

Aggregate and Distributional Dynamics of Consumer Credit in the US

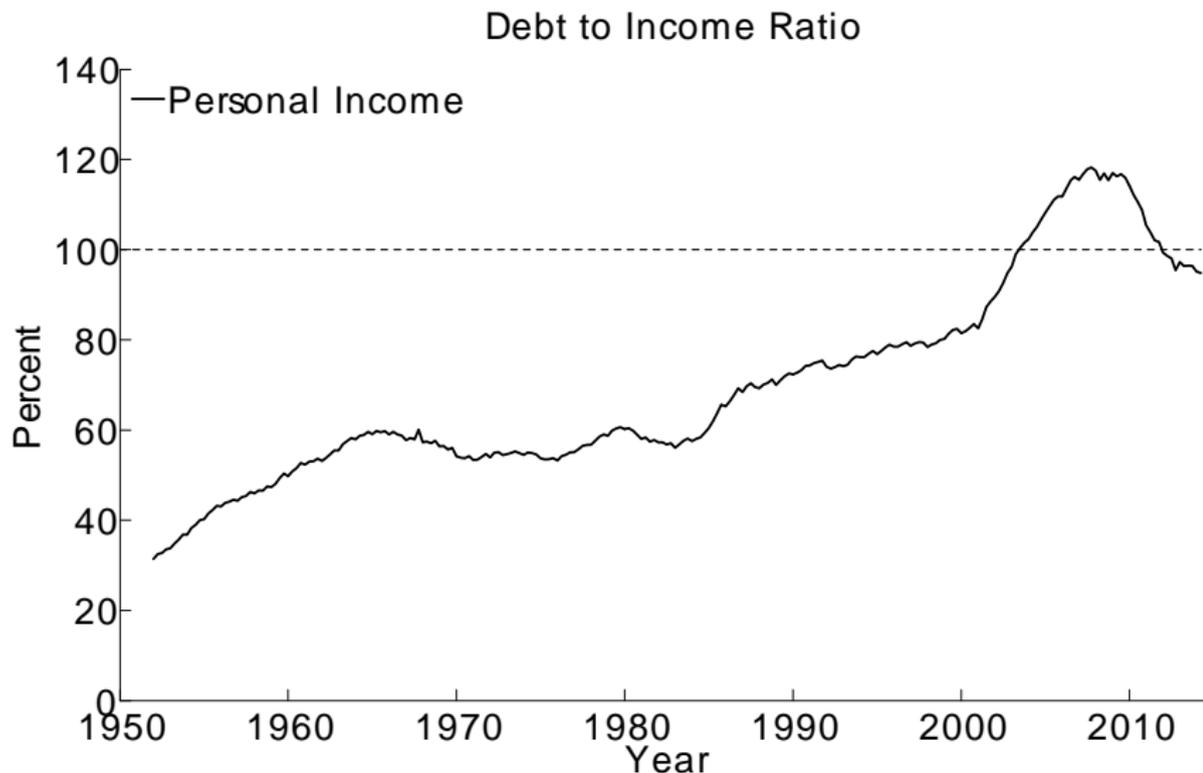
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Annual Meeting of the SED, Warsaw, Poland

June, 2015

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Aggregate Dynamics of Consumer Credit in the US



Source: Flow of Funds

Purpose of Today's Talk (I)

- ▶ Document the distributional dynamics of consumer credit (unsecured and secured) by age
 - ▶ Unsecured credit is relatively flexible (i.e., credit cards, store credit)
 - ▶ Secured credit is more rigid (long-term with built repayment structure and amortization)
- ▶ Want to argue that the behavior of unsecured credit depends on the presence of other liabilities (auto and student loans, and mortgage)
 - ▶ Limits the ability to borrow in response to negative income shocks
 - ▶ Retract consumption in the presence of opportunities

Purpose of Today's Talk (II)

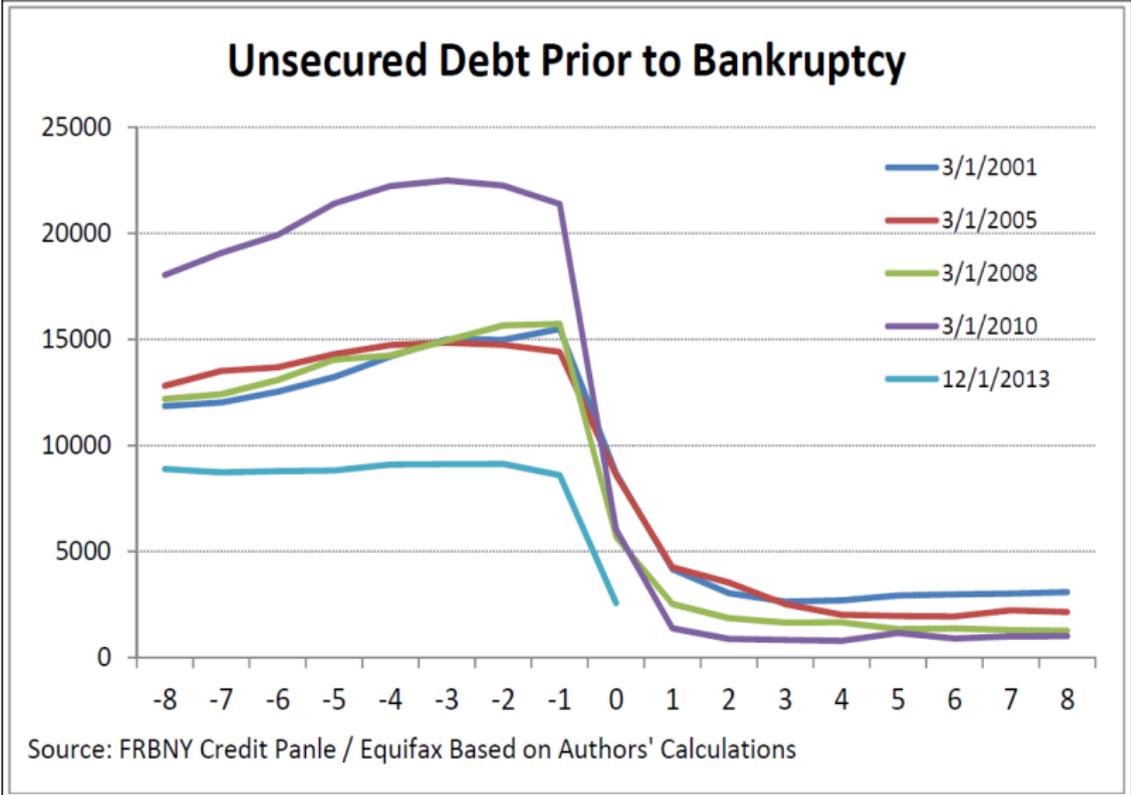
- ▶ Special emphasis on the individuals between 20-34. Why?
 - ▶ The initial debt positions at age 20 are very similar
 - ▶ For this group, the exposure to large shocks (i.e., health, kids, divorce, etc...) is more limited
 - ▶ Look at the average, top and bottom 10% of the borrowers' distribution
- ▶ Examine an off the shelf model and see how it fits the data
 - ▶ Consumption and debt commitments are important to generate short-term borrowing
 - ▶ These can generate borrowing across all income groups

Why do we care?

- ▶ Evaluation of the performance of models with heterogeneous agents
- ▶ **Models of individual credit:** Why do individuals borrow? What are they doing with the loans? smooth consumption, insure shocks, purchase durable/lumpy goods
- ▶ **Models of default:** What does borrowing look like before default? What default options are preferred?

Example: Borrowing prior to default

Figure 8: Unsecured Debt Adjustments Prior to Bankruptcy



Key Findings: Credit in General

- ▶ The distribution of unsecured debt holding is “hump-shaped” by age with a peak around age 48-55.
- ▶ The distribution of mortgage debt, auto debt, and student loans peak earlier.
- ▶ Individuals that also hold mortgage debt have much larger balances of unsecured credit.

Key Findings: Credit Boom and the Great Recession

- ▶ The credit boom expanded borrowing across all four classes.
- ▶ The Great Recession significantly reduced consumer debt balances for all age cohorts but increased holdings of student debt
- ▶ Default
 - ▶ For individuals between age 20 and 31, the Great Recession triggers an increase in foreclosure rates as a vehicle to discharge unsecured debt.
 - ▶ The bankruptcy option is not used as frequently as foreclosure because of the smaller size of unsecured debt relative to mortgage debt.
 - ▶ Unlike other periods, young individuals tried to decrease unsecured debt levels but fail and use the bankruptcy option.

