

Aggregate Fluctuations, Consumer Credit and Bankruptcy

David Fieldhouse

UWO

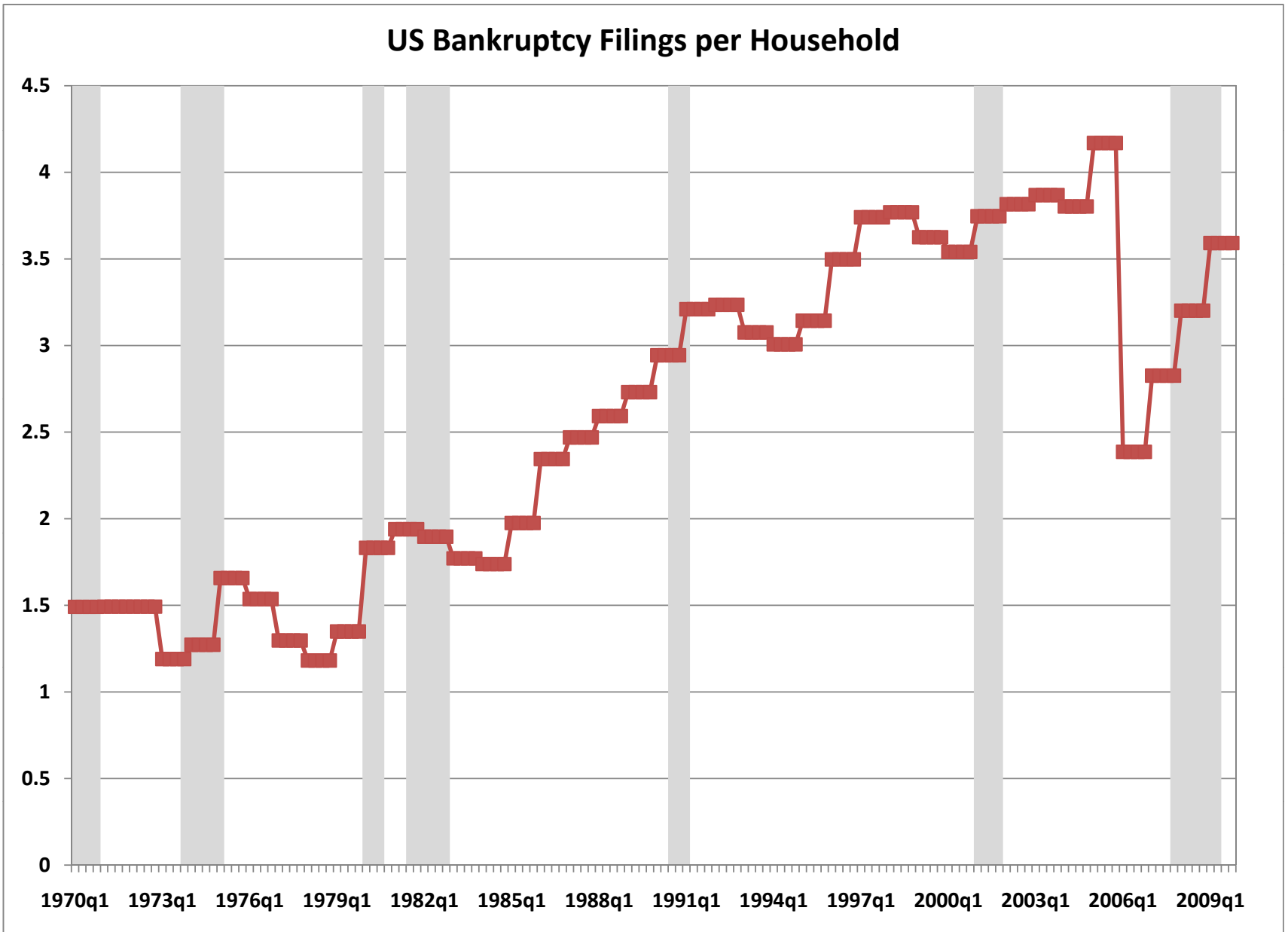
Igor Livshits

UWO

Jim MacGee

UWO

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Motivation

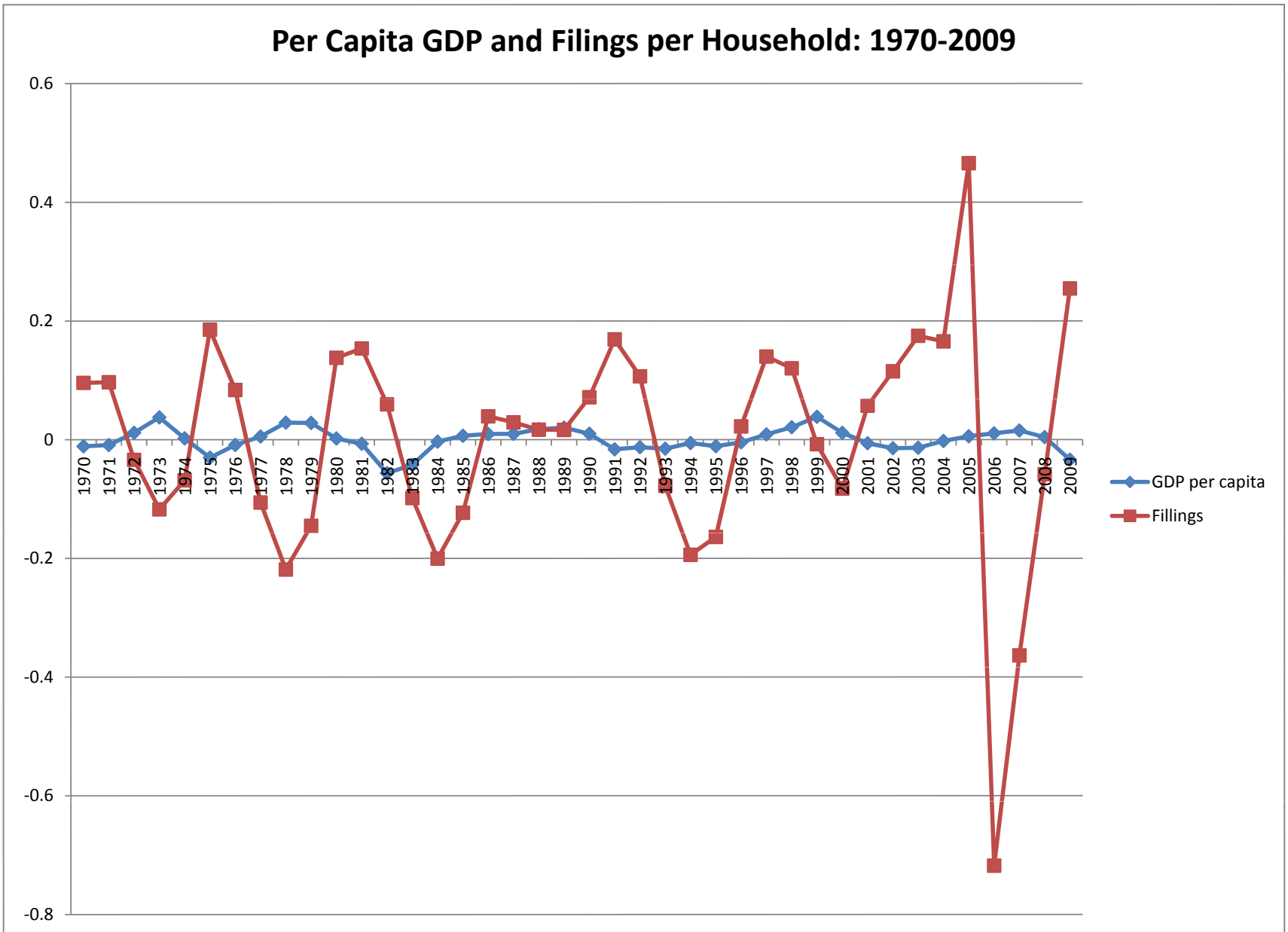
- Cyclical movements in bankruptcy and consumer credit
 - are large
 - are largely overlooked by the recent quantitative macro literature on consumer bankruptcy

