Consumer revolving credit and debt over the life-cycle and business cycle

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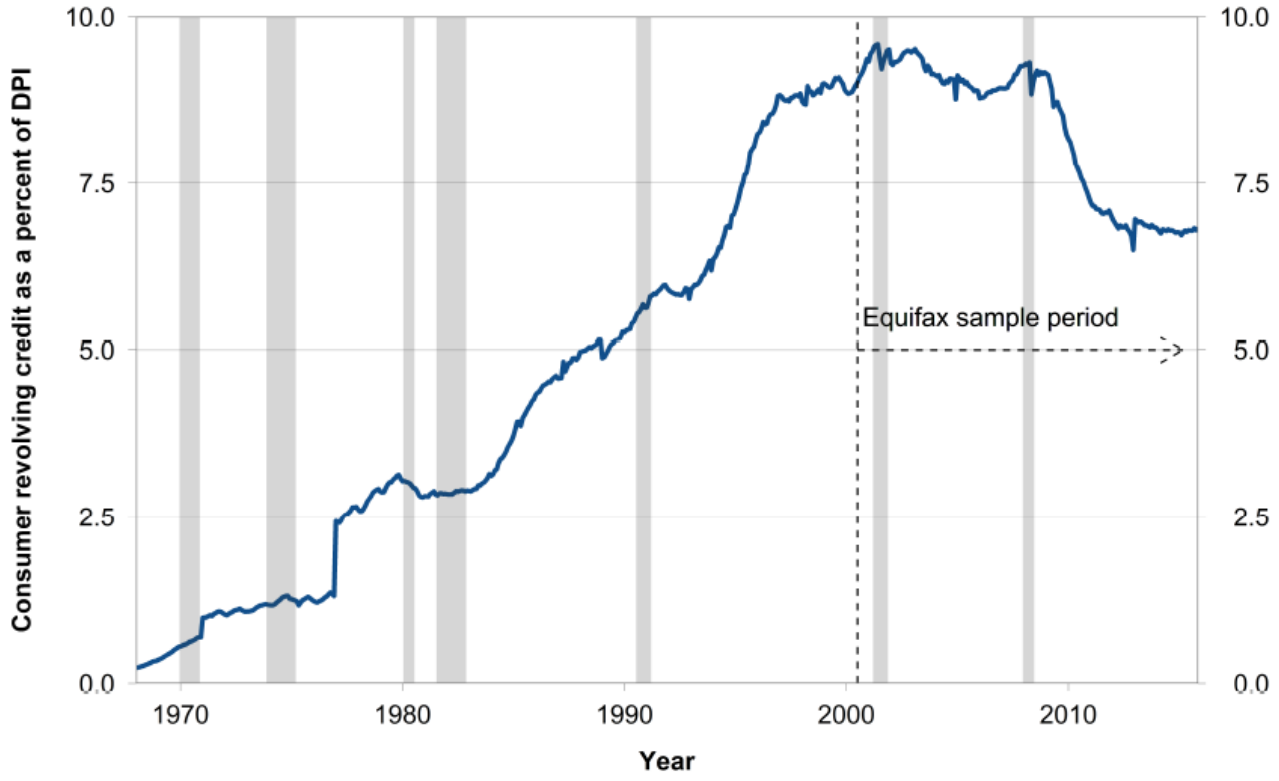
Overview