Data and Limitations

Data Source: FRBNY's Consumer Credit Sample (CCP)

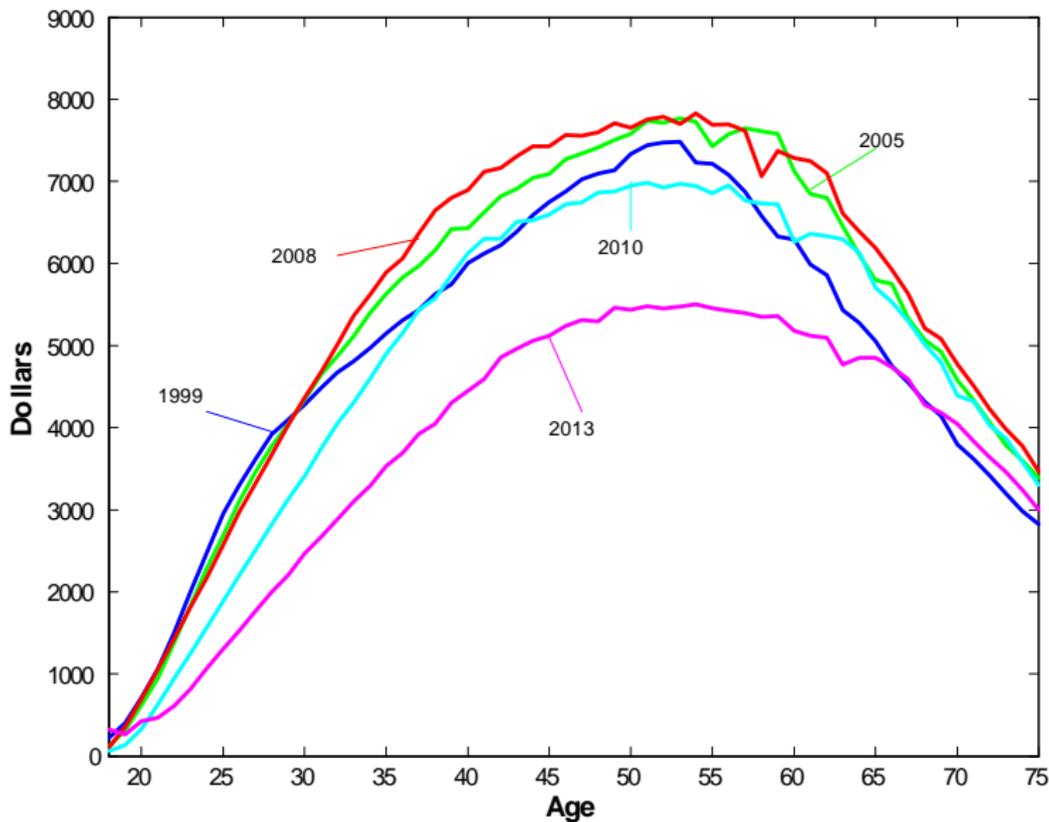
- ▶ Analysis based on FRBNY's Consumer Credit Sample (CCP) and Survey of Consumer Finances (SCF)
- ▶ The CCP is a longitudinal quarterly database that tracks the liability side of consumers' balance sheets (2004-2013)
- ▶ Database is a 5% random sample of credit reports provided by Equifax.
- ▶ Individual data on
 - ▶ unsecured and secured balances,
 - ▶ payments,
 - ▶ delinquencies, bankruptcies, and foreclosures (not today)

Limitations

- ▶ The data set (FRBNY Credit Panel/Equifax) is very detailed in documenting liabilities, but it has no information about assets or income.
- ▶ Complement the dynamic analysis by matching the data with the SCF to gather more information about each individual (education, income, wealth,...)
- ▶ Very difficult to separate changes in credit supply (tightening of credit) from deleverage
- ▶ Models can be used to identify features that are important to understand the dynamics of liabilities, and then backout implied assets and income

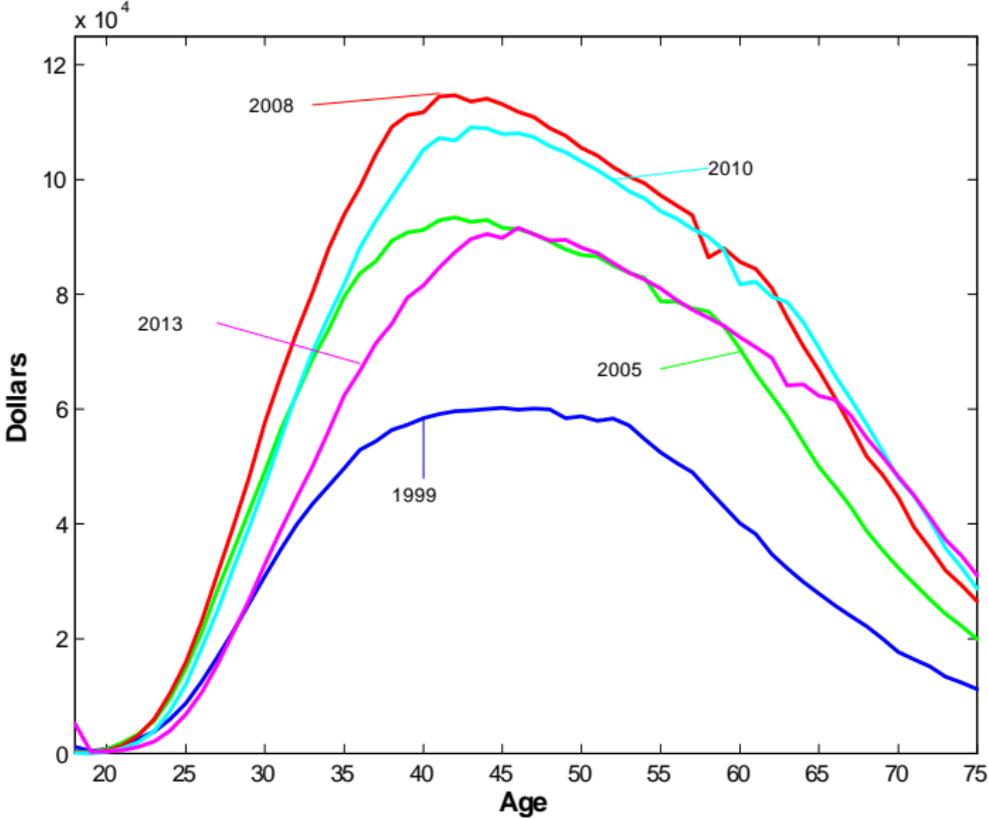
Has the use of the types of household debt changed over time?

Unsecured Consumer Credit (Credit Cards)



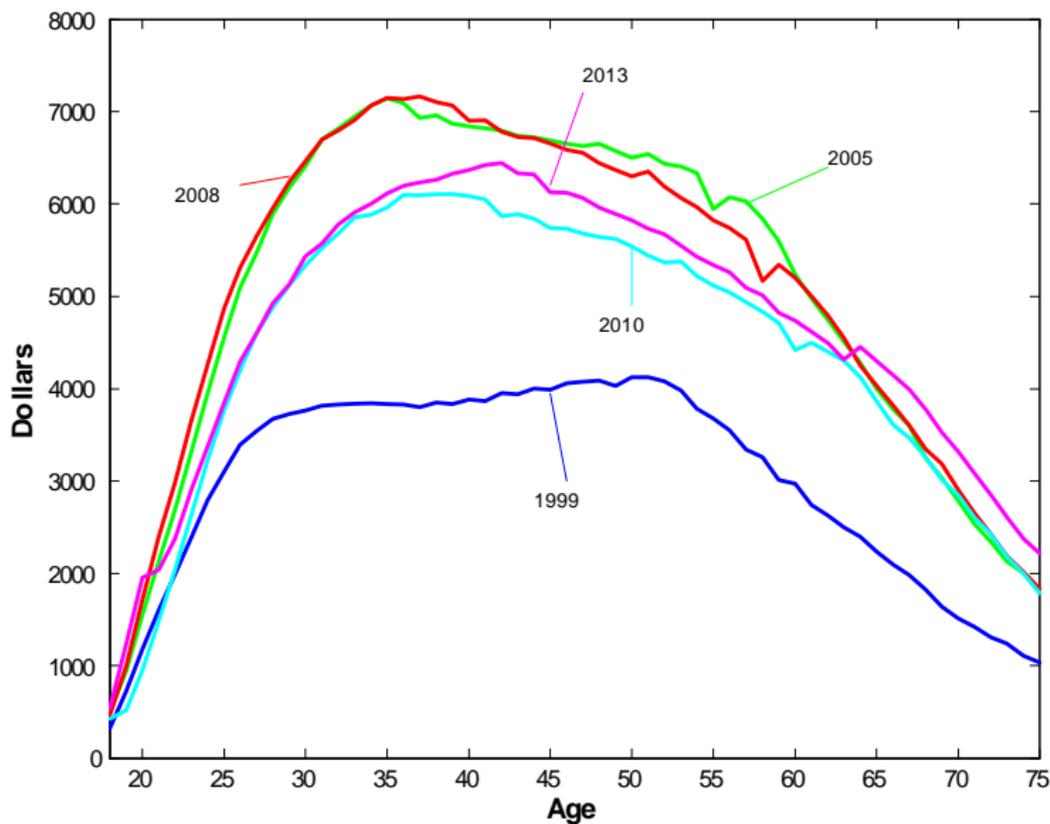
Source: FRBNYConsumerCreditPanel/Equifax

