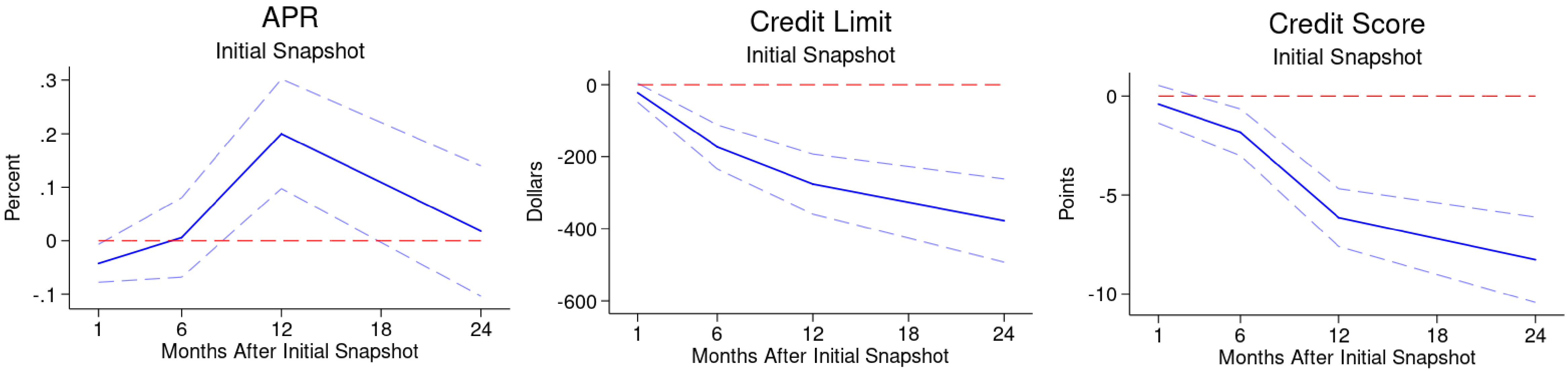


Observed Account Differences

- At the point of balance transfer, those that will comingle or separate have similar loan terms

	APR (%)	Credit Limit ($)	Credit Score	Income
Pre Card Act	-5.111***	3,846	-13.58	20,482
	(1.816)	(4,850)	(24.84)	(33,960)
Comingle	-0.0961	-1,024*	-13.21**	-3,008
	(0.412)	(603.0)	(5.359)	(5,144)
Pre Card Act x Comingle	0.209	479.0	3.108	2,760
	(0.427)	(642.2)	(5.660)	(5,336)
Additional Controls	✓	✓	✓	✓
Observations	19,571	19,571	19,571	19,571
# of Pre Card Act Comingle	7,809	7,809	7,809	7,809
R^2	0.573	0.631	0.556	0.622

Estimated δ – Risk Pricing (Regression Plot)



Effect of the CARD Act on Interest Charges

- We investigate the impact of the CARD Act on excess interest fees.
- The imputed finance charge follows the CARD Act rules for payment allocation.
  - We created a counterfactual finance charge by forcing payments to be applied to the purchase APR first.
  - The calculation assumes that the path of payments before the CARD Act is unchanged and that the promotional APR, which is unavailable in the data, is approximately a third of the purchase APR.

Effect of the Card Act on Interest Charges

- The approximate $120 dollar difference represents the average savings a less sophisticated balance transfer cardholder would gain had the CARD Act payment rules been active.

	Pre Card Act	
	Sophisticated	Less Sophisticated
Actual Finance Charge	$334	$565
Imputed Finance Charge (Card Act Rules)	$347	$445
Difference		$120

Spillovers to Other Loans

- We observed the differences in credit card loan characteristics and risks following a balance transfer.
- We further investigate spillovers to other use of consumer credit to determine if less sophisticated credit card users also make poor use of other products.
- We used the Equifax Consumer Credit Panel Data (CCP) to gather additional details on non-credit card loan products (ex. auto loans, student loans, mortgage, etc.)

