Aggregate Fluctuations, Consumer Credit and Bankruptcy

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May 2010
US Bankruptcy Filings per Household

[Graph showing US Bankruptcy Filings per Household from 1970q1 to 2009q1]
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

GDP per capita
RC/DI
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
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- Benchmark model misses some key aspects of the data
  - Volatility of bankruptcy filing rate (and interest rate)
  - Cyclicality 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

<table>
<thead>
<tr>
<th>Series</th>
<th>Data</th>
<th>Persistent Recession</th>
<th>Transitory Recession</th>
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<td>$\sigma$</td>
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## Experiments: Intermediation Shocks

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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

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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:
\[ y_{ij} = z_{ij} \eta_{ij} \bar{e}_j \]
- Effective labor endowment follows life cycle pattern, \( \bar{e}_j \)
- \( z \) – persistent shock, Markov with finite support
- \( \eta \) – 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 $\gamma$ of earnings is garnisheed.
   - Lenders receive $\Gamma = \gamma y$.

4. Additional costs of filing:
   - “Stigma” – utility cost $\chi$
   - Filing cost $\phi$
   - “Burning” fraction $\lambda$ 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 $\tau$ 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 $j$.
- $q^b = \frac{1}{1 + rs + \tau}$ = 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 $\theta$ is the default probability.

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