Mortgage Loans



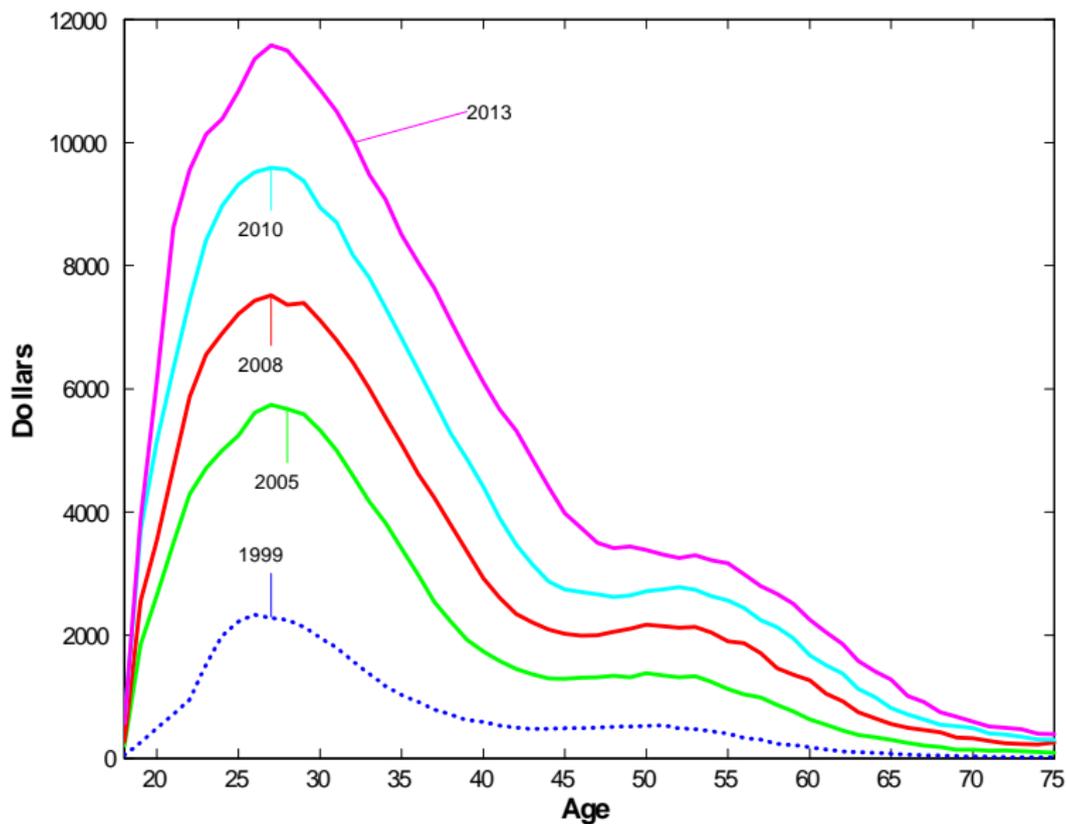
Source: FRBNYConsumerCreditPanel/Equifax

Auto Loans



Source:FRBNYConsumerCreditPanel/Equifax

Student Loans



Source: FRBNYConsumerCreditPanel/Equifax

What is the Takeaway?

Consumer Debt Categories:

- ▶ Behave differently over time.
- ▶ Have different age-cohort participation rates.

Facts on the Participation Rate in Types of Household Debt

Renters: Holding Shares of Debt by Age

Type of Debt Holding	21-35 Age Cohorts			All Age Cohorts		
	6/2004	6/2009	6/2014	6/2004	6/2009	6/2014
No Debt	27.3%	26.4%	25.5%	35.2%	36.9%	38.6%
Unsec.	31.5	24.1	20.2	38.1	32.4	28.1
Auto	4.8	4.5	5.1	3.7	4.3	4.5
Stu Debt	5.4	10.2	15.0	2.1	4.2	6.0
Unsec.&Auto	15.3	11.9	10.5	14.2	12.1	11.6
Unsec.&Stu Debt	10.0	12.8	12.5	4.0	5.5	5.7
Auto& Stu Debt	0.8	2.1	3.0	0.4	1.0	1.3
Unsec&Auto&Stu Debt	4.8	7.1	8.0	2.1	3.4	4.1

Source: FRBNY Consumer Credit Panel/Equifax

- ▶ The largest participation rate is unsecured credit only
- ▶ Recently, student debt has become more important.
- ▶ Holding shares vary over debt category and by age.
- ▶ Holding of young differ from the entire population holding shares.

Homeowners: Holding Shares of Debt by Age

Type of Debt Holding	21-35 Age Cohort			All Age Cohort		
	6/2004	6/2009	6/2014	6/2004	6/2009	6.2014
Mortg.	7.7	7.6	7.9	8.5	9.0	9.5
Unsec.&Mortg	32.5	27.3	24.3	44.0	42.5	38.9
Auto&Mortg.	4.9	5.5	5.0	3.8	3.9	4.2
Mortg&Stu Debt	1.0	2.2	2.9	0.3	9.0	1.1
Unsec&Mortg&Auto	39.3	30.1	29.3	37.4	32.2	32.6
Unsec&Mortg&Stu Debt	5.8	10.4	10.7	2.5	4.8	5.3
Auto&Mortg&Stu debt	1.0	2.2	2.1	0.3	0.6	0.7
All Forms	7.8	14.7	17.8	3.2	6.0	7.7

Source: FRBNY Consumer Credit Panel/Equifax

- ▶ The largest participation rate combines mortgage debt with another form of debt.
- ▶ Just like the renter case, the holding shares vary over debt category and by age.

Facts on the Levels of Household Debt

Levels of Unsecured Debt: Renters

Levels of Unsecured Debt

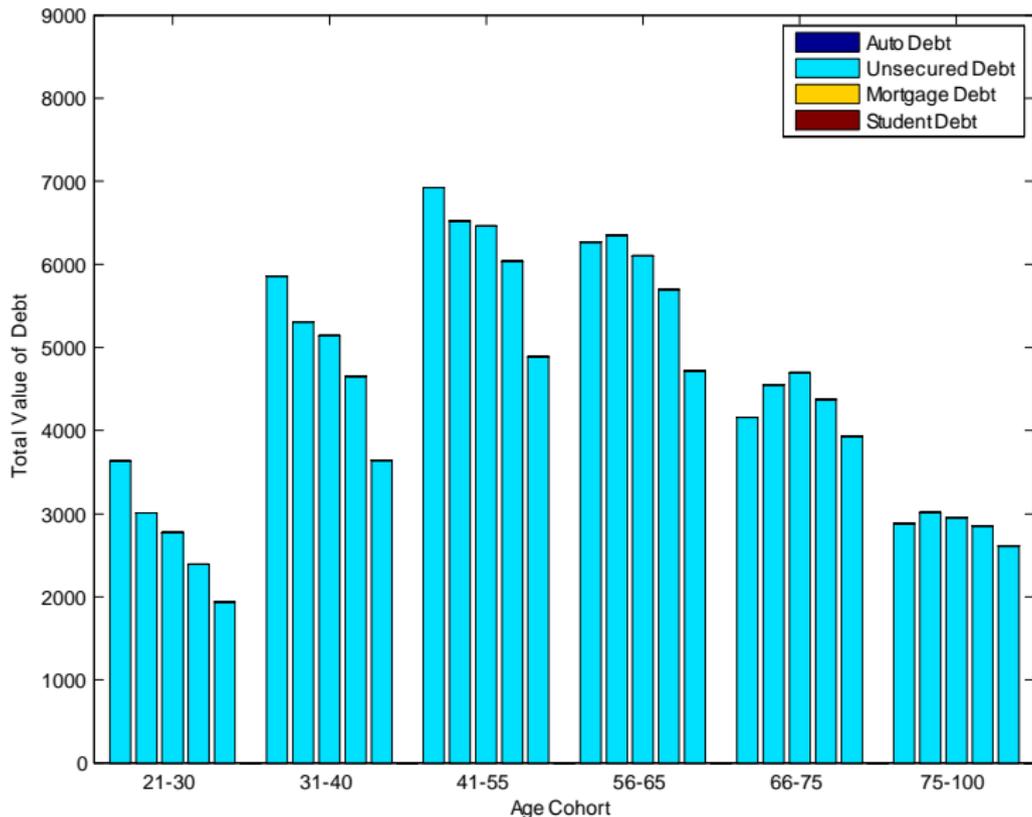
(data in thousands)