Matching to the Equifax Consumer Credit Panel Data

- Equifax CCP is a semi-annual snapshot of a random 5% subset of borrowers. Contains entire credit file including mortgages, student loans, auto loans, and credit cards
- To bring in the Y-14M promotional balance data, we have to loan-level match
  - Exact matches: zip code, origination month, snapshot month, credit limit (within $1), cycle balance (within $1)
  - Fuzzy matches: credit score Equifax Riskscore vs FICO (within 25 points)
  - For an account to be considered a match, there has to be at least 2 months that fulfill the match criteria between Y-14M and Equifax.
  - Of 1,516,049 accounts in the Y-14M, 82,702 (~ 5% rate) match

Significant Spillover to Other Credit Products

	Card Delinquency	Auto Delinquency	Student Delinquency	Mortgage Delinquency	Auto Loan Term	Number of Credit Inquiries	Chance of Bankruptcy	Personal Loan Lender
Pre Card Act	0.0942***	0.0629***	0.0509***	0.0700***	-0.521	0.460***	0.0443***	0.00982***
	(0.00404)	(0.00400)	(0.00575)	(0.00313)	(0.340)	(0.0351)	(0.00267)	(0.00255)
Comingle	0.0460***	0.0256***	0.0208***	0.0130***	0.313	0.117***	0.0150***	0.00491*
	(0.00417)	(0.00408)	(0.00573)	(0.00299)	(0.366)	(0.0357)	(0.00264)	(0.00265)
Pre Card Act x Comingle	0.0108*	0.0163***	-0.00699	0.0132***	1.587***	0.158***	0.00709*	0.0106***
	(0.00612)	(0.00608)	(0.00863)	(0.00490)	(0.511)	(0.0534)	(0.00419)	(0.00389)
Additional Controls	✓	✓	✓	✓	✓	✓	✓	✓
Observations	82,702	72,791	24,999	70,916	72,791	82,702	82,702	82,702
R^2	0.113	0.056	0.084	0.070	0.030	0.091	0.030	0.010

Local Determinants of Sophistication

- We measured whether financial sophistication correlates with the local area characteristics such as the college graduation rate, unemployment rate and local average income, etc.
- We used the zip-code level data from 2011 American Community Survey.