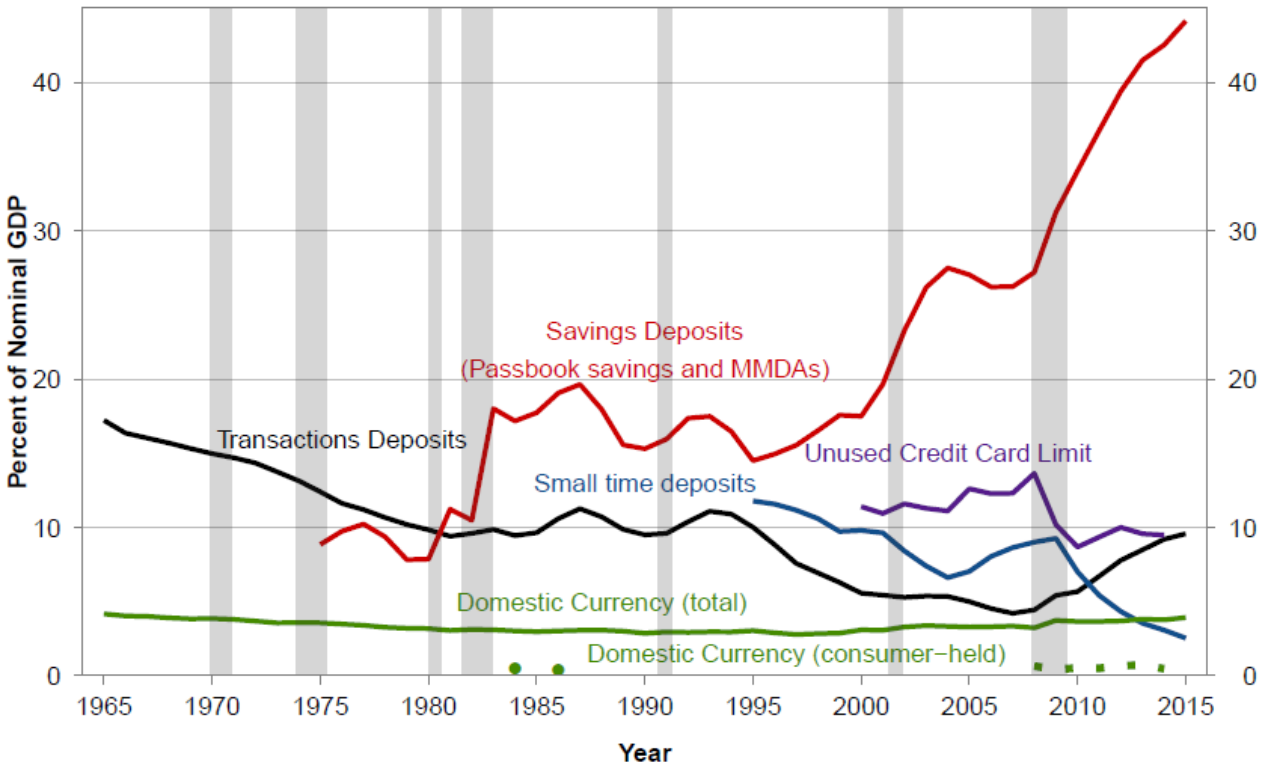
- Motivation
- Literature
- Data
- Empirical results
- Theory and estimation
  - Identification of convenience use vs. revolving
  - Credit limit and debt dynamics
- Conclusions and future research

Consumer revolving credit



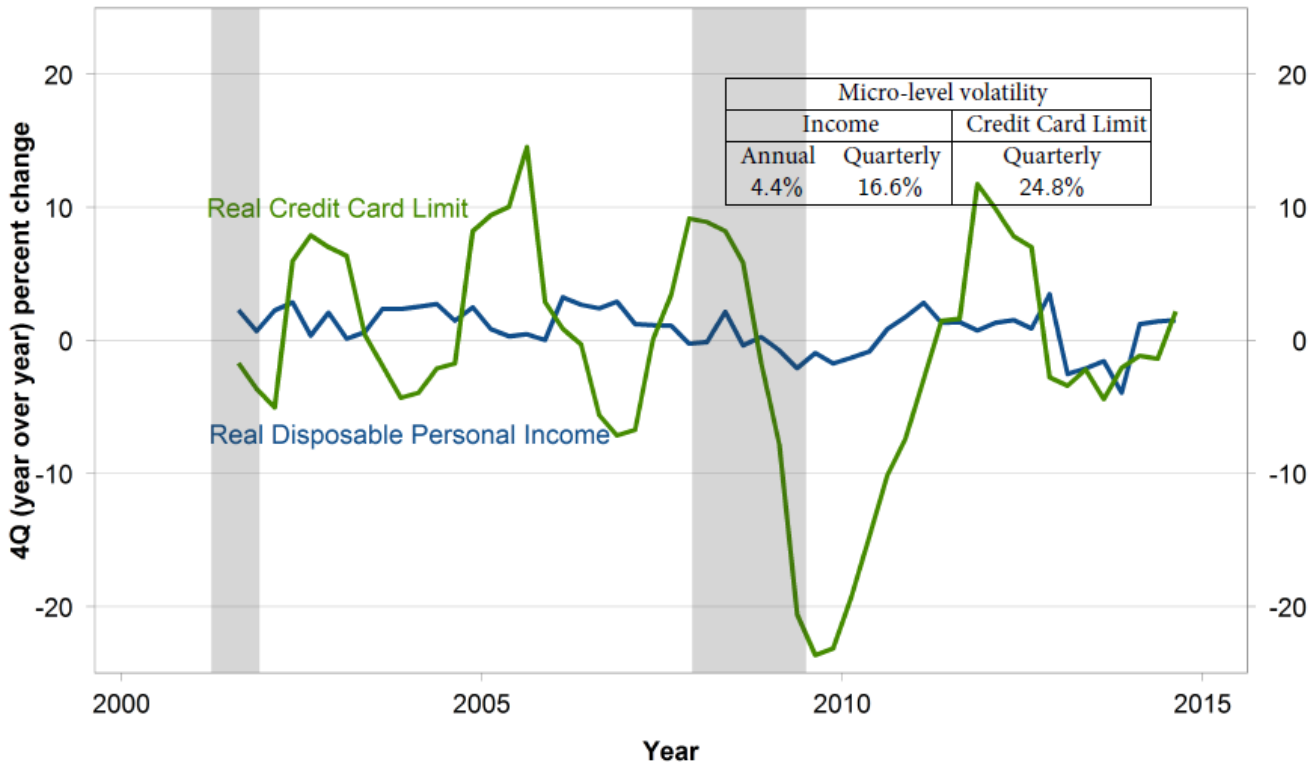
Source: Author's calculations from BEA NIPA Tables and Fed Board G.19 Statistical Releases.