June,2004 June,2009 June 2014

All Cohorts			
upper 10%	30.5	28.8	20.5
average	5.2	4.7	3.6
lower 10%	2.4	2.2	1.8
Age 18-35			
upper 10%	21.5	16.6	10.8
average	3.9	3.0	2.1
lower 10%	2.1	1.6	1.2

Source: FRBNY Consumer Credit Panel/Equifax

Holding Only Unsecured Credit (Samples '99,'05,'08,'10,'13)



Levels of Auto: Renters

Levels of Auto Debt

(data in thousands)

	June,2004	June,2009	June 2014
All Cohorts			
upper 10%	30.5	28.8	20.5
average	5.2	4.7	3.6
lower 10%	2.4	2.2	1.8
Age 18-35			
upper 10%	37.5	31.4	32.6
average	13.4	12.3	12.3
lower 10%	20.8	10.1	10.1

Source: FRBNY Consumer Credit Panel/Equifax

Levels of Student Debt: Renters

Levels of Student Debt

(data in thousands)

	June,2004	June,2009	June 2014
All Cohorts			
upper 10%	57.6	68.0	86.1
average	13.4	16.9	20.1
lower 10%	8.6	11.0	13.1
Age 18-35			
upper 10%	55.2	67.9	76.3
average	12.3	16.8	18.3
lower 10%	8.3	10.6	12.1

Source: FRBNY Consumer Credit Panel/Equifax

Levels of Unsecured Debt and Auto Debt: Renters

Levels of Unsecured and Auto Debt

(data in thousands)

	June,2004		June,2009		June 2014	
	Unsec.	Auto	Unsec.	Auto	Unsec.	Auto
All Cohorts						
upper 10%	33.7	47.8	31.8	35.6	9.8	41.6
average	8.4	18.0	7.5	15.2	3.5	15.8
lower 10%	5.7	14.9	5.0	13.5	2.0	13.1
Age 18-35						
upper 10%	21.2	48.4	17.8	36.0	18.5	42.4
average	6.4	17.8	5.1	15.2	9.2	16.1
lower 10%	4.8	14.5	3.8	13.5	3.8	13.4

Source: FRBNY Consumer Credit Panel/Equifax

What is the Takeaway?

- ▶ The level of debt varies over time and by debt instrument.
- ▶ The level of debt, by category, varies within an age cohort.

Who are these Renters?

SCF: Renters -18-35 cohort (data in thousands)

Category	SCF		Asset Categories				Debt Categories			
	Year	Obs.	Income	Vehic	Stocks	MM	C/C	Vehic.	Mortg	Stud
Only Secured	2004	102	38.0	6.7	2.0	0.5	5.5	0	0	0
	2010	154	45.1	7.5	3.1	0.5	5.4	0	0	0
	2013	131	37.8	7.2	3.0	5.6	2.2	0	0	0
Only Student	2004	20	22.4	3.8	0.9	0	0	0	0	16.5
	2010	76	34.3	3.9	1.1	0	0	0	0	19.5
	2013	85	20.2	3.9	0.4	6.0	0	0	0	18.4
Only Auto Debt	2004	144	35.4	14.9	0.9	0.2	0	11.3	0	0
	2010	28	39.8	16.0	0	0	0	7.6	0	0
	2013	33	38.9	14.2	0	0	0	7.3	0	0
Unsec. & Auto	2004	49	40.8	18.4	1.0	4.8	3.0	10.9	0	0
	2010	47	48.8	20.1	1.7	0.9	2.1	9.9	0	0
	2013	58	47.4	20.1	4.9	0.3	2.3	11.8	0	0

Source: Survey of Consumer Finance

Levels of Mortgage Debt: Homeowners

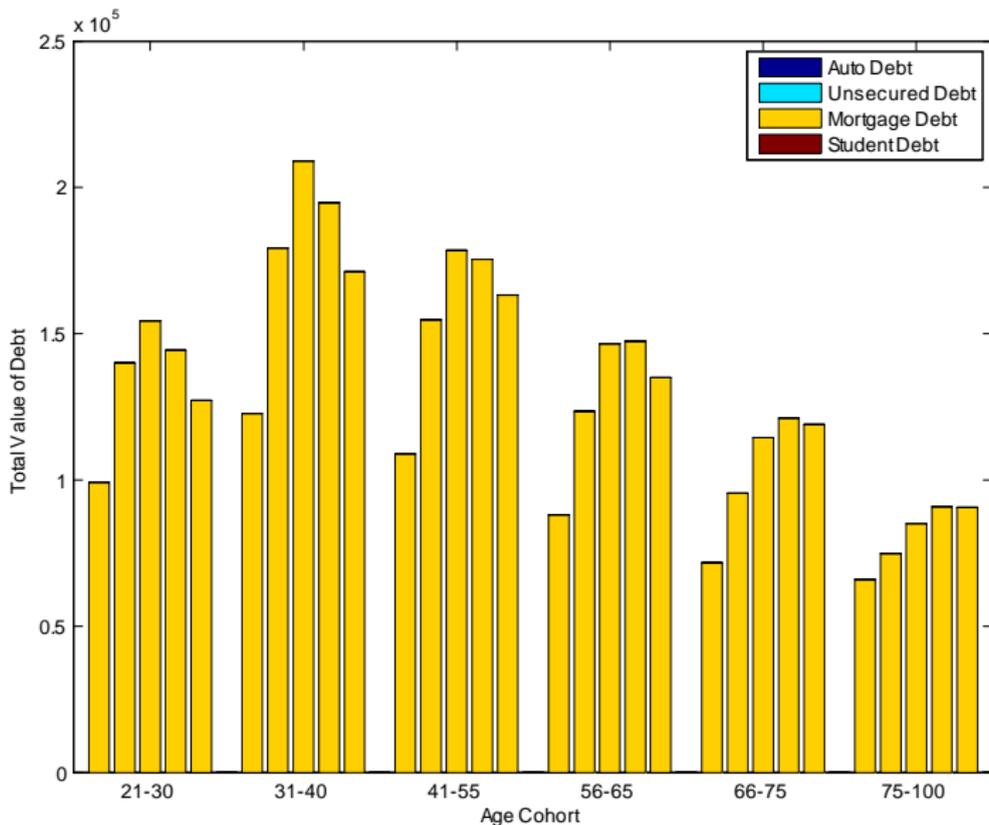
Levels of Mortgage Debt

(data in thousands)

	June,2004	June,2009	June 2014
All Cohorts			
upper 10%	487.9	624.4	527.8
average	134.8	160.8	142.5
lower 10%	97.2	110.9	101.5
Age 18-35			
upper 10%	454.4	575.2	431.8
average	148.1	176.5	143.2
lower 10%	116.1	135.9	112.9

FRBNY Consumer Credit Panel/Equifax

Holding Only Mortgage Debt (Samples '99,'05,'08,'10,'13)



