Accounting for the Rise in Consumer Bankruptcies

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UWO                UWO              Stanford

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Motivation

1. Large increase in consumer bankruptcy filings.
   - 1.4 filings per 1,000 adults in 1970
   - 8.5 filings per 1,000 adults in 2002
   - Similar increase in Canada:
     from 0.2 per 1,000 adults in 1970 to 4.3 in 2002.

2. Policy debate about reforming bankruptcy law.
   - Canada tightened BIA in 1997
   - US tightened in 2005

Understanding (1) important for (2).
Figure 1: Consumer Bankruptcies per 1000 of 18-64 yr-old
Our Contribution

- Framework to evaluate proposed explanations for rise in consumer bankruptcy filings
  - Quantitative model of consumer bankruptcy
  - Numerical experiments in parameterized model

- Compare model implications of each story to key facts:
  - Increase in bankruptcy filing rate
  - Increase in aggregate unsecured debt / income
  - Average real interest rate on loans roughly constant
## Key Facts

<table>
<thead>
<tr>
<th>Fact</th>
<th>1980-84</th>
<th>1995-99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 7 filings(^1)</td>
<td>0.25%</td>
<td>0.83%</td>
</tr>
<tr>
<td>Average borrowing interest rate(^2)</td>
<td>11.5-12.7%</td>
<td>11.7-13.1%</td>
</tr>
<tr>
<td>Debt(^3)/Disposable Income</td>
<td>5%</td>
<td>9%</td>
</tr>
</tbody>
</table>

\(^1\) Non-business Ch. 7 filings as percent of all households.

\(^2\) 24 month personal loans and credit cards, respectively.

\(^3\) Estimate of unsecured credit.
Proposed Explanations

1. Increase in Uncertainty
   - Increase in earnings volatility
   - Increase in expense risk
   - Demographic changes in the population
     - Age composition (baby-boomers)
     - Marital status

2. Changes in Credit Markets
   - Decrease in stigma
   - 1978 bankruptcy law amendments
   - Removal of interest rate ceilings (Marquette)
   - Improved lending technology
     - Decrease in transaction cost of borrowing
Summary of Our Results

- None of the explanations “works” by itself.
- We can match all three key facts with a combination of:
  - Decline in stigma
  - Decline in transaction cost of lending
- Uncertainty based stories play small role quantitatively.
- Demographic changes: not important quantitatively.
- *Marquette*: not a driving force.
Model Used to Evaluate Stories

- 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
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:

\[ y_{ij} = z_{ij} \eta_j \bar{e}_j \]

- 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. Fraction $\gamma$ of earnings is garnisheed.
   - Lenders receive $\Gamma = \gamma y$.

2. Cannot save or borrow in default period.
   - Captures seizure of assets.

3. Cannot file following period.
   - Captures 6 year waiting period.

4. Stigma – utility cost $\chi$ during default period.
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 ($\pi$) 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 $q(d', z, j) < \frac{1}{1 + r}$, then $q(d', z, j)$ is set to 0.
The Plan

- Calibrate benchmark economy to match late 90’s. **Targets:** Filings, unsecured debt, interest rates.

- Run “backward” experiments trying to match early 80’s.

- Consider each story individually.
  - Plausible changes in relevant parameters.
  - Changes required to match the early 80’s.

- Try promising combinations.
Benchmark Parameterization

- 16 periods (3 years each). Last period is “Retirement”.
- Utility is CRRA with $\sigma = 2$, $\beta = 0.94^3$.
- Interest rate on savings $r^s = 3.44\%$.
- No interest rate ceiling.
- No stigma.

Earnings

- Age profile from Gourinches and Parker (2002).
- Persistent state – discretized AR(1) with $\rho = 0.96$ and $\sigma^2_\varepsilon = 0.014$.
- 3 transitory shock values, $\sigma^2_\eta = 0.05$. 
Parameterization: Expense Shocks

Use data on:

1. Medical bills (MEPS 1996-97)
2. Divorce (US Vital Statistics, Equivalence Scale)

Combine to construct two expense shocks:

1. 82% of avg. earnings with probability 0.46%
2. 26% of avg. earnings with probability 6%
Parameterization: Calibration

Choose the remaining two parameters

- \( \tau \) – transaction cost of lending,
- \( \gamma \) – garnishment rate

to match two key facts:

- Bankruptcy filing rate of 0.83%,
- Unsecured debt = 9% of disposable income.