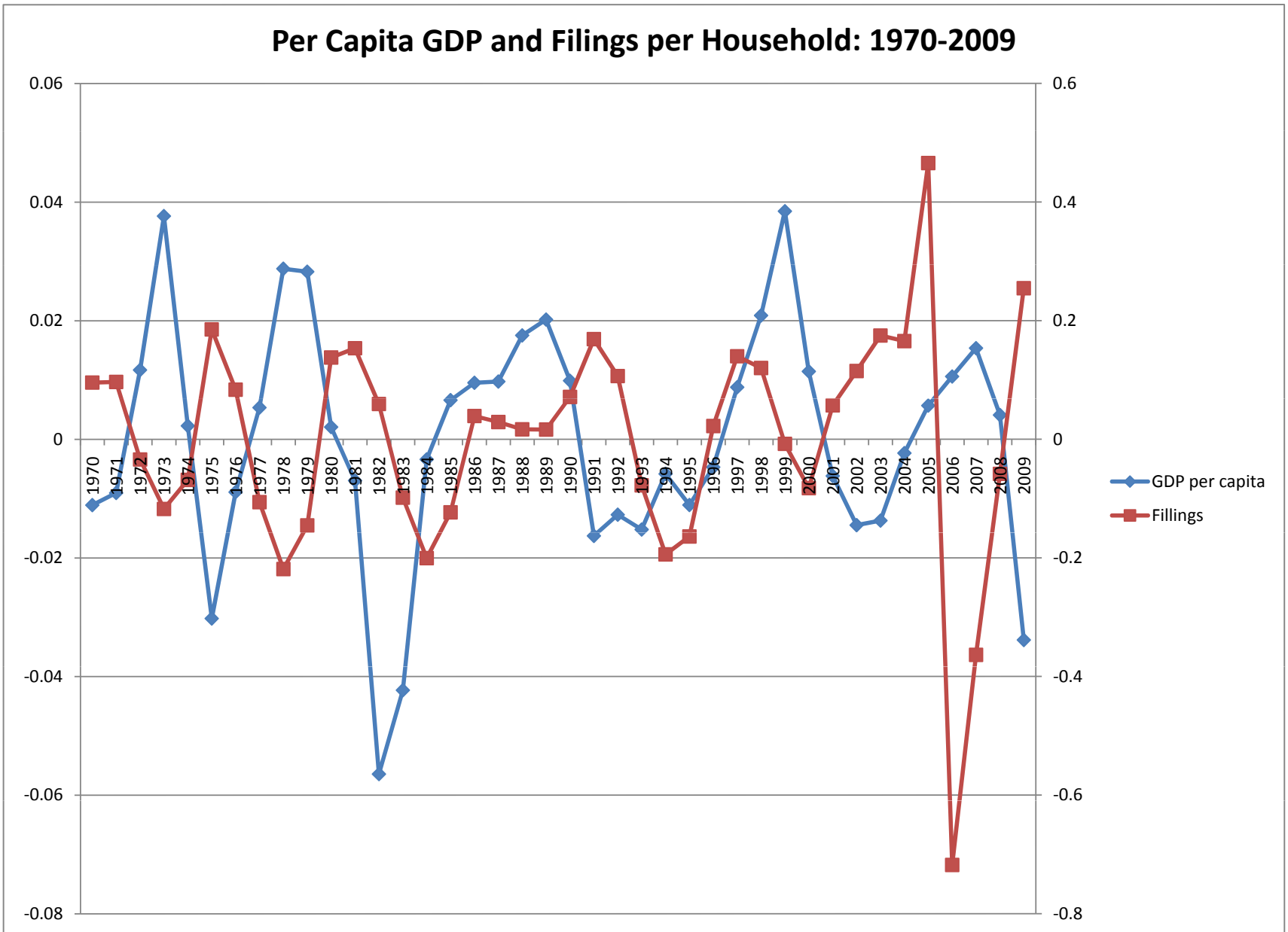
Questions

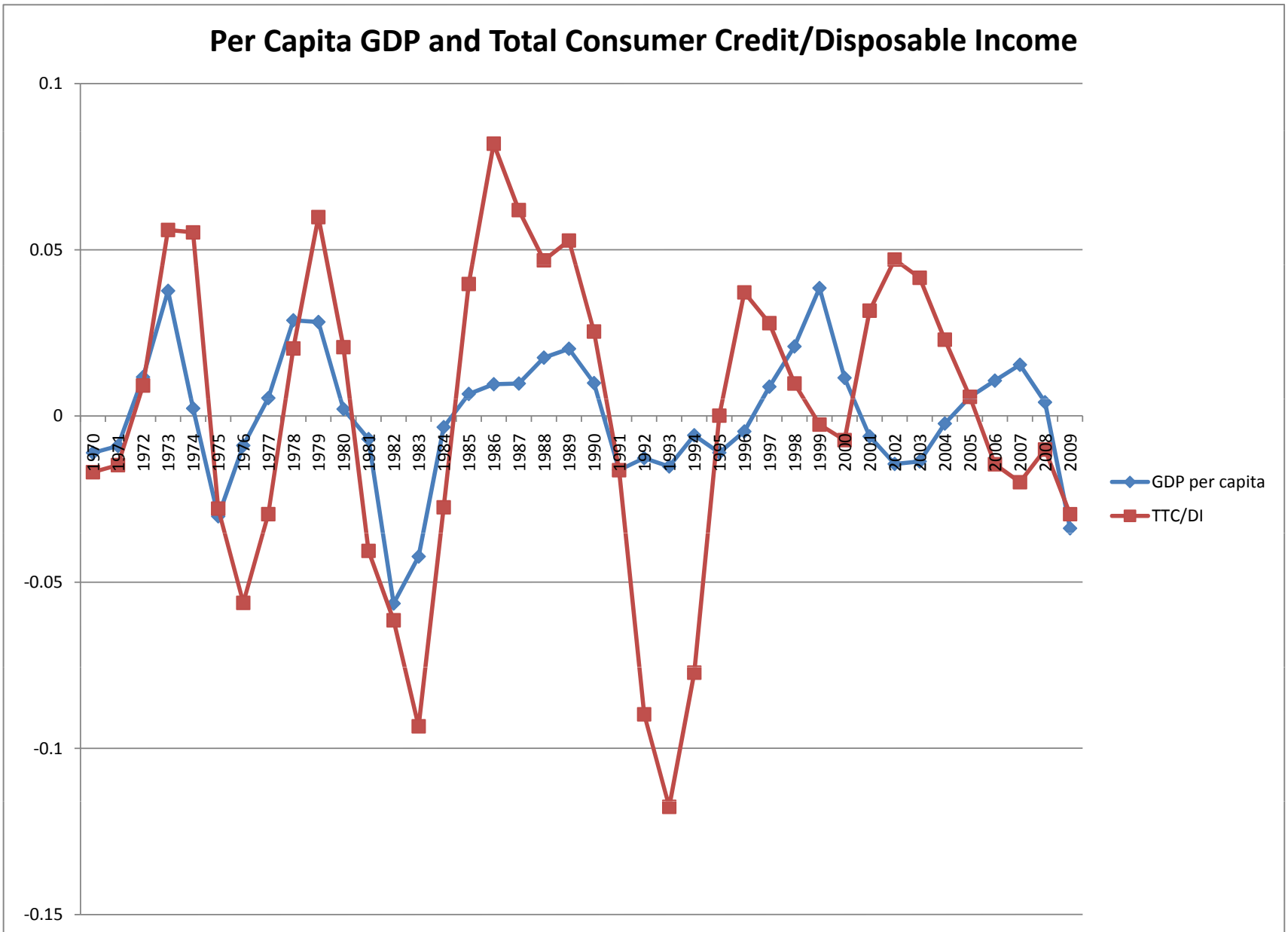
- What are the key stylized facts?
- Can the “standard” incomplete markets model account for the business-cycle properties of
 - Bankruptcy filing rate
 - Unsecured debt / income
 - Interest rates

What We Do

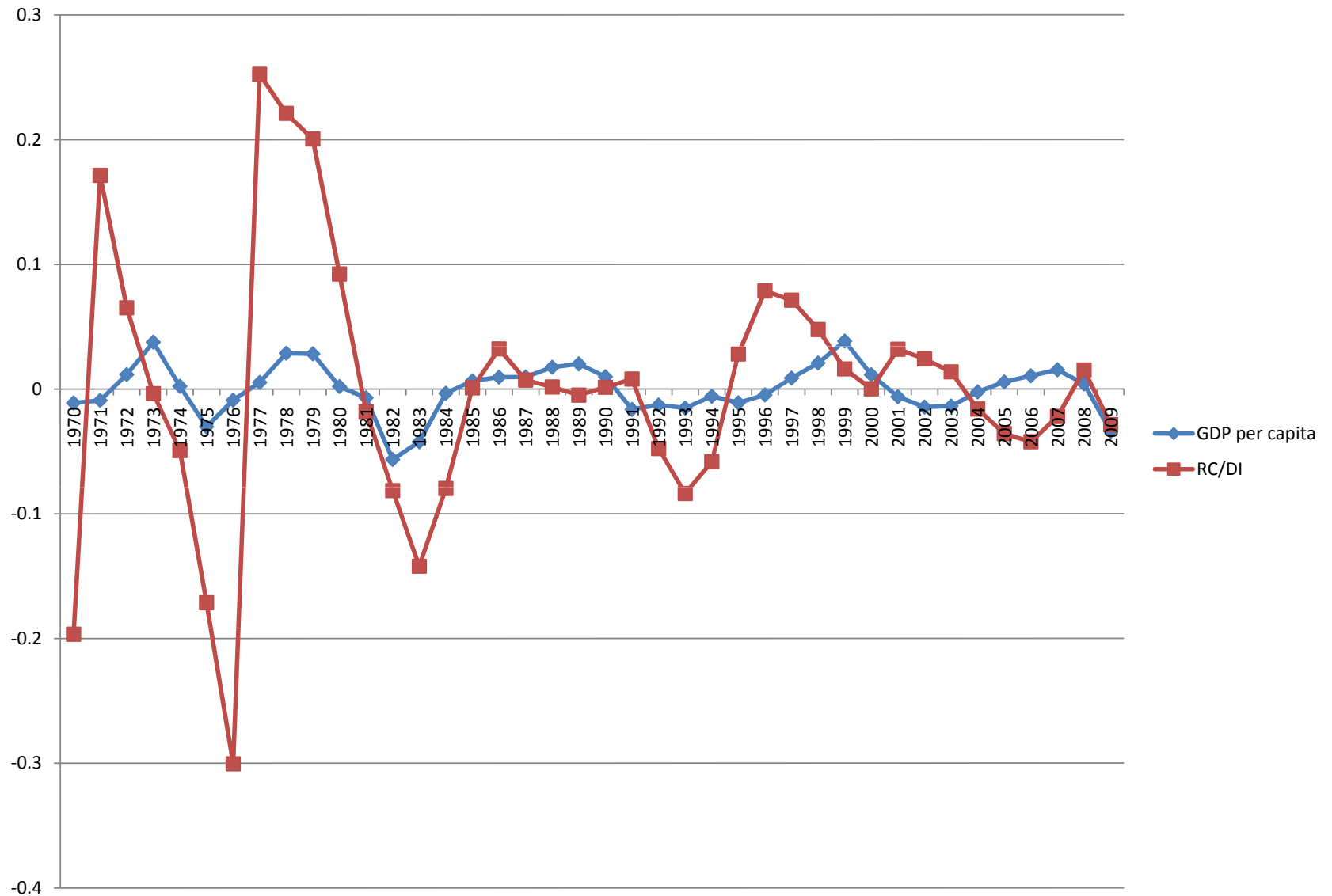
- Document key aspects of the cyclical behaviour of
 - Bankruptcy filing rate
 - Unsecured debt (as a fraction of income)
 - Interest rates
- Extend the “standard” quantitative model of consumer bankruptcy to allow for aggregate fluctuations
 - Aggregate state affects the distribution of persistent idiosyncratic income shocks
 - The (risk-free) cost of borrowing may vary with the aggregate state