Source: FRBNYConsumerCreditPanel/Equifax

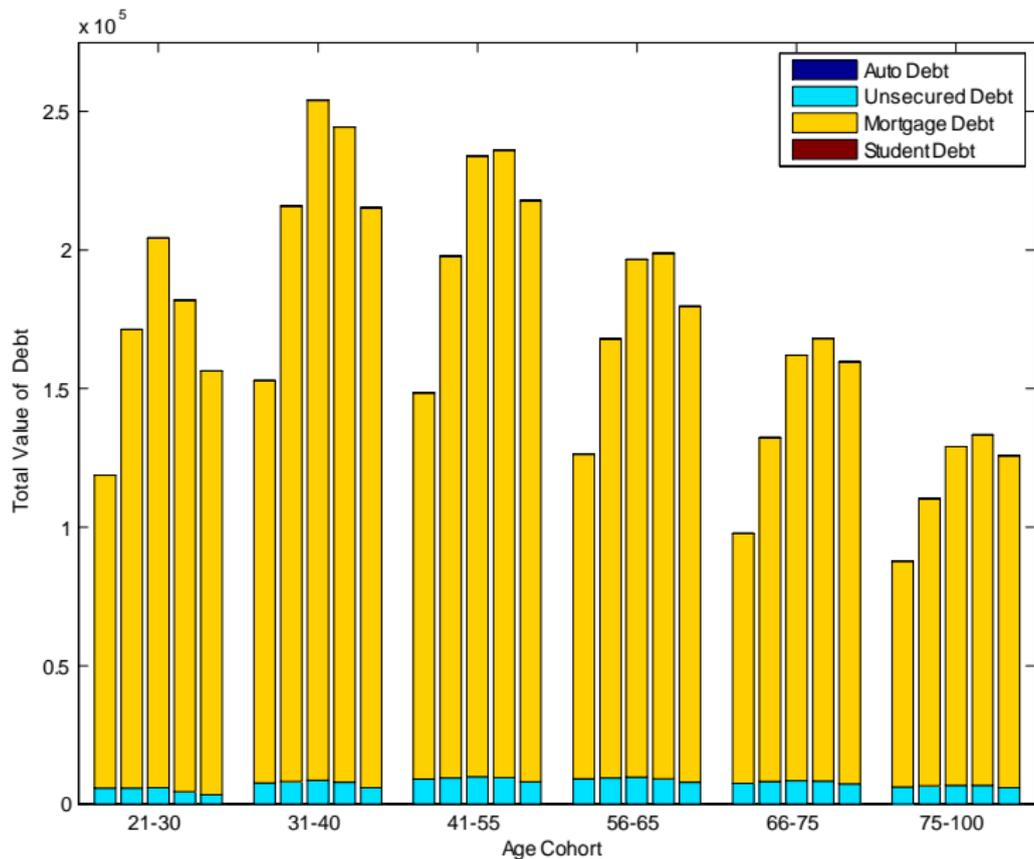
Levels of Unsecured and Mortgage Debt: Homeowners

Levels of Unsecured Debt and Mortgage Debt (data in thousands)

	June,2004		June,2009		June 2014	
	Unsec.	Mortg.	Unsec.	Mortg.	Unsec.	Mortg.
All Cohorts						
upper 10%	16.8	602.4	20.5	801.2	13.2	663.3
average	9.2	170.5	9.5	210.5	7.3	183.5
lower 10%	8.3	124.5	8.3	147.6	6.7	132.7
Age 18-35						
upper 10%	12.4	524.4	12.3	651.5	5.8	538.9
average	7.7	180.4	7.1	215.9	4.2	187.3
lower 10%	7.2	143.2	6.6	169.8	4.0	150.1

Source: FRBNY Consumer Credit Panel/Equifax

Holding Mortgage and Unsecured Credit Debt



Levels of Auto, Unsecured, and Mortgage Debt: Homeowners

Levels of Auto, Unsecured and Mortgage Debt (data in thousands)

	June, 2004			June, 2009			June 2014		
	Unsec.	Mortg.	Auto	Unsec.	Mortg.	Auto	Unsec.	Mortg.	Auto
All Cohorts									
upper 10%	24.4	584.3	24.4	31.4	789.9	26.3	17.4	641.6	26.5
average	12.3	180.1	12.3	13.5	220.4	18.3	9.3	190.6	18.8
lower 10%	11.0	137.1	11.1	11.5	159.8	17.5	8.4	142.6	18.0
Age 18-35									
upper 10%	15.4	483.5	31.9	22.0	604.1	24.8	8.3	448.3	23.8
average	9.6	176.6	17.8	10.4	209.0	19.7	5.9	172.8	20.0
lower 10%	8.9	144.0	15.7	9.0	166.7	18.6	5.6	143.7	17.8

Source: FRBNY Consumer Credit Panel/Equifax

Who are these Homeowners?

SCF: Homeowners 18-35 Cohort (data in thousands)

Debt Category	SCF		Asset Categories					Debt Categories		
	Year	Obs	Income	Vehic	Stock	MM	House	C/C	Vehic.	Mortg
Only Mortgage	2004	12	36.2	9.5	0	0	98.3	0	0	64.3
	2010	19	42.6	7.3	0	0	109.2	0	0	83.8
	2013	11	46.4	7.6	2.7	0	119.0	0	0	93.6
Unsec & Mortg.	2004	66	88.0	14.5	11.9	4.4	293.2	5.6	0	185.9
	2010	76	79.8	15.4	2.9	16.2	215.8	8.8	0	160.2
	2013	59	85.6	15.7	1.3	5.4	238.8	2.5	0	215.9
Unsec, Auto, & Mort	2004	60	91.9	32.4	6.1	3.2	239.2	5.7	18.9	162.4
	2010	40	90.4	32.5	1.2	5.6	204.6	6.1	20.1	172.4
	2013	58	96.8	30.6	24.7	7.7	219.3	3.9	16.6	166.6

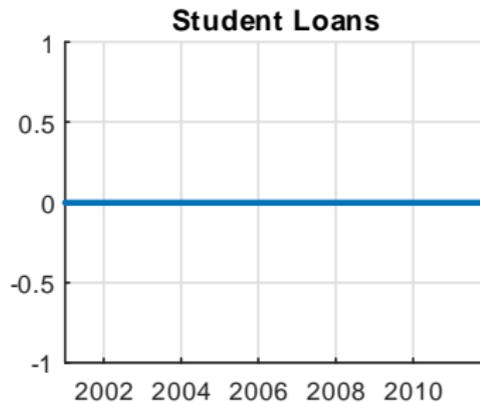
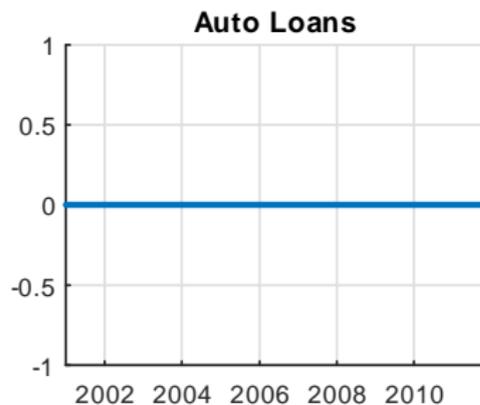
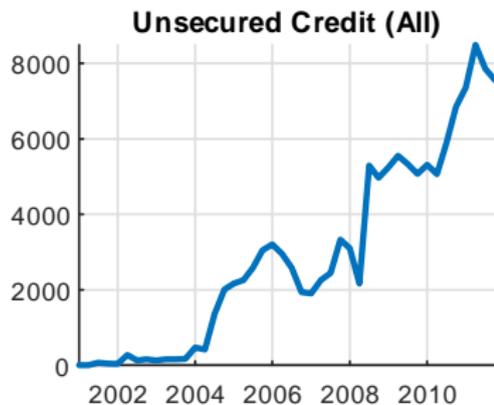
Source: Survey of Consumer Finance

How do Households Adjust to Shocks?

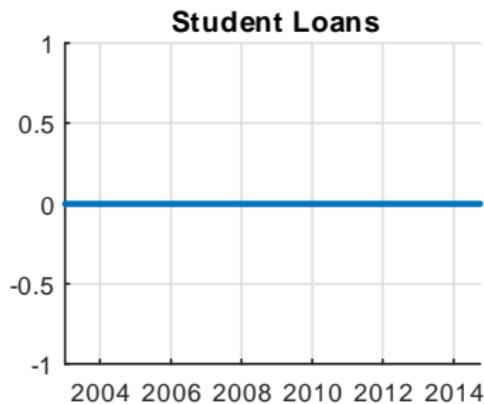
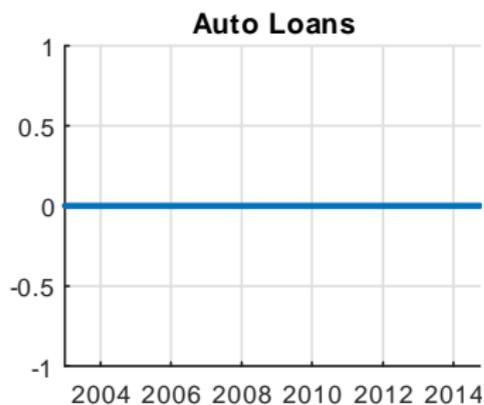
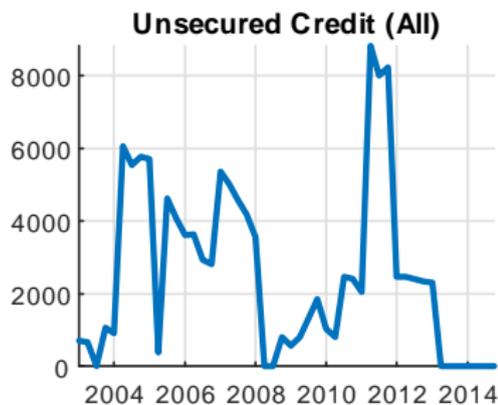
Response to shocks