Result: \( \tau = 3.56\% \) and \( \gamma = 28.3\% \).

Note: Average borrowing rate falls within the data range.
Analysis: Individual Stories

Demographic changes are quantitatively unimportant

- Age composition
- Marital status

Numerical Experiments

1. Change in variance of income
   (a) Transitory
   (b) Persistent
2. Increasing expense shocks
3. Decreasing stigma
4. Decline in transaction cost of lending
5. Change in usury laws
## Summary of Experiments

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Defaults</th>
<th>Debt/earnings</th>
<th>avg. ( r^b )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-99 (model/data)</td>
<td>0.84%</td>
<td>9.04%</td>
<td>11.7%</td>
</tr>
<tr>
<td>1980-84 data</td>
<td>0.25%</td>
<td>5%</td>
<td>11.5%</td>
</tr>
<tr>
<td>Realistic Income</td>
<td>0.822%</td>
<td>12.1%</td>
<td>9.8%</td>
</tr>
<tr>
<td>No Transitory</td>
<td>0.818%</td>
<td>11.7%</td>
<td>9.4%</td>
</tr>
<tr>
<td>No Persistent</td>
<td>0.63%</td>
<td>20.6%</td>
<td>8.01%</td>
</tr>
<tr>
<td>Realistic Expense</td>
<td>0.73%</td>
<td>9.03%</td>
<td>10.9%</td>
</tr>
<tr>
<td>No small shock</td>
<td>0.25%</td>
<td>8.91%</td>
<td>8.6%</td>
</tr>
<tr>
<td>Stigma</td>
<td>0.26%</td>
<td>12.89%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Transaction Cost</td>
<td>0.81%</td>
<td>4.06%</td>
<td>20.16%</td>
</tr>
<tr>
<td>Usury ( \bar{r} = 8% )</td>
<td>0.59%</td>
<td>2.04%</td>
<td>7.79%</td>
</tr>
<tr>
<td>Combination</td>
<td>0.26%</td>
<td>5.24%</td>
<td>11.77%</td>
</tr>
</tbody>
</table>
Experiment 1: Income Shocks

- Variance of shocks has increased
  HSV (2004): $\sigma^2_\eta$ up 25%, $\sigma^2_\epsilon$ up 42%
- Persistence of income has decreased

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<tr>
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<td>5%</td>
<td>11.5%</td>
</tr>
<tr>
<td>$\sigma^2_\eta$, $\sigma^2_\epsilon$ ↓</td>
<td>0.822%</td>
<td>12.1%</td>
<td>9.8%</td>
</tr>
<tr>
<td>$\sigma_\eta = 0$</td>
<td>0.818%</td>
<td>11.7%</td>
<td>9.4%</td>
</tr>
<tr>
<td>$\sigma_\epsilon = 0$</td>
<td>0.63%</td>
<td>20.6%</td>
<td>8.01%</td>
</tr>
<tr>
<td>$\rho = 0.98, \sigma^2_\epsilon = 0.014$</td>
<td>0.92%</td>
<td>5.97%</td>
<td>12.92%</td>
</tr>
<tr>
<td>$\rho = 0.98, \sigma^2_\epsilon = 0.007$</td>
<td>0.85%</td>
<td>9.98%</td>
<td>9.41%</td>
</tr>
</tbody>
</table>

Conclusion: Cannot generate large change in filings.
**Experiment 2: Expense Shocks**

**Aim:** Decrease expense shocks to match 1980-84 filings

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<td>11.5%</td>
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<tr>
<td>No small shock</td>
<td>0.25%</td>
<td>8.91%</td>
<td>8.6%</td>
</tr>
<tr>
<td>No large shock</td>
<td>0.74%</td>
<td>8.89%</td>
<td>11.5%</td>
</tr>
</tbody>
</table>

**Conclusion:**
- Extreme changes in expense shocks can match filings.
- But generates insufficient changes in debt/income ratio.

What is a realistic change in expense shocks?
Experiment 2.2: Realistic Expense Shocks

Increase in Out-Of-Pocket Medical Spending in the Data

- Real OOPS per HH: $1,477 in 1980 → $1,946 in 1998.
- As fraction of median income: 3.55% → 4.16%.
- Fraction of uninsured HHs: 13% in 1987 → 16% in 1998.

Experiment: Decrease magnitudes and probabilities by 15%.