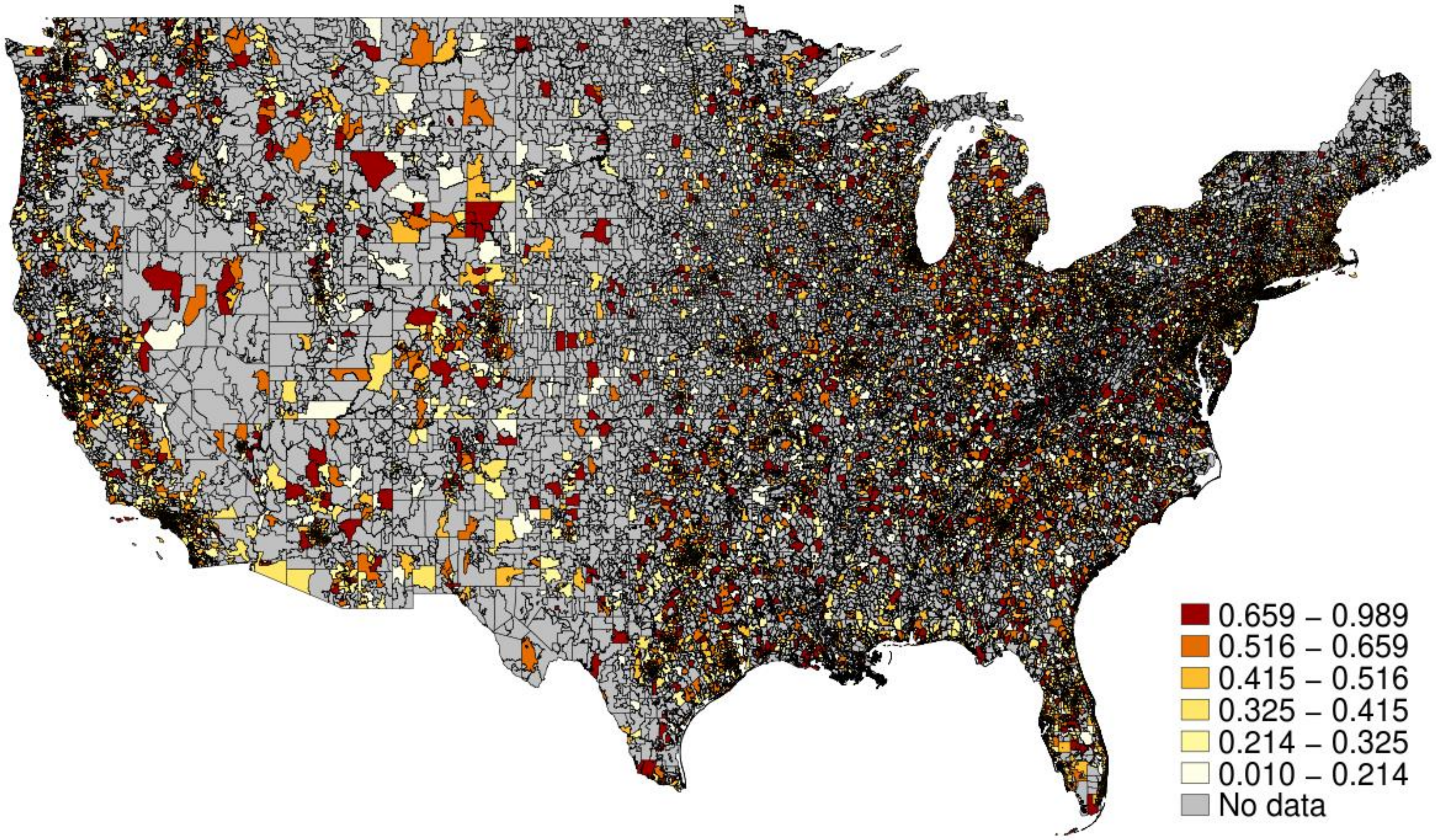
Correlation with Local Determinants

- Aggregated Y-14M data to a higher geographical level
- The regressor of interest is defined to be

$$Ratio = \frac{Average\ Pre\ Card\ Act\ Comingle\ Rate}{Average\ Post\ Card\ Act\ Comingle\ Rate}$$

- An increase in ratio indicates the proportion of the less sophisticated increases relative to the proportion of the more sophisticated.
- Include state and aggregate card controls such as average balance, balance transfer volume, utilization, payment, purchases, credit limits, APR, and credit score.

Significant Regional Variation in Pre Card Act Comingle Rate



Local Determinants of Comingle Rate

	Ratio of Pre to Post Comingle Rate
Local Unemployment Rate	0.00241***
	(0.000601)
Local Finance Employment Share	-0.000907*
	(0.000510)
Local Population Age 16+	-1.63e-07
	(3.79e-07)
Local Average Income	0.0157
	(0.0103)
Local College Graduation Rate	-0.00107***
	(0.000274)
State and Card Controls	✓
Counties	21,950
R^2	0.070