- ▶ Unsecured credit is a very flexible instrument to borrow and insure shocks
- ▶ Secured credit is usually long-term and rigid (commitment)
 - ▶ Installment (auto) loans: 4-5 years
 - ▶ College loans: 5-10 years
 - ▶ Mortgages: 30 years

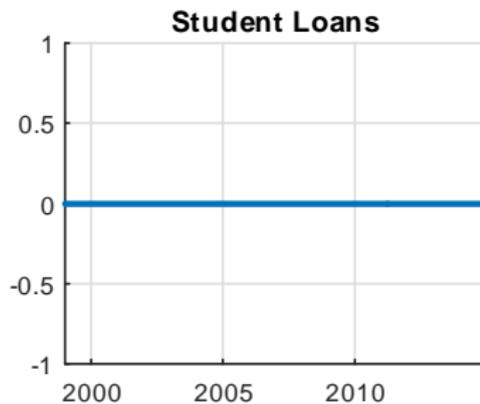
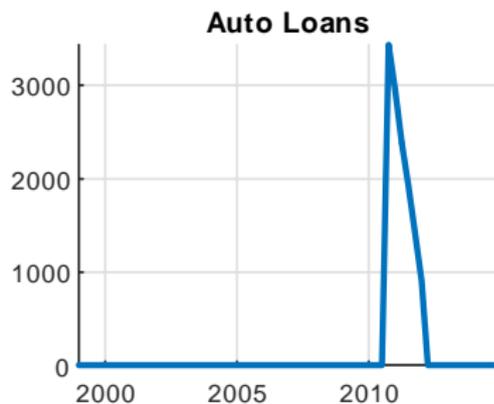
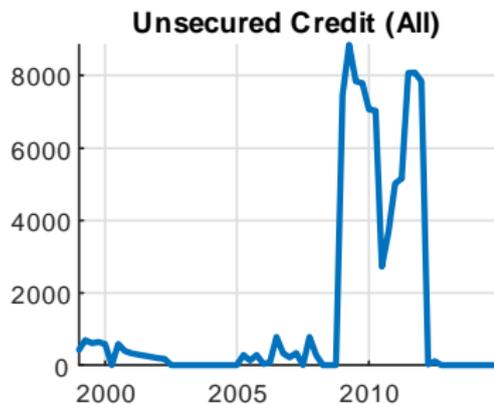
Case 1: Only Unsecured Credit (Life-Cycle)



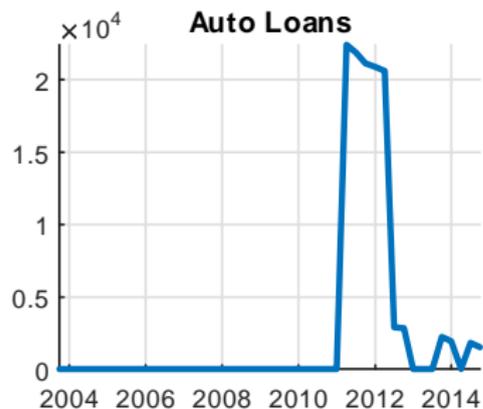
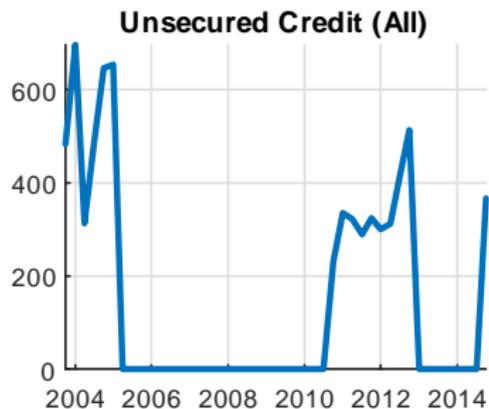
Case 2: Only Unsecured Credit (Income Shocks)



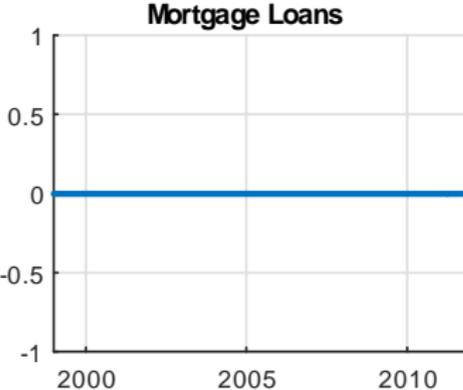
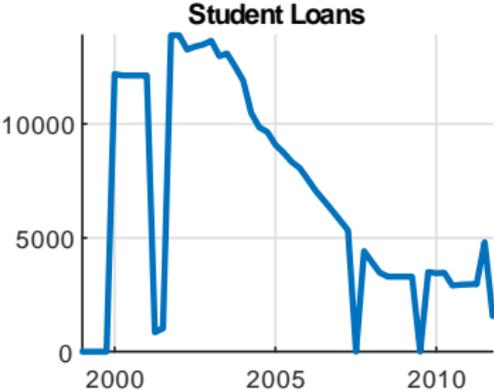
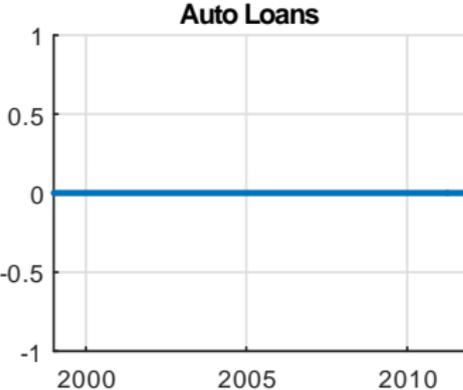
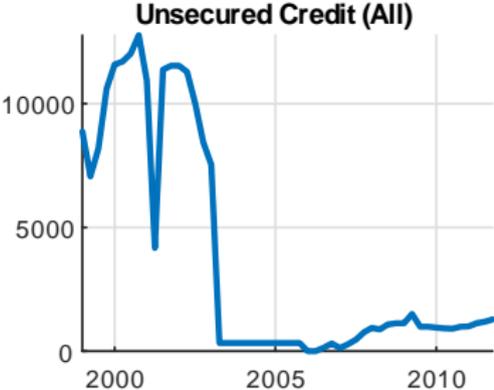
Case 3a: Lumpy borrowing



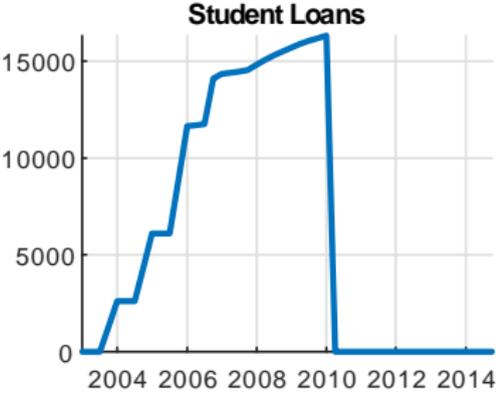
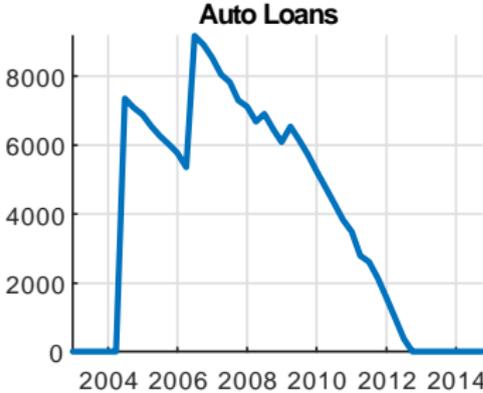
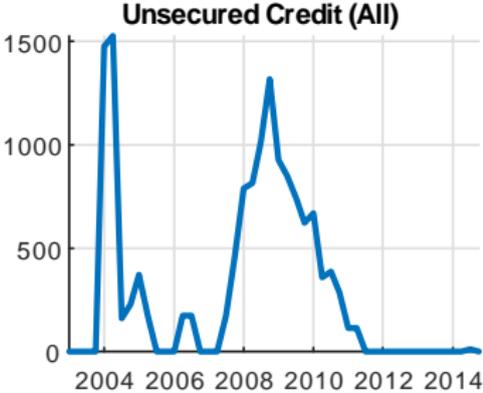
Case 3b: Lumpy borrowing



