Assessing Bankruptcy Reform in a Model with Temptation and Equilibrium Default

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Rising consistently since early 1980s.
Seems to be declining as a result of the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) in 2005.
Background

- Models with present bias (hyperbolic-discounting, temptation) have become widely-used in macro/finance.
  - Theoretical foundations (Laibson (1997), Gul and Pesendorfer (2001))
  - Consumers’ preferences for illiquid assets (Laibson (1997))
  - Credit card debt with a high interest rate (Laibson et al. (2003))
  - Payday loans (Agarwal et al. (2009))
  - Social Security (İmrohoroğlu et al. (2003), Findley and Caliendo (2008))
  - Optimal taxation (Krusell et al. (2010))
  - Retirement Decision (Feigenbaum and Findley (2015))
  - Mandatory saving Floors (Malin (2008))
  - Rising indebtedness and welfare (Nakajima (2012))

- Models with equilibrium default/bankruptcy have been developed. (Livshits et al. (2007), Chatterjee et al. (2007))

- White (2007) argues that hyperbolic-discounting preference is an important feature in constructing a model of bankruptcies for policy evaluation.
Contribution

- I develop a quantitative model with:
  - Equilibrium default
  - Hyperbolic-discounting / temptation
  - Coexistence of exponential- and hyperbolic-discounting agents.

- And use the model to evaluate the BAPCPA within the model.
  - Does the model replicate what happened after the BAPCPA?
  - What are the welfare implications?
  - Does hyperbolic-discounting matter? How?
  - Can the BAPCPA be improved?

- I also investigate other bankruptcy policy reforms.
Other Issues

- Illiquid assets (housing).
- Simultaneous holding of asset and debt.
- Informal default.
- Chapter 13 bankruptcy.
- Richer heterogeneity (e.g., heterogeneous $\delta_j$ and/or $\beta_j$).
Model: Overview

- Partial-eqm life-cycle model with uninsured idiosyncratic shocks.
  - Agents work till age $I_R$ and live up to age $I$.
  - Persistent and transitory labor income shocks.
  - Expenditure shock.

- Two-types of agents
  - Exponential-discounting preferences.
  - Quasi-hyperbolic discounting preferences (sophisticated).

- Equilibrium default.
  - Taking $q(.)$ as given, agents determine $g_h(.)$ (default or not).
  - Taking $g_h(.)$ as given, competitive credit sector determines $q(.)$. 
Model: Preferences

- Two preference types:
  - \( j = 1 \): Exponential-discounting, measure \( \phi \).
  - \( j = 2 \): Quasi-hyperbolic-discounting, measure \( 1 - \phi \).

- Common CRRA period utility function:
  \[
  \frac{(c_i/\nu_i)^{1-\sigma}}{1-\sigma}.
  \]
  - \( \nu_i \): Household equivalent scale for age-\( i \).

- Two type-dependent discount factors:
  - \( \delta_j \): Long-term discount factor.
  - \( \beta_j \): Short-term discount factor.

- Assume:
  - \( \beta_1 = 1.0, \beta_2 = 0.7 \)
  - \( \delta_1 = \delta_2 \).
Exponential-discounting agents: $\beta_1 = 1.0$ and $\delta_1 = 0.9544$.

Hyperbolic-discounting agents: $\beta_1 = 0.7$ and $\delta_1 = 0.9544$. 
Model: Endowment

- Agents born with $a = 0$.

- Labor income: $e(i, p, t) = e_i \exp(p + t)$
  - $e_i$: Average labor income for age-$i$.
  - $p$: Persistent shock to labor income (Markov).
  - $t$: Transitory shock to labor income (i.i.d.).

- Social Security benefits: $b(i, p, t) = \psi_e \bar{e} + \psi_p p$
  - Only for age $i > I_R$.
  - $\bar{e}$: Average labor income.
  - $p$: Persistent shock to labor income at age-$I_R$.

- OOP expenditure shock $x$: i.i.d. (Livshits et al. (2007))

- Two paths to bankruptcy:
  - Series of low income shocks $\rightarrow$ Accumulated debt $\rightarrow$ Default.
  - Large medical expense shock $\rightarrow$ Default.
Model: Default

- Based on Chatterjee et al. (2007): Captures salient characteristics of Chapter 7 bankruptcy in the U.S.

- **Benefits** of defaulting:
  - Existing debt and bills are wiped out.
  - No future obligation to repay: *fresh start*

- **Costs** of defaulting:
  - Filing cost: $\xi = $600.
  - Wage garnishment: Proportion $\eta$ of the current income.
  - Cannot save in the filing period.
  - Credit history turn bad ($h = 1$).
  - While credit history is bad, excluded from loan market ($a' \geq 0$).
  - With probability of $\lambda$, credit history turns good ($h = 0$).

- Agents optimally choose whether to default or not.
Model: Default Decision \((h = 0)\)

\[
h^* = \begin{cases} 
0 \text{ (non-default)} & \text{if } V_{\text{non}}^*(.) > V_{\text{def}}^*(.) \\
1 \text{ (default)} & \text{Otherwise}
\end{cases}
\]  

\[
V(j, i, 0, p, t, x, a) = \begin{cases} 
V_{\text{non}}(j, i, 0, p, t, x, a) & \text{if } h^* = 0 \\
V_{\text{def}}(j, i, 0, p, t, x, a) & \text{if } h^* = 1
\end{cases}
\]