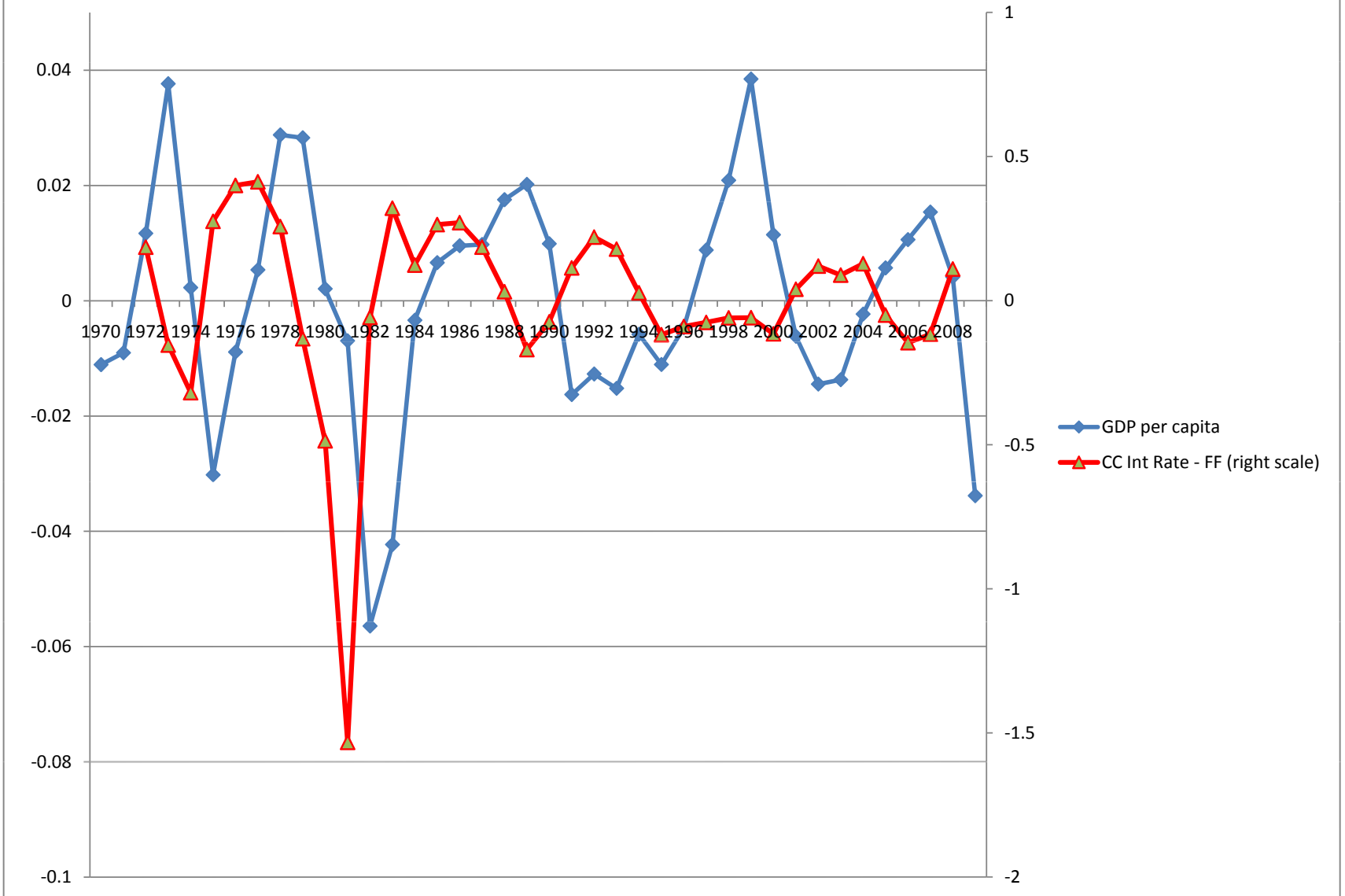


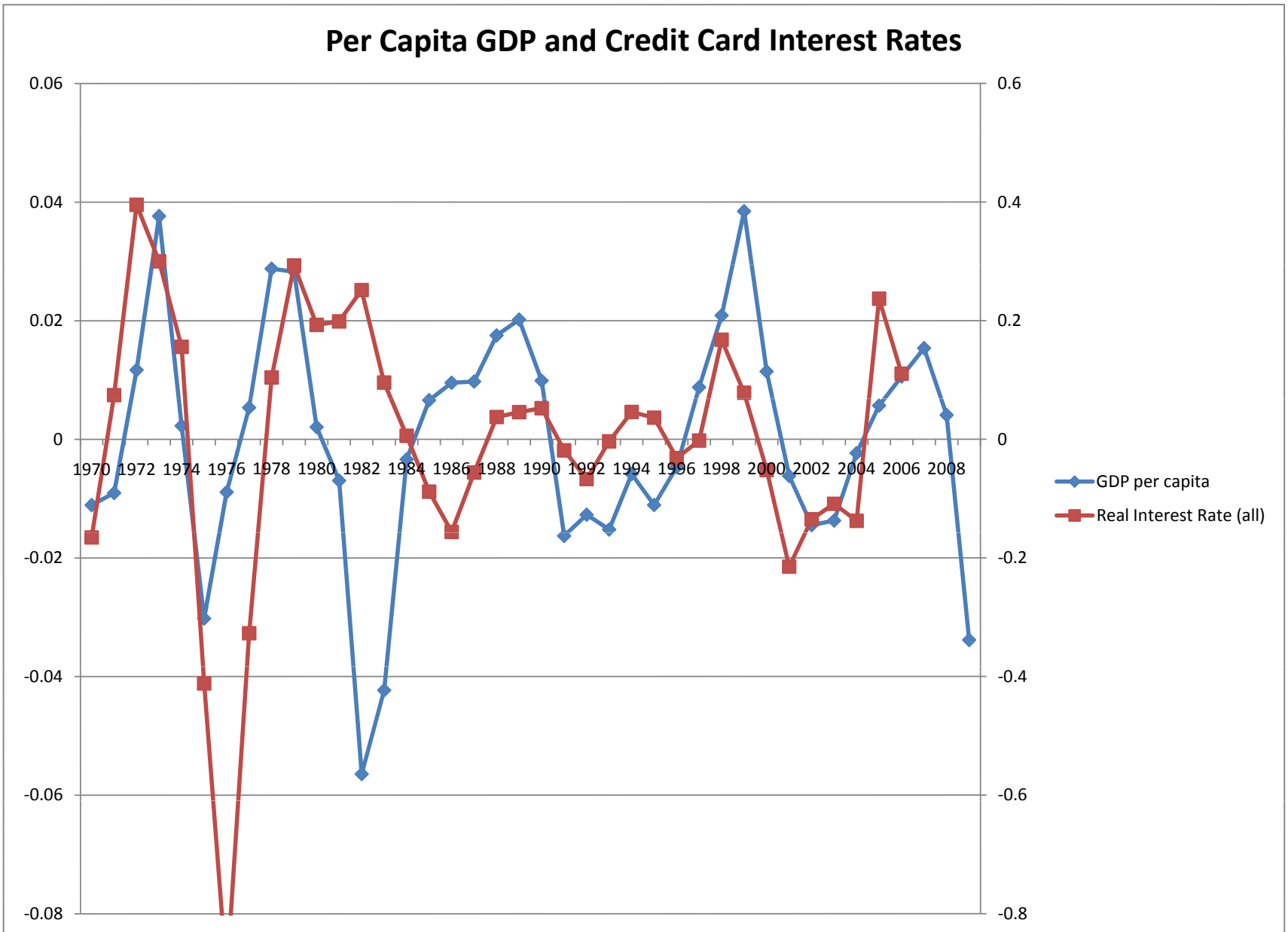


Per Capita GDP and Revolving Credit/Disposable Income



Per Capita GDP and Credit Card Interest Rates





What We Find

- Cyclical movements in **bankruptcy filings**
 - are very large
 - and counter-cyclical
- Consumer (revolving) **credit** as a fraction of income
 - is pro-cyclical
 - for the most part
 - but not after 1996