Sources of liquidity for payments



Source: Author's calculations from Equifax/CCP, Survey of Consumer Payment Choice (SCPC), Survey of Currency and Transaction Account Usage (SCTAU), and Fed Board H.6 Releases.

Income vs. credit limit volatility



Sources: Carroll and Samwick (1997), Fulford (2015a, JME), authors' calculations from Equifax/CCP and BEA NIPA Tables.

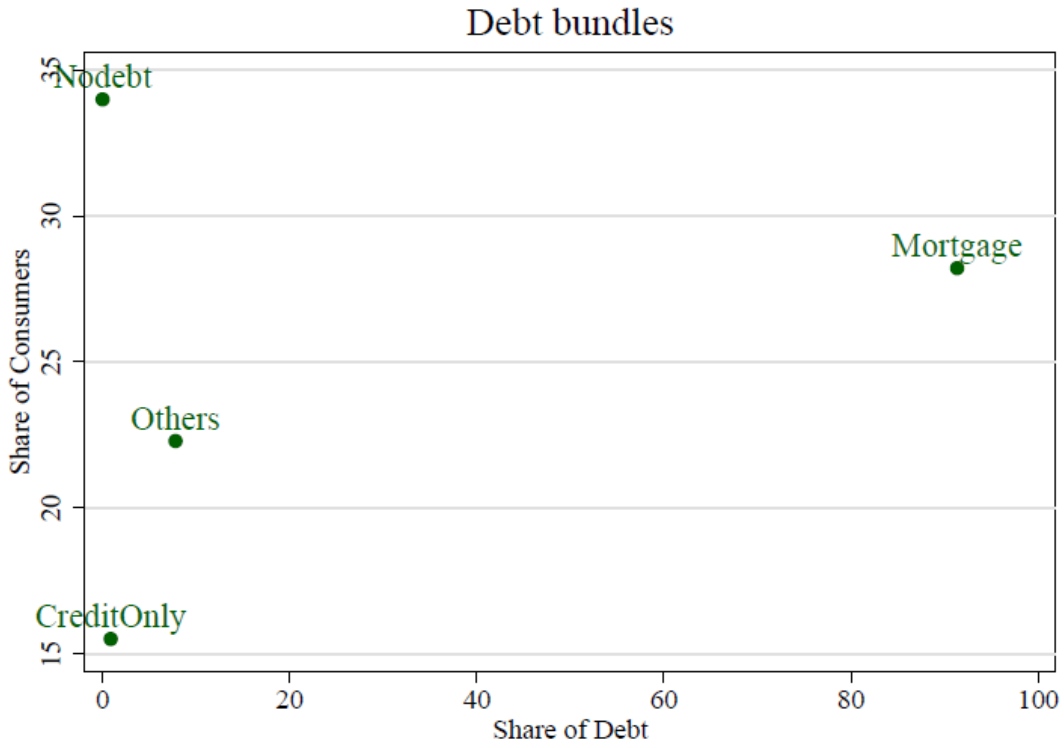
Abbreviated Literature Review

- **Household finance is important**
  - Campbell (2006), Zinman (forthcoming)
- **Credit cards as a source of revolving credit**
  - ***Consumption smoothing***: Stavins (2000), Gross and Souleles (2002), Lopes (2008), Athreya (2008), Fulford (2015b, EER)
  - ***Added complexity of change in limit***: Gross and Souleles (2002), Fulford (2013, JDE), Agarwal et al. (2015), Fulford (2015a, JME)
- **Credit cards as a payment instrument**
  - Carow and Staten (1999), Stavins (2001), Prescott and Weinberg (2003), Schuh and Stavins (2010), Telyukova (2013)