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<tr>
<td>1980-84 data</td>
<td>0.25%</td>
<td>5%</td>
<td>11.5%</td>
</tr>
<tr>
<td>15% decrease</td>
<td>0.73%</td>
<td>9.03%</td>
<td>10.9%</td>
</tr>
</tbody>
</table>

The probability of family-related shocks has gone down, not up!
Experiment 3: Stigma

**Aim:** Introduce stigma to match filings in 1980-84. **Achieved** with utility loss $\approx$ consumption loss of 28%.

<table>
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<tr>
<td>1980-84 data</td>
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<td>5%</td>
<td>11.5%</td>
</tr>
<tr>
<td>Stigma</td>
<td>0.26%</td>
<td>12.89%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

**Conclusion:** Can match the change in filings rates **but** generates counterfactual debt/income and interest rates.
Experiment 4: Transaction Cost

Experiment: Increase transaction cost $\tau$ (benchmark $= 3.56\%$).

<table>
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<td>11.7%</td>
</tr>
<tr>
<td>1980-84 data</td>
<td>0.25%</td>
<td>5%</td>
<td>11.5%</td>
</tr>
<tr>
<td>$\tau = 5.56%$</td>
<td>0.82%</td>
<td>6.01%</td>
<td>15.8%</td>
</tr>
<tr>
<td>$\tau = 7.56%$</td>
<td>0.81%</td>
<td>4.06%</td>
<td>20.16%</td>
</tr>
</tbody>
</table>

Conclusion:

- Small effect on filings.
- Too large change in average interest rate.
1978 *Marquette* Decision essentially removed any interest caps.

<table>
<thead>
<tr>
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<th>avg. $r^b$</th>
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<td>11.7%</td>
</tr>
<tr>
<td>1980-84 data</td>
<td>0.25%</td>
<td>5%</td>
<td>11.5%</td>
</tr>
<tr>
<td>$\bar{r} = 10%$</td>
<td>0.68%</td>
<td>8.9%</td>
<td>8.25%</td>
</tr>
<tr>
<td>$\bar{r} = 8%$</td>
<td>0.59%</td>
<td>2.04%</td>
<td>7.79%</td>
</tr>
</tbody>
</table>

**Conclusion:**

- Tight interest rate ceiling affects filing rates.
- Implies large changes in debt and interest rates.
- No comparable change in law in Canada.
## Experiment 6: Combination

Combine Stigma, Transactions Costs, Income and Expense

<table>
<thead>
<tr>
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<td>11.7%</td>
</tr>
<tr>
<td>1980-84 Data</td>
<td>0.25%</td>
<td>5.0%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Combo</td>
<td>0.26%</td>
<td>5.24%</td>
<td>11.77%</td>
</tr>
<tr>
<td>No $\Delta$ Exp.</td>
<td>0.31%</td>
<td>5.21%</td>
<td>11.94%</td>
</tr>
<tr>
<td>No $\Delta$ Stigma</td>
<td>0.71%</td>
<td>4.35%</td>
<td>18.18%</td>
</tr>
<tr>
<td>No $\Delta$ $\tau$</td>
<td>0.31%</td>
<td>12.74%</td>
<td>7.93%</td>
</tr>
<tr>
<td>No $\Delta$ Transitory</td>
<td>0.27%</td>
<td>5.25%</td>
<td>11.82%</td>
</tr>
</tbody>
</table>

### Conclusion:

- The combination of stories accounts for the rise.
- Stigma and transaction cost are most important.
Summary

- No single story can account for all the key facts.
- Combination of stories can account for all the key facts.
- Two main forces:
  - Decrease in stigma,
  - Decrease in transaction cost of borrowing.
- Changes in uncertainty play surprisingly small role.
- Demographic changes are quantitatively unimportant.

Needed: Theory of stigma.
Challenges

- Characteristics of Bankrupts.
- Including collateralized debt and Chapter 13 option.
Debt as % of Disposable Income, USA

- Total Debt
- Mortgage
- Consumer
- Revolving

Rise in Bankruptcies – p. 29/36
Constructed Bankruptcy Rates per 1,000 Households (U.S.)
(holding age specific filings rates constant)