What We Find

- Cyclical movements in **bankruptcy filings**
 - are very large
 - and counter-cyclical
- Consumer (revolving) **credit** as a fraction of income
 - is pro-cyclical
 - for the most part
 - but not after 1996
- Benchmark model misses some key aspects of the data
 - Volatility of bankruptcy filing rate (and interest rate)
 - Cyclicalities of unsecured debt
- What is missing in the “standard” model?
 - Intermediation shocks?

Aggregate Fluctuations in the Model

- Standard incomplete markets model of personal bankruptcy
- Exogenous aggregate states
 - Affect the distribution of persistent income shocks
 - Greater probability of negative shocks
 - Smaller probability of positive shocks
 - Unchanged support of income distribution
 - May affect the (exogenous) risk-free interest rate
- Endogenous shifts in “lending standards”
- Endogenous changes in “demand for loans”

Model Basics

- Stochastic life cycle model
- Two types of idiosyncratic uncertainty:
 - Income shocks
 - Expense shocks
- Incomplete markets
 - Non-contingent debt only
 - Consumers can declare bankruptcy
- Equilibrium interest rate incorporates default risk
 - ⇒ depends on age, current income, amount borrowed, and the **aggregate state**

Model: Timing

- The aggregate state is realized
- Individual shocks are realized
- Bankruptcy decisions are made
- Lenders post price schedules for non-filers
 - reflecting persistence of both aggr. and idio. states
- Households make consumption / savings decisions
 - Non-filers may choose to borrow

Benchmark Parameterization

- Annual frequency: 45 periods plus 12-year “Retirement”
- Utility is CRRA with $\sigma = 2$, $\beta = 0.94$
- Interest rate on savings $r^s = 4\%$
- Transaction cost of making loans $\tau = 4\%$
- Earnings
 - Age profile from Gourinches and Parker (2002)
 - Persistent state: 5-state Markov
 - Transitory shock: 3 possible values
- Expense shocks
 - Large shock: \$125K with probability 0.16%
 - Smaller shock: \$40K with probability 2.4%

Numerical Experiments: Persistent Income

Series	Data		Persistent Recession		Transitory Recession	
	σ	$\rho(\cdot, Y)$	σ	$\rho(\cdot, Y)$	σ	$\rho(\cdot, Y)$
GDP	1.98	1	1.87	1	1.71	1
Consumption	1.78	0.90	1.11	0.98	0.8	0.96
Filings	19.2	-0.3	1.25	-0.73	1.17	-0.62
Debt/Y	10.7	0.49	2.76	-0.89	2.83	-0.95
Avg. int. rate	22.96	-0.43	0.06	-0.89	0.04	-0.95

Experiments: Intermediation Shocks

Series	Data		Constant Interest		Counter-cyclical	
	σ	$\rho(\cdot, Y)$	σ	$\rho(\cdot, Y)$	σ	$\rho(\cdot, Y)$
GDP	1.98	1	1.87	1	1.78	1
Consumption	1.78	0.90	1.11	0.98	1.58	0.78
Filings	19.2	-0.3	1.25	-0.73	2.70	-0.55
Debt	11.5	0.58	1.4	-0.41	2.36	0.29
Debt/Y	10.7	0.49	2.76	-0.89	2.5	-0.44
Avg. int. rate	22.96	-0.43	0.06	-0.89	15.9	-0.43