Data Sources

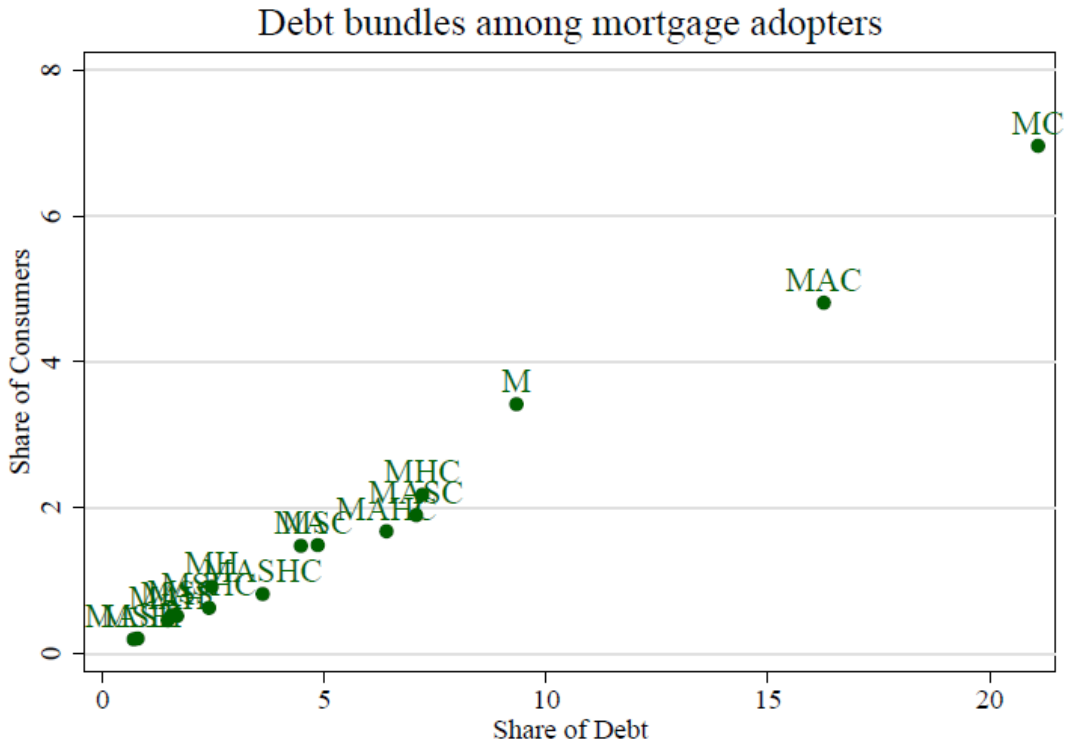
	NY Fed/CCP	SCPC	SCF
Time period	1999-2015	2008-2015	1983-2013
Frequency	Quarterly	Annual	Triannual
Unit of Obs	Consumers	Consumers	Households
Sponsor	Equifax	Boston Fed	Fed Board
Sample size	~15 mil (5% sample of all Equifax credit accounts)	~2,000	~30,000
Summary	Full credit history for each account. (aggregate by debt type, plus mortgage trade lines).	Consumer preferences, adoption, and use of payment options.	Household assets and liabilities, income.

Combinations of consumer debt, summary



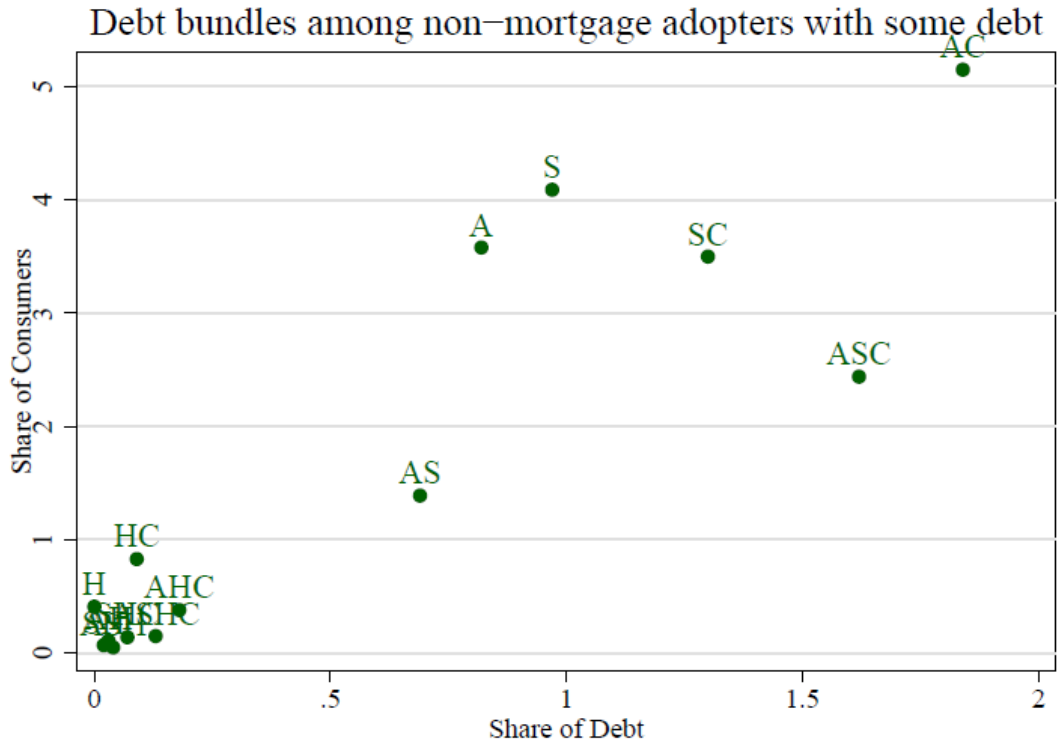
Source: Authors' calculations from Equifax/CCP.