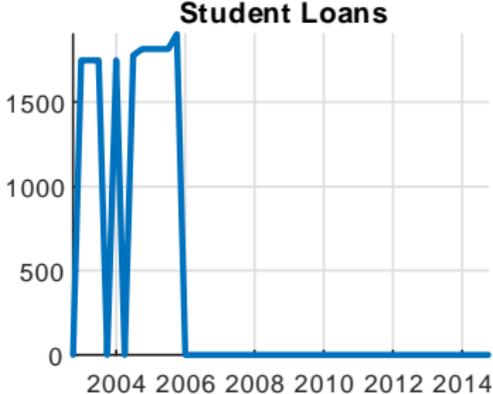
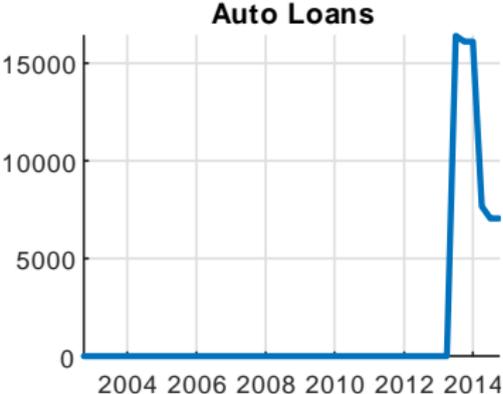
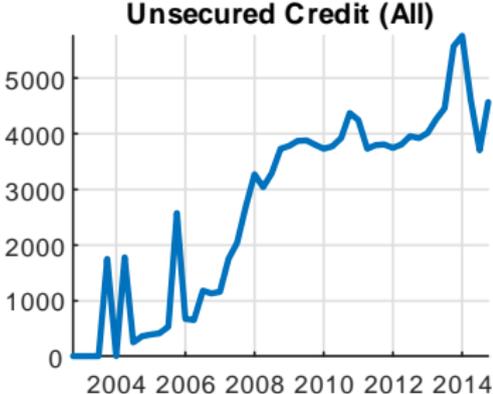
Case 4: Unsecured credit funds college



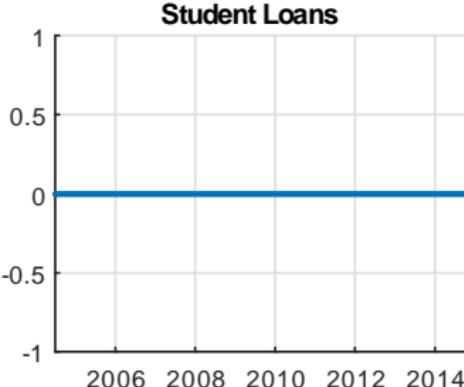
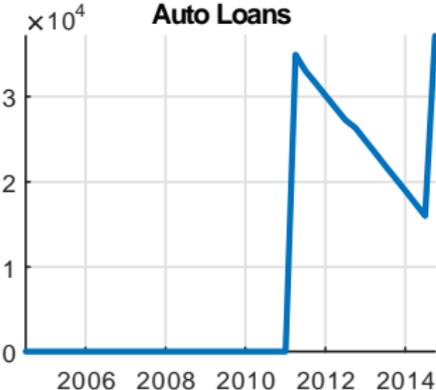
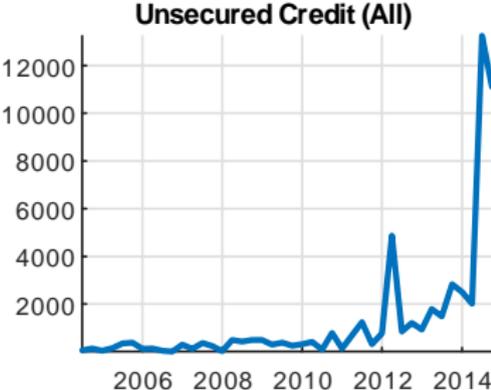
Case 5a: Commuting



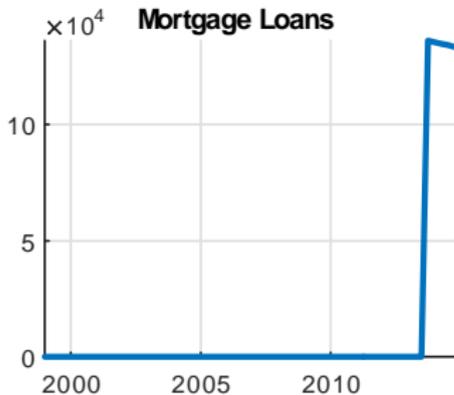
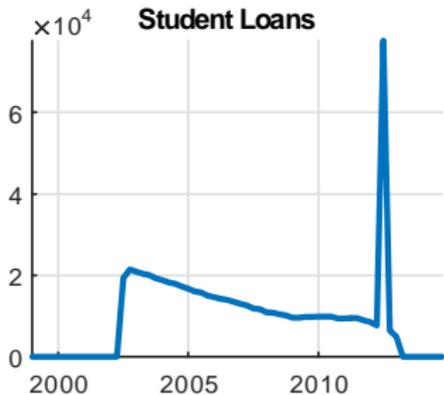
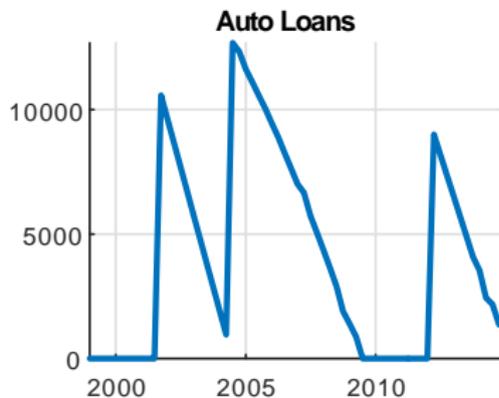
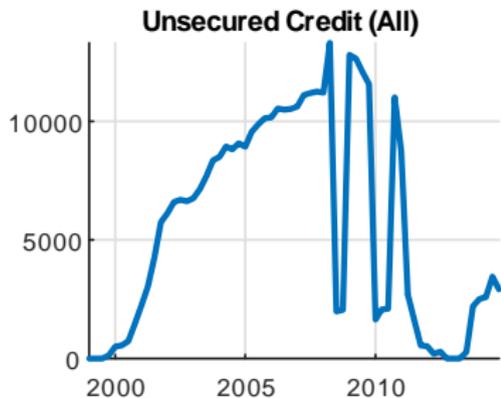
Case 5b: Commuting



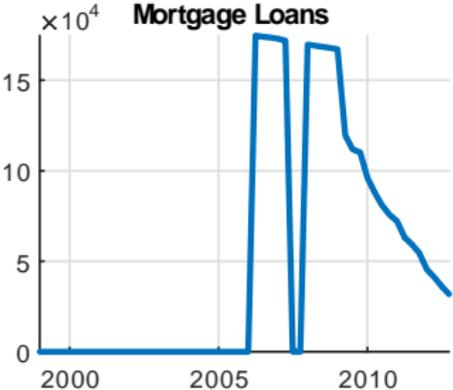
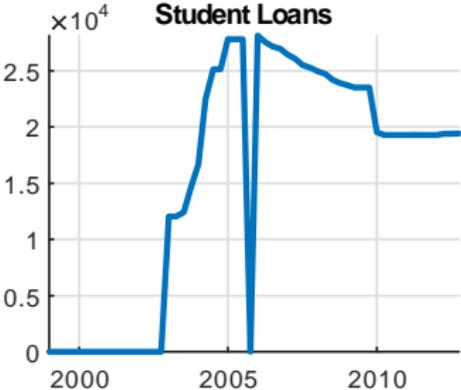
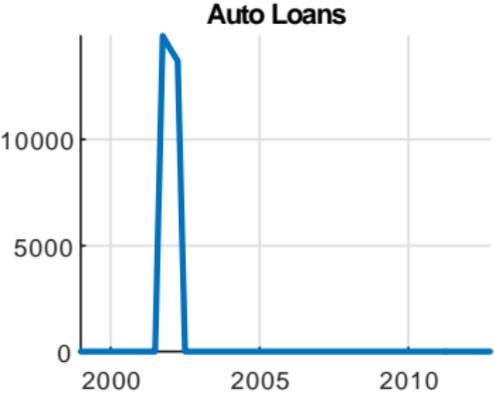
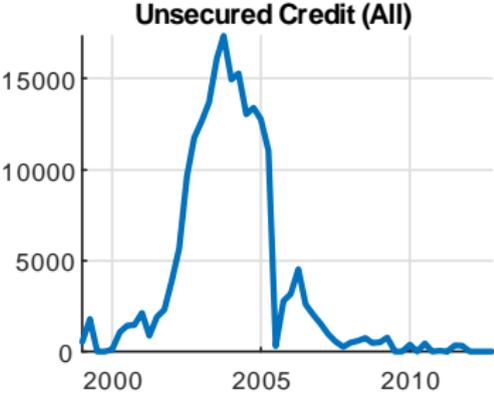
Case 6: Add housing