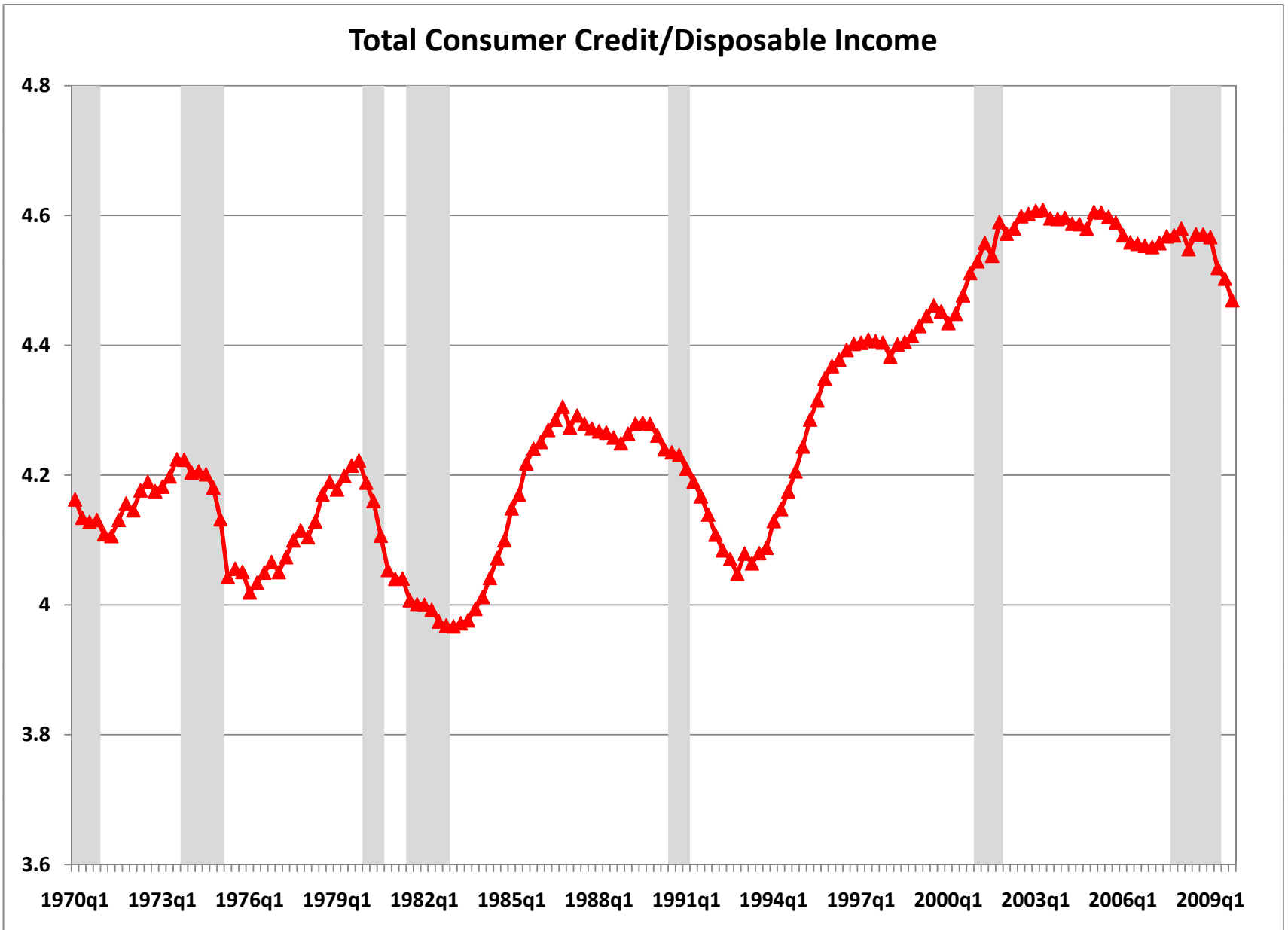
Summary

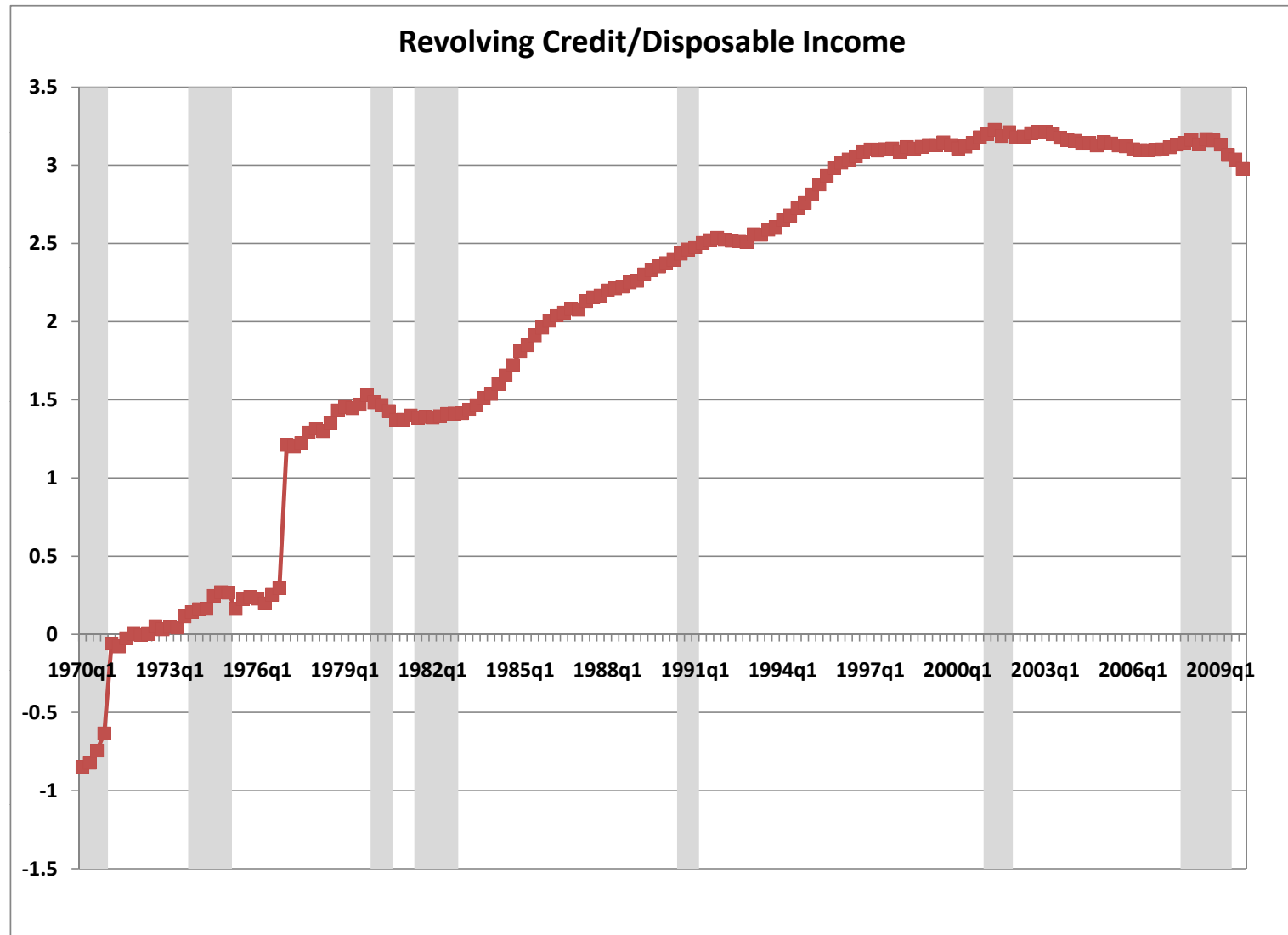
- Stylized facts:
 - Cyclical movements in bankruptcy filings are very large and counter-cyclical
 - Unsecured credit as a fraction of income is procyclical in most of the data sample but much less so after 1996
 - Average borrowing interest rates less clear
- Benchmark model misses some key aspects of the data
 - Matches the pro-cyclicality of bankruptcy filings
 - But misses the volatility of the filing rate and the cyclicality of unsecured debt
- “Intermediation shocks” seem to help matters
 - Mechanically, need borrowing rate to go up in recession

Bankruptcies, Credit and Output over the Cycle

HP-filtered annual U.S. data, in logs, per capita, 1970 – 2009

Series	1970 – 2009		1970 – 1985		1986 – 2009	
	σ	$\rho(\cdot, Y)$	σ	$\rho(\cdot, Y)$	σ	$\rho(\cdot, Y)$
GDP	1.98	1	2.49	1	1.60	1
Consumption	1.78	0.90	2.25	0.9	1.42	0.92
Filings	19.2	−0.3	13.2	−0.51	22.5	−0.25
RC/DPI	10.43	0.48	16.11	0.55	3.91	0.23
CC/DPI	4.7	0.58	4.6	0.80	4.8	0.37
Avg. int. rate	22.96	−0.43	35.55	−0.54	10.63	0.08





Model: Households

Preferences:

$$\sum_{j=1}^J \beta^{j-1} u(c_j)$$

Expense Shocks

- Exogenous increase in household's debt
- Idiosyncratic expense shock: $\kappa \in K$, iid

Earnings:

$$y_j^i = z_j^i \eta_j^i \bar{e}_j$$

- Effective labor endowment follows life cycle pattern, $\bar{e}_j$
- z – persistent shock, Markov with finite support
- η – transitory shock, iid, finite support