Combinations of consumer debt, mortgage adopters



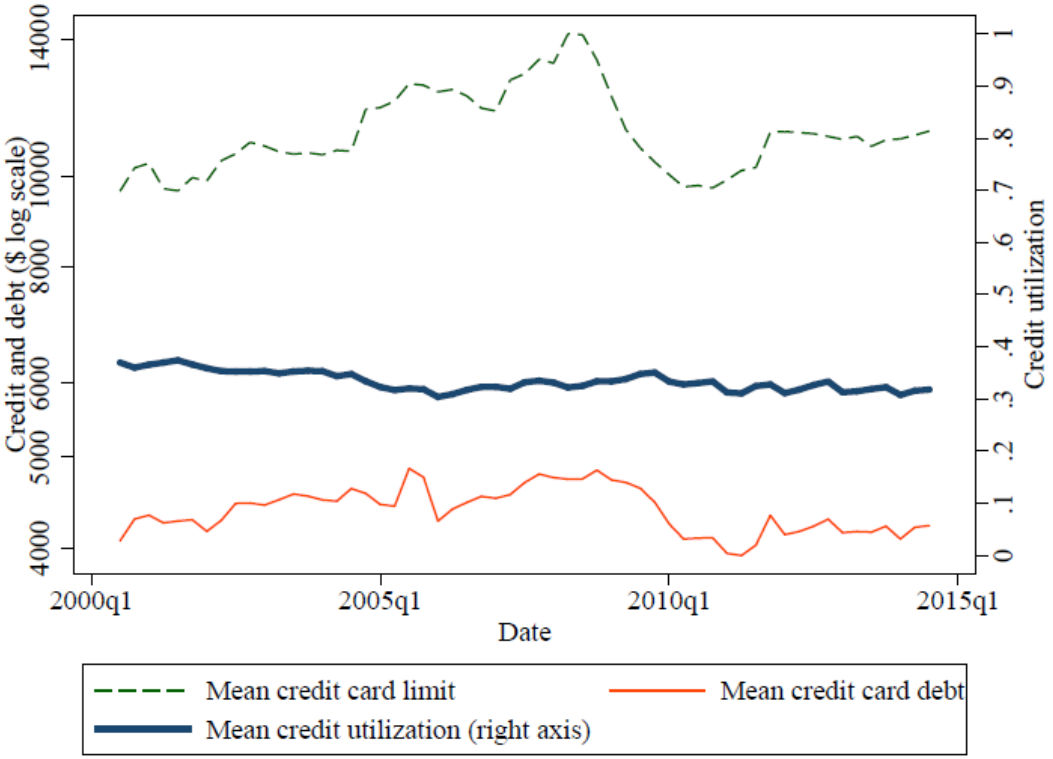
Source: Authors' calculations from Equifax/CCP.

Combinations of consumer debt, non-mortgage adopters



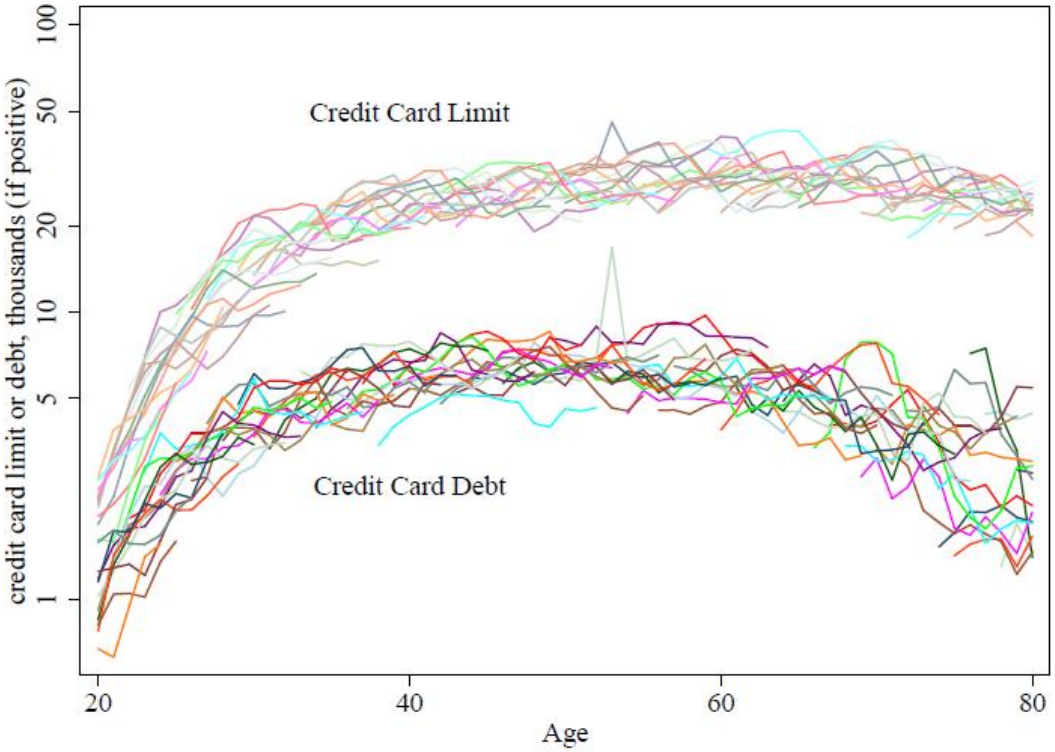
Source: Authors' calculations from Equifax/CCP.