- At 1991 filing rates
- At 2001 filing rates
- Actual
Implied Bankruptcy Rates (per 1,000 25+ adults), U.S.
(holding marital status specific filing rates constant)
Equilibrium: Household Problem

\[ V_j(d, z, \eta, \kappa) = \max_{c, d'} [u(c) + \beta E \max \{ V_{j+1}(d', z', \eta', \kappa'), \overline{V}_{j+1}(z', \eta') \}] \]

s.t. \( c + d + \kappa \leq \bar{e}_j z \eta + q^b(d', z, j) d' \)

where \( \overline{V} \) is value of filing for bankruptcy:

\[ \overline{V}_j(z, \eta) = u(c) - \chi + \beta E \max \{ V_{j+1}(0, z', \eta', \kappa'), \overline{W}_{j+1}(z', \eta', \kappa') \} \]

where \( c = (1 - \gamma)\bar{e}_j z \eta \)

and \( \overline{W} \) is value of defaulting immediately following bankruptcy:

\[ \overline{W}_j(z, \eta, \kappa) = u(c) - \chi + \beta E \max \{ V_{j+1}(d'(\kappa), z', \eta', \kappa'), \overline{V}_{j+1}(z', \eta', \kappa') \} \]

where \( c = (1 - \gamma)\bar{e}_j z \eta, \quad d' = (\kappa - \gamma\bar{e}_j z \eta)(1 + r^r) \)
**Equilibrium: Definition**

Given a bankruptcy rule \((\bar{y}, \gamma, \phi)\), and risk-free bond prices \((q^s, \bar{q}^b)\), a recursive competitive equilibrium is value functions \(V, \bar{V}, \bar{W}\), policy functions \(c, d', I(d, z, j)\), default probabilities \(\theta(d', z, j)\), and a pricing function \(q^b\) such that:

1. Value functions satisfy functional equations, and \(c, d'\) and \(I\) are the associated optimal policy functions.

2. The bond prices \(q\) are determined by zero profit condition.

3. The default probabilities are correct:
   \[
   \theta(d', z, j) = E(I(d' + \kappa', z', j + 1))
   \]
## Benchmark: Causes of Bankruptcy

<table>
<thead>
<tr>
<th>Income Shock</th>
<th>Small $\kappa$</th>
<th>Large $\kappa$</th>
<th>$\kappa = 0$</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>48.32%</td>
<td>7.93%</td>
<td>13.50%</td>
<td>69.75%</td>
</tr>
<tr>
<td>Lower Persist.</td>
<td>11.01%</td>
<td>2.22%</td>
<td>6.95%</td>
<td>20.18%</td>
</tr>
<tr>
<td>Bad Transitory</td>
<td>5.35%</td>
<td>0.90%</td>
<td>1.53%</td>
<td>7.78%</td>
</tr>
<tr>
<td>Pers. + Trans.</td>
<td>1.23%</td>
<td>0.25%</td>
<td>0.80%</td>
<td>2.28%</td>
</tr>
<tr>
<td>Total</td>
<td>65.91%</td>
<td>11.31%</td>
<td>22.78%</td>
<td>100%</td>
</tr>
</tbody>
</table>
“Family” Expense Shocks

The probability of family related shocks has gone down, not up!

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Births per 1,000 population</td>
<td>15.9</td>
<td>14.3</td>
</tr>
<tr>
<td>Births per 1,000 women aged 15-44</td>
<td>68.4</td>
<td>64.3</td>
</tr>
<tr>
<td>Births per 1,000 unmarried women</td>
<td>29.4</td>
<td>43.3</td>
</tr>
<tr>
<td>Intended Births</td>
<td>61.9%</td>
<td>69%</td>
</tr>
<tr>
<td>Births per 1,000 teenagers (15-19 yrs old)</td>
<td>53.0</td>
<td>50.3</td>
</tr>
<tr>
<td>Divorces per 1,000 population</td>
<td>5.3</td>
<td>4.1</td>
</tr>
</tbody>
</table>
# Overview Bankruptcy Law

<table>
<thead>
<tr>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch. 7, 11, 13</td>
<td>Straight, Proposal</td>
</tr>
</tbody>
</table>

### Chapter 7

**Straight Bankruptcy**

- Discharge unsecured debt in exchange for assets.
- Non-dischargeable: child support, taxes, etc.

<table>
<thead>
<tr>
<th>6 years between filings</th>
<th>No limit on frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>roughly 4 months process</td>
<td>9 months</td>
</tr>
</tbody>
</table>

| Court fees: $209, | Fees: $1,347, |
| Legal fees: $750-$1,500 | Counselling costs: $170 |
| roughly 70% filings | roughly 85% filings |