Model: Bankruptcy Punishment

1. Cannot save or borrow in default period.
 - Captures seizure of assets.
2. Cannot file following period.
 - Captures 6 year waiting period.
3. Fraction γ of earnings is garnisheed.
 - Lenders receive $\Gamma = \gamma y$.
4. Additional costs of filing:
 - “Stigma” – utility cost χ
 - Filing cost ϕ
 - “Burning” fraction λ of consumption

Model: Financial Markets

- Asset structure: one-period non-contingent bonds
- Risk free bond prices q^s , q^b exogenously given
- Perfectly competitive financial intermediaries
 - Accept deposits and make loans
 - Pay proportional transaction costs τ on loans
 - Observe household's debt, productivity (z) and age
- Competitive financial markets
 - Zero expected profits on each loan
 - Law of large numbers $\Rightarrow$ zero ex-post profits

Equilibrium: Bond Prices

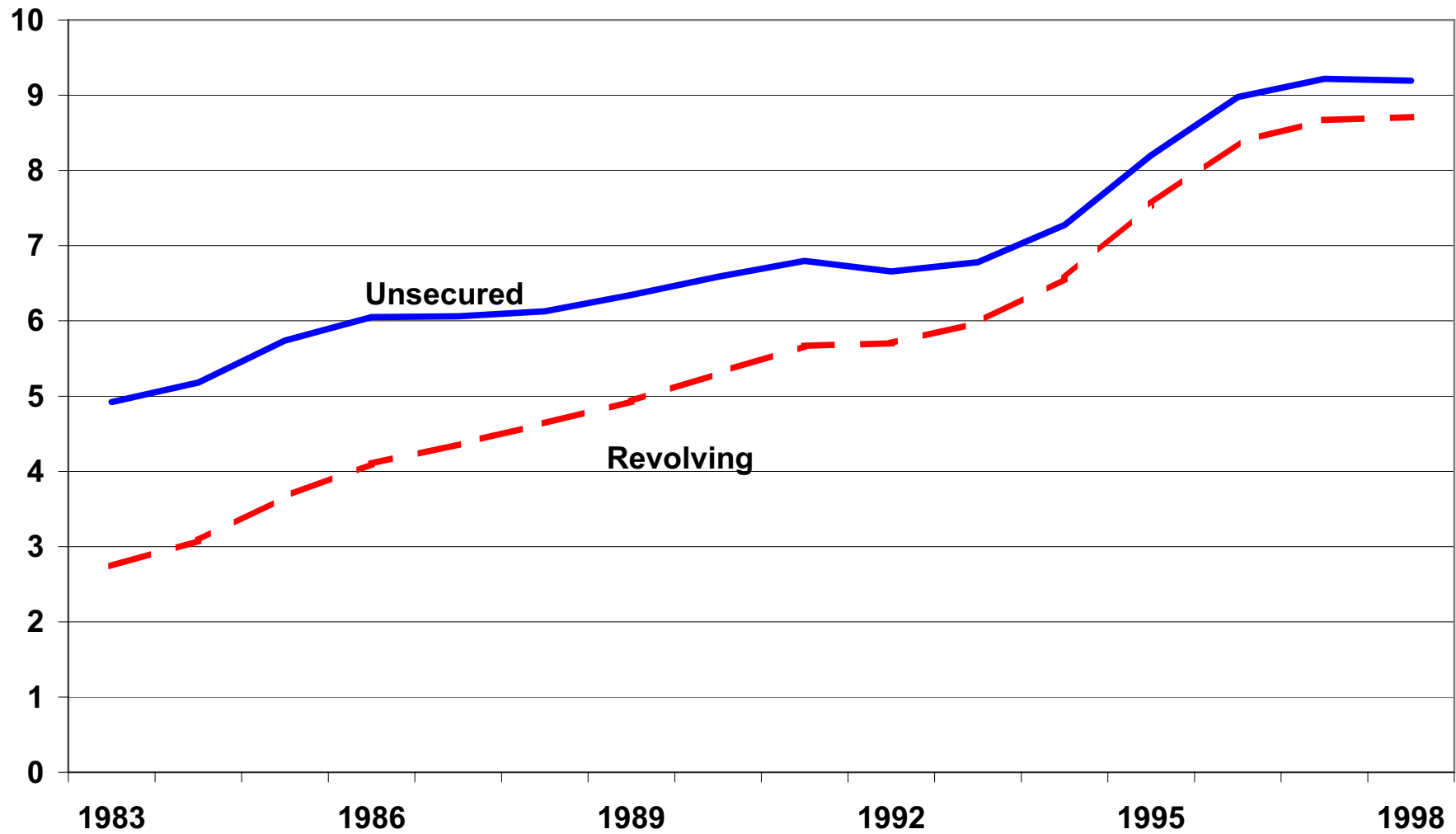
- $q(d, z, j)$ depends on debt d , productivity z , and age j .
- $q^b = \frac{1}{1+r^s+\tau}$ = price of a bond with no risk of default.
- Zero-profit condition:

$$q(d', z, j) = (1 - \theta(d', z, j))q^b + \theta(d', z, j)E \left(\frac{\Gamma(z', j+1)}{d' + \kappa'} \middle| I = 1 \right) q^b$$