Credit limits and debts vary over time, utilization does not



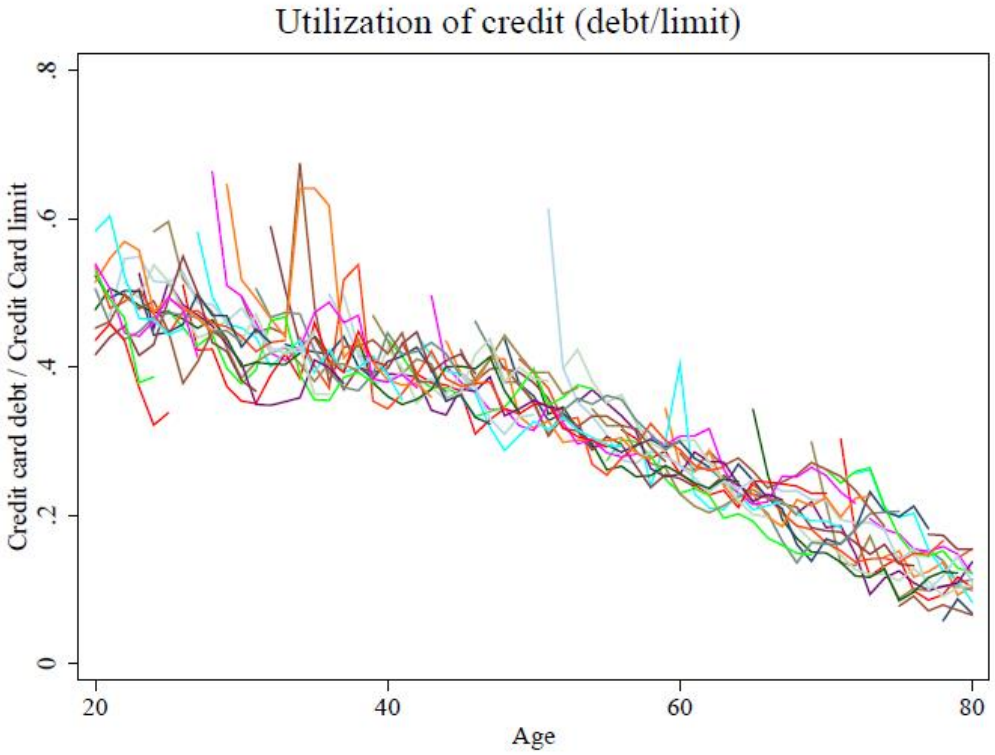
Source: Author's calculations from Equifax/CCP.

Credit limits and debts increase with age



Source: Author's calculations from Equifax/CCP.

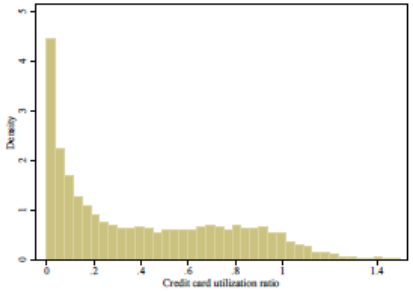
Credit utilization decreases slowly



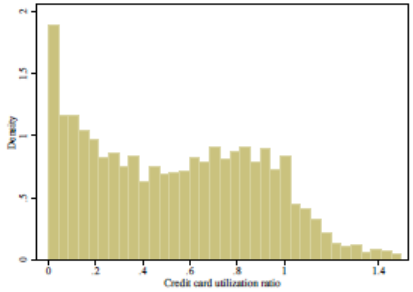
Source: Author's calculations from Equifax/CCP.

Distributions of utilization by age

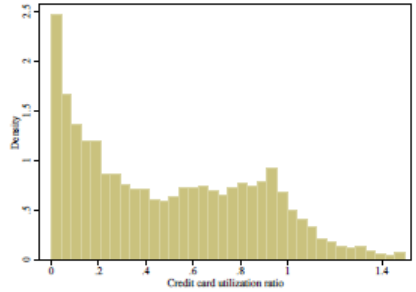
All ages



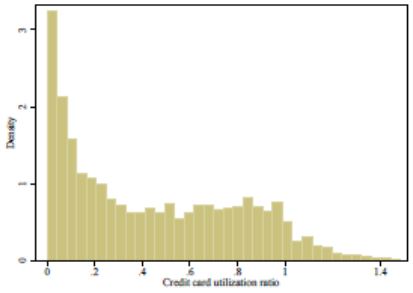
Age 20-30



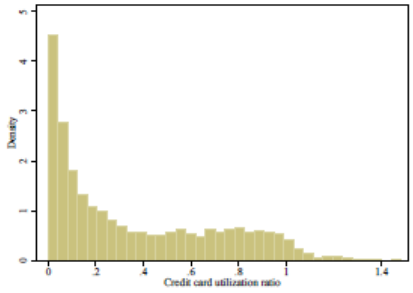
Age 30-40



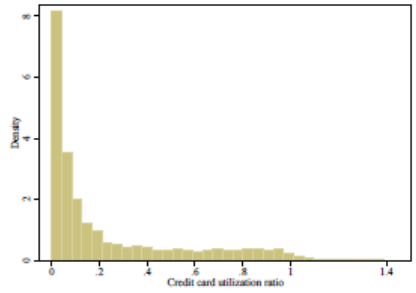
Age 40-50



Age 50-60



Age 60-80



Source: Author's calculations from Equifax/CCP.