Conclusion

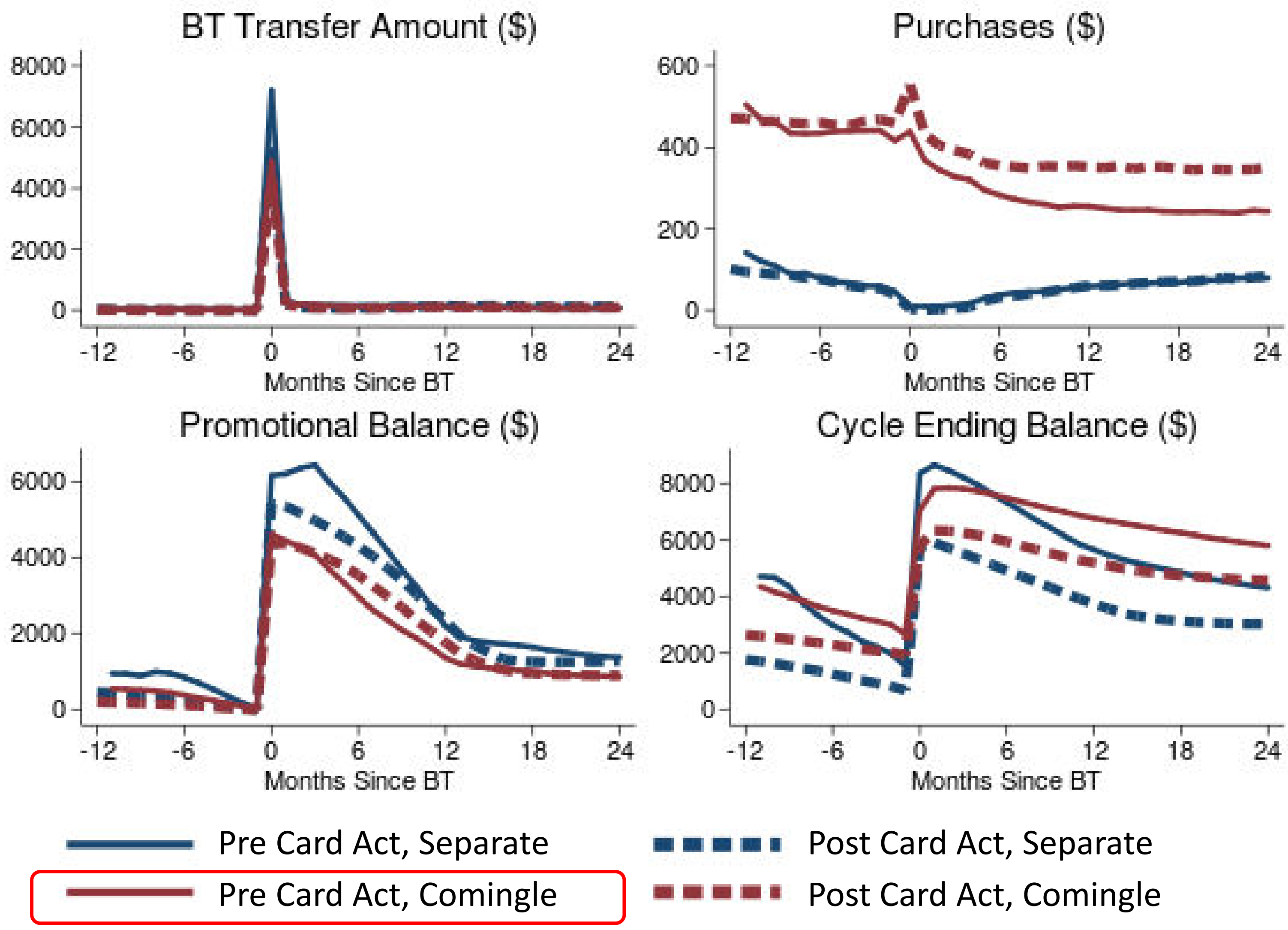
Conclusion

- The financially less sophisticated are at higher risk of delinquency and default, are more likely to pay unnecessary fees, and pay larger finance charges.
- Prior to revealing their lack of sophistication in the data, their cost of borrowing and loan terms are statistically similar, indicating that this form of sophistication is not initially priced.
- The CARD Act reduced the cost of being unsophisticated and reduced their interest payments.
- Less sophisticated use of credit card rules creates increased risks in other consumer lending products such as auto, home, and personal loans.
- An area's proportion of financially less sophisticated is also correlated with local education and unemployment rates.

Thank You!

Appendix

Average Account Characteristics



Credit Risk

- Other dimensions of credit risk at 12 months after initial snapshot

	Days Past Due	Late Fee	Finance Charge	Over Limit Fee
Pre Card Act	1.861***	0.0357***	20.59***	0.00765***
	(0.0942)	(0.00196)	(0.626)	(0.000799)
Comingle	0.221***	0.0156***	6.843***	0.00258***
	(0.0577)	(0.00184)	(0.436)	(0.000651)
Pre Card Act x Comingle	0.877***	0.00715**	12.30***	0.0152***
	(0.146)	(0.00280)	(0.828)	(0.00129)
Additional Controls	✓	✓	✓	✓
Observations	149,491	149,491	149,491	149,491
R^2	0.150	0.156	0.375	0.156