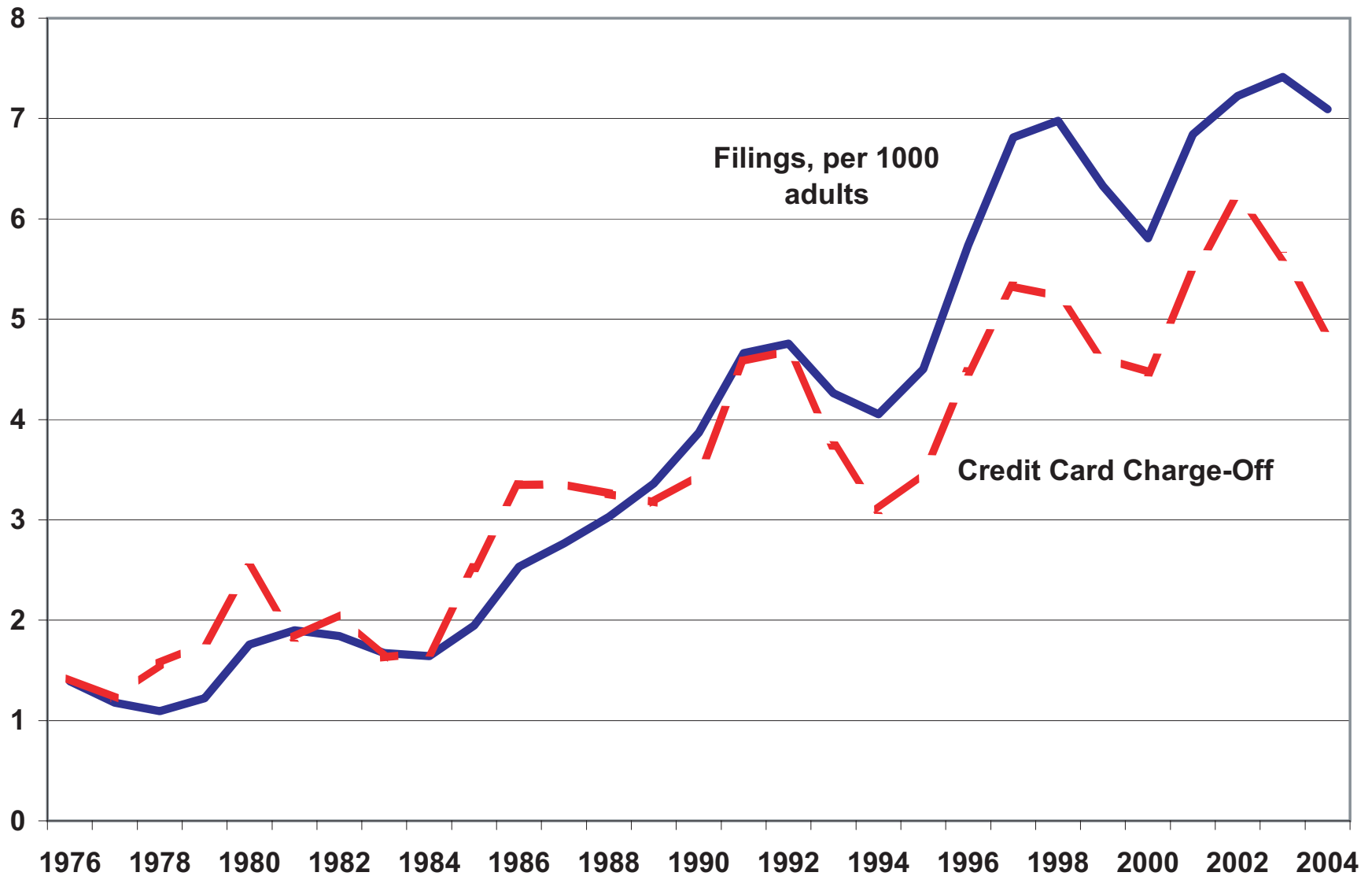
where θ is the default probability.

- Borrower's bond price determined by:
 - risk free borrowing rate
 - default probability
 - garnishment rule
- Usury law: If $q(d', z, j) < \frac{1}{1+\bar{r}}$, then $q(d', z, j)$ is set to 0.

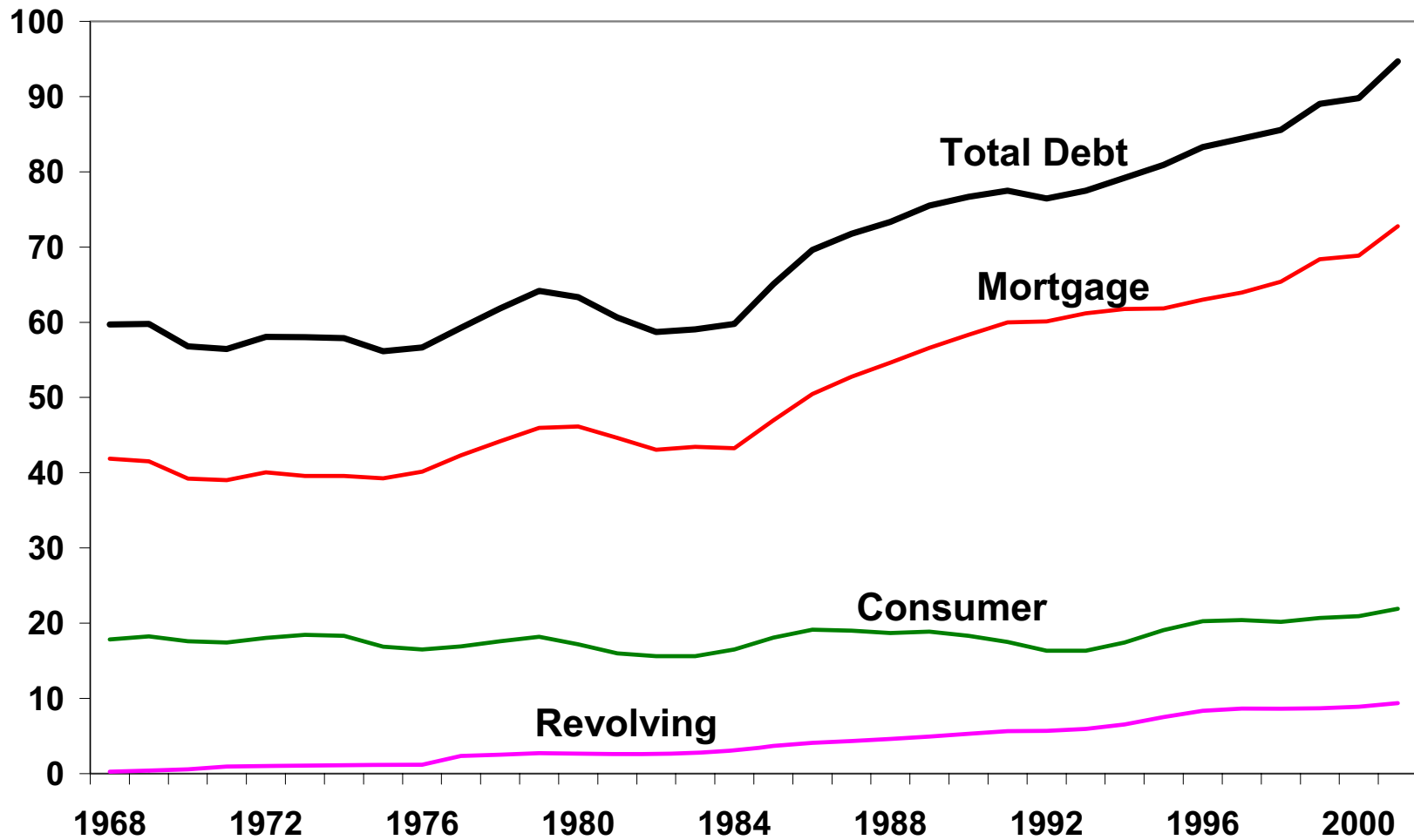
Unsecured and Revolving Credit as % Disposable Income



Bankruptcies and Charge-Off Rate



Debt as % of Disposable Income, USA



Consumer Bankruptcy Law in the U.S.

We focus on **Chapter 7** (about 70% of all filings):

- Discharge unsecured debt in exchange for assets
- Non-dischargeable: student loans, child support, alimony
- 6 years between filings
- roughly 4 months process
- Court fees: \$209, legal fees: \$750-\$1,500

Chapter 13 (not part of this paper):

- Reorganization of debt and repayment plan