A little theory

- **Convenience users**: Past debts or utilization not predictive of future utilization

$$D_{i,t} = \omega_{i,t} C_{i,t}$$

$$\text{Credit utilization}_{i,t} = D_{it}/B_{it} = \omega_{i,t} C_{i,t}/B_{i,t}$$

- **Revolvers**: Past debts or utilization predict future debts and utilization. Accumulation equation:

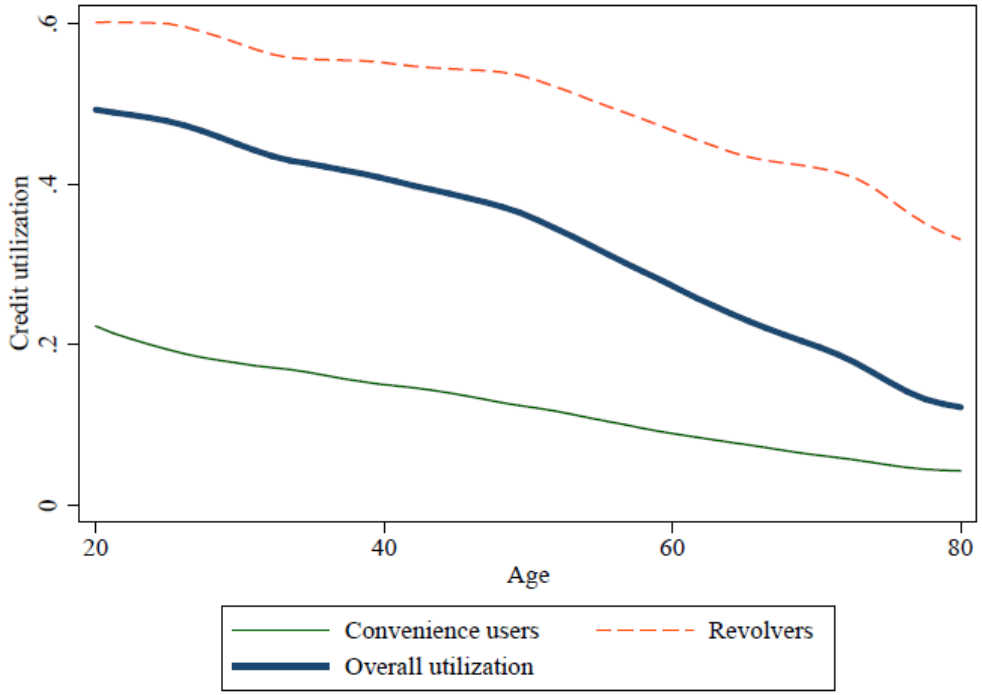
$$D_{t+1} = (1 + r)(D_t + C_t - Y_t)$$

- Any observation could be coming from either a Revolver or Convenience user.
- Use theory to distinguish which is more probable

A little estimation

- Convenience users and revolvers are not identified in the data.
- Assume convenience users essentially do not respond to limits.
  - Based on the assumption, can estimate probabilities that an individual in the Equifax/CCP data is a convenience user vs. revolver, based on the time series of their past limits and debts.
- Further impose the SCF conditional likelihood of revolving/convenience based on credit utilization and age to be the same as those estimated in Equifax/CCP.
- To implement estimation, use an expectation maximization (EM) procedure, to infer/identify convenience use and revolving.

Credit utilization by convenience users and revolvers



Notes: Linear age trend is from fixed effects. Colinearity of age-cohort-year effects means the linear trend can be in any of them. Source: Author's calculations from Equifax/CCP.

Credit utilization results

$$\text{Credit utilization}_{it} = \theta_t + \theta_a + \alpha_i + \beta \text{Credit utilization}_{i,t-1} + \epsilon_{it}$$

	Credit utilization$_t$					
	All	All	All	All	All	Revolver
Credit utilization$_{t-1}$	0.874***	0.868***	0.647***	0.647***	0.514***	0.766***
	(0.000876)	(0.000892)	(0.00131)	(0.00139)	(0.00441)	(0.00125)
Credit utilization$_{t-2}$				0.0156***		
				(0.000643)		
Credit util$_{t-1}$ × Age					0.00314***	
					(9.93e-05)	
Constant	0.0479***					
	(0.000461)					
Observations	347,642	347,642	347,642	332,696	347,642	238,111
R-squared	0.741	0.743	0.429	0.444	0.431	0.616
Fixed effects	No	No	Yes	Yes	Yes	Yes
Age and year effects	No	Yes	Yes	Yes	Yes	Yes
Number of accounts			10,451	10,103	10,451	
Frac. Variance from FE			0.477	0.467	0.498	

Source: Author's calculations from Equifax/CCP.