Case 7a: Not all debt is correlated



Case 7b: Not all debt is correlated



Model

Model

- ▶ Consumption/Savings over the life-cycle with uninsurable income risk
- ▶ Preferences over consumption and durables $u(c, d)$ with the usual properties.
- ▶ Earnings:
 - ▶ Persistent shock (e_j): 3 state Markov chain Γ with transition matrix:

$$\Gamma_{e,e'} = \begin{bmatrix} \pi_{11} & 1 - \pi_{11} & 0 \\ \pi_{21} & \pi_{22} & \pi_{23} \\ 0 & 1 - \pi_{33} & \pi_{33} \end{bmatrix} = \begin{bmatrix} 0.992 & 0.008 & 0 \\ 0.009 & 0.980 & 0.011 \\ 0 & 0.083 & 0.917 \end{bmatrix}$$

- ▶ Transitory shock: Conditional on the persistent shock $F(\varepsilon, e)$

$$F(\varepsilon, e) = \left[\frac{\varepsilon - \underline{\varepsilon}(e)}{\bar{\varepsilon}(e) - \underline{\varepsilon}(e)} \right]^\chi,$$

Baseline Case: Unsecured Credit Only

The problem can be written as

$$\begin{aligned} v(a, j, e) &= \max_{c, y} \{u(c) + \beta \psi_{j+1} E[v(a', j+1, e') / e]\}, \\ \text{s.t.} \quad &c + y = a, \\ &a' = y(1 + r) + \varepsilon, \\ &y \geq \bar{y}. \end{aligned}$$

Consumption and Debt Commitments

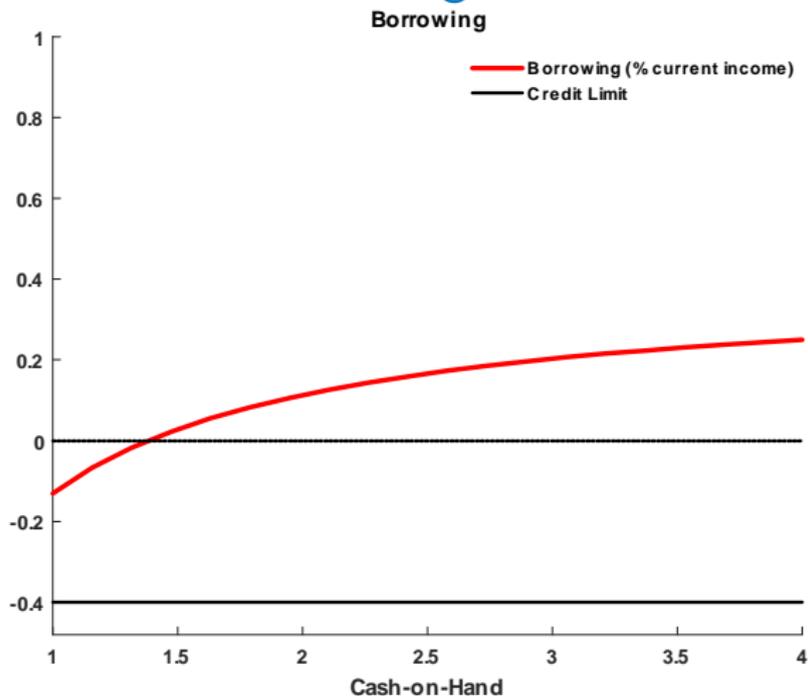
Add consumption or debt commitment (i.e., child daycare or student loans)

$$v(a, b, j, e) = \max_y \left\{ u\left(a - y - \underset{\text{Debt}}{bR} - \underset{\text{Cons.}}{\bar{c}}\right) + \beta_{j+1} Ev(\cdot) \right\},$$

Durable goods with long-term financing (i.e., house or car)

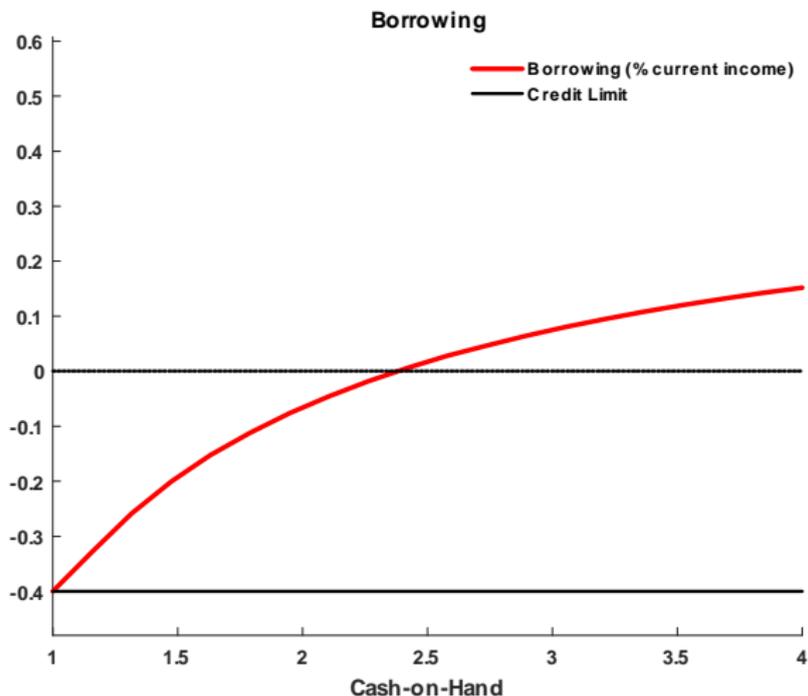
$$v(a, b, h, j, e) = \max_y \left\{ u\left(a - y - \underset{\text{Debt}}{bR} - \underset{\text{Cons.}}{\bar{c}}, h\right) + \beta_{j+1} Ev(\cdot) \right\},$$

Baseline: Short-Term Borrowing



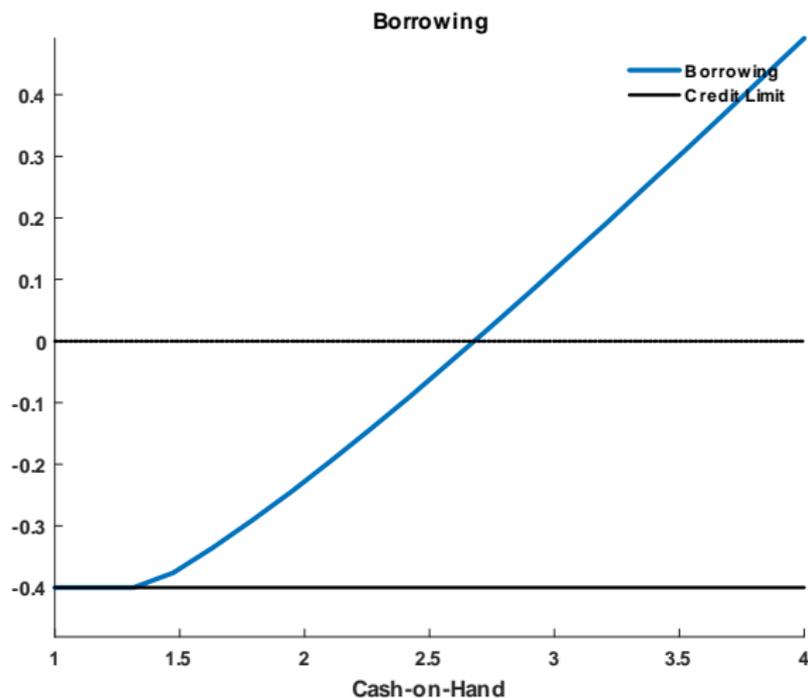
- ▶ $\beta < 1 + r$ designed to generate borrowing
- ▶ Transitory income shocks are insured by adjusting savings (little borrowing)

Add Commitments



- ▶ The income level threshold that uses unsecured credit increases substantially
- ▶ Key insight: The SCF data reveals that the size of the commitment depends on income

Commitments and Borrowing Constraints



- ▶ Borrowing constraints can be important to determine ceilings in the dynamics of debt