Credit and debt regressions

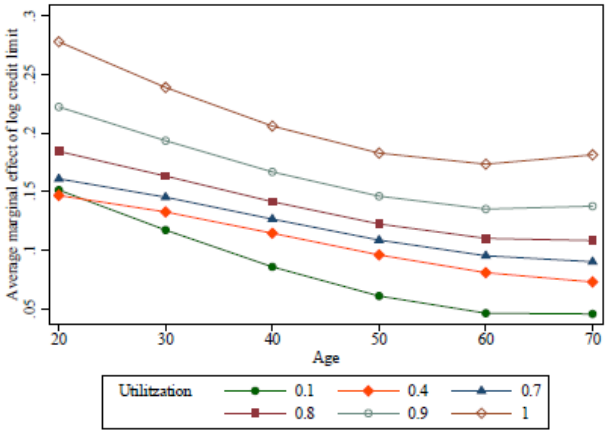
$$\text{Log Debt}_{it} = \theta_i + \theta_t + \theta_a + \alpha \text{Log Limit}_{i,t-1} + \beta \text{Log Debt}_{i,t-1} + \epsilon_{it}$$

	Log Debt$_t$				Log Limit$_t$		
	All	All	All	Revolvers	All	Convenience	Revolvers
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Log Debt$_{t-1}$	0.505***	0.758***	0.604***	0.861***	0.00687***	-0.0141***	0.0240***
	(0.00157)	(0.00119)	(0.00132)	(0.000593)	(0.000561)	(0.000580)	(0.000616)
Log Credit Limit$_{t-1}$	0.414***	0.134***	0.313***	0.130***	0.848***	0.736***	0.903***
	(0.00262)	(0.00148)	(0.00243)	(0.000787)	(0.000933)	(0.00114)	(0.000807)
Observations	296,369	296,369	361,280	293,014	307,805	361,280	361,280
R-squared	0.432	0.667	0.610	0.926	0.778	0.412	0.412
Accounts	10,028		10,718	10,718	10,149	10,718	10,718
Fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes
Zero included	No	No	Yes	No	No	Yes	Yes
Age effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Long-term credit impact	0.862	0.875	0.879	0.990			
Credit salience σ	0.443	0.665	0.530	0.756			

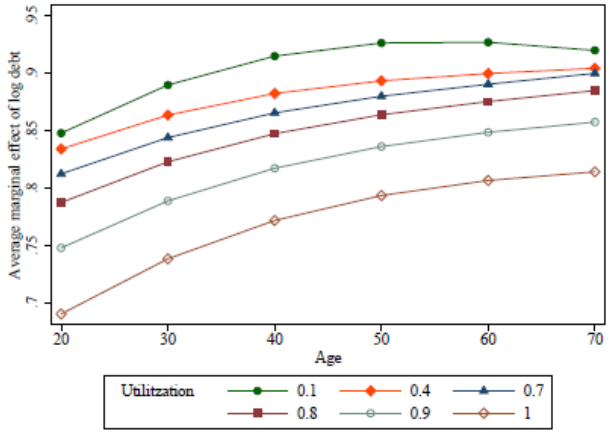
Source: Author's calculations from Equifax/CCP.

Interactions with utilization and age for Revolvers

One quarter impact 1% change in limit



One quarter impact 1% change in debt



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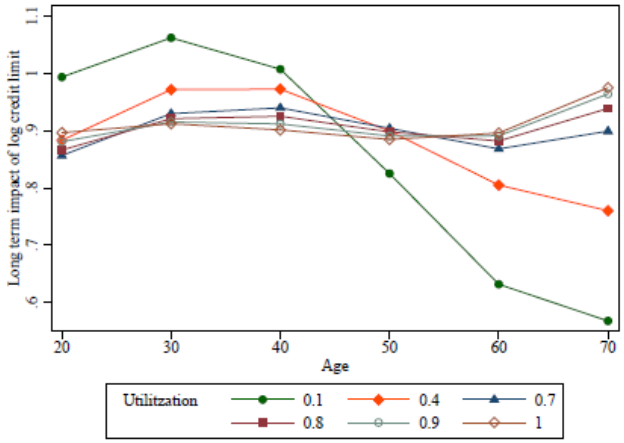
Long term impact 1% change in limit



Source: Author's calculations from Equifax/CCP.

Summary of results

- Aggregate utilization of credit is essentially acyclical.
- Average utilization starts at ∼50% (age 20) and drops to ∼20% (age 60).
  - Convenience users have lower, more stable utilization over lifetime.
  - Revolvers have higher, declining utilization over lifetime.
  - Transition of some revolvers to convenience users is an important dynamic of average lifecycle utilization.
- Revolvers adjust their debt to changes in credit limits essentially one-for-one within two years.
  - Assumes convenience users essentially do not respond to limits.
- Future research:
  - a model to interpret results, using an extension of Gourinchas and Parker (2001) and Cagetti (2003).

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