- Default decision is made based on the discount factor \(\beta_j \delta_j\).
- Value is computed based on \(\delta_j\) only.
Model: Value Conditional on Non-Defaulting

\[ a^* = \arg\max_{a' \in \mathbb{R}} \left\{ u \left( \frac{c}{V_i} \right) + \beta_j \delta_j \mathbb{E} V(j, i + 1, 0, p', x', t', a') \right\} \]  \hspace{1cm} (3)

\[ c + a' q(j, i, 0, p, t, x, a') + x = e(i, p, t) + b(i, p, t) + a \] \hspace{1cm} (4)

\[ V^*_\text{non}(j, i, 0, p, t, x, a) = \begin{cases} 
-\infty & \text{if } B(.) = \emptyset \\
\left( \frac{c}{V_i} \right) + \delta_j \mathbb{E} V(j, i + 1, 0, p', t', x', a^*) & \text{if } B(.) \neq \emptyset
\end{cases} \] \hspace{1cm} (5)

\[ V_{\text{non}}(j, i, 0, p, t, x, a) = \begin{cases} 
-\infty & \text{if } B(.) = \emptyset \\
\left( \frac{c}{V_i} \right) + \delta_j \mathbb{E} V(j, i + 1, 0, p', t', x', a^*) & \text{if } B(.) \neq \emptyset
\end{cases} \] \hspace{1cm} (6)

- Optimal saving decision is based on \( \beta_j \delta_j \), while the value is evaluated with \( \delta_j \) only.
Model: Value Conditional on Defaulting

\[ V_{def}(j, i, h, p, t, x, a) = u \left( \frac{c}{v_i} \right) + \delta_j \mathbb{E} V(j, i + 1, 1, p', t', x', 0) \]  
(7)

\[ c + \xi = e(i, p, t)(1 - \eta) + b(i, p, t) \]  
(8)

\[ V^*_{def}(j, i, h, p, t, x, a) = u \left( \frac{c}{v_i} \right) + \delta_j \mathbb{E} V(j, i + 1, 1, p', t', x', 0) \]  
(9)

\[ c + \xi = e(i, p, t)(1 - \eta) + b(i, p, t) \]  
(10)

- Existing debt \( a \) and expenditure \( x \) are wiped away.
- Credit history turns bad \((h' = 1)\).
- Cannot save in the defaulting period \((a' = 0)\).
- \( \xi \): Cost of filing.
- \( \eta \): Wage garnishment.
Model: Decision of Agent with Bad Credit History ($h = 1$)

\[
V(j, i, 1, p, t, x, a) =
\begin{cases}
V_{\text{def}}(j, i, 1, p, t, x, a) & \text{if } B(.) = \emptyset \\
u \left( \frac{c}{\nu_i} \right) + \delta_j \mathbb{E} V(j, i + 1, h', p', t', x', a^*) & \text{if } B(.) \neq \emptyset
\end{cases}
\] (11)

\[
a^* = \arg\max_{a' \in \mathbb{R}^+} \left\{ u \left( \frac{c}{\nu_i} \right) + \beta_j \delta_j \mathbb{E} V(j, i + 1, h', p', x', t', a') \right\}
\] (12)

c + a' q(j, i, 1, p, t, x, a') + x = e(i, p, t) + b(i, p, t) + a
\] (13)

- Agents can default only if defaulting is the only choice.
- Agents cannot save: $a' \in \mathbb{R}^+$. 
Model: Unsecured Credit Sector

- Mass of credit card companies, each of which is a price taker.
- Offers discount bonds of price \( q(j, i, h, p, t, x, a') \).
- A credit card company can target any type of agents.
  - Cross-subsidization is impossible in equilibrium.
  - Zero profit for each type in equilibrium.
- Zero profit condition of a credit card company making loans to measure \( m \) of type-(\( j, i, 0, p, t, x, a' \)) agents:

\[
m \mathbb{E} \left[ 1_{g_h = 0}(-a') + 1_{g_h = 1}\eta e(i + 1, p', t') \frac{-a'}{x' - a'} \right] \\
= m(-a'q(j, i, 0, p, t, x, a'))(1 + r + \iota) \quad (14)
\]
Model: Credit Card Sector: $q(.)$ Function

1. Solving the zero profit condition for $q$:

$$q(j, i, 0, p, t, x, a') = \frac{\mathbb{E}\left[1_{gh=0} + 1_{gh=1}\frac{\eta e(i+1, p', t')}{x'-a'}\right]}{1 + r + \iota}$$

(15)

2. In case $\eta = 0$:

$$q(j, i, 0, p, t, x, a') = \frac{1_{gh=0}}{1 + r + \iota}$$

(16)

3. Special case: no default

$$q(j, i, 0, p, t, x, a') = \frac{1}{1 + r + \iota}$$

(17)

4. Special case: all default

$$q(j, i, 0, p, t, x, a') = 0$$

(18)
Default probability is an increasing function of the size of debt.

Therefore, $q(.)$ (default premium) is a decreasing (increasing) function of the size of debt.

With $\eta = 0$, at some point, $q(.)$ becomes zero. The corresponding debt level gives the endogenous borrowing constraint.

When the punishment is very harsh, nobody defaults, and the model becomes the one with the natural borrowing limit.

When the punishment is very mild, everybody defaults, and the model becomes the one with zero borrowing limit.
Model: Equilibrium

Steady-state recursive equilibrium satisfies:

1. Given \( q(\cdot) \), agent’s optimize:
   \[ V(j, i, h, p, t, x, a) \] is the optimal value function and
   \[ g_a(j, i, h, p, t, x, a) \] and \( g_h(j, i, h, p, t, x, a) \) are associated optimal
decision rules.

2. Given \( g_h(\cdot) \), zero profit of credit card sector:
   \[ q(j, i, h, p, t, x, a') \]

3. Type distribution of agents, \( \mu \), is time-invariant.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I$</td>
<td>54</td>
<td>Last age is age 73.</td>
</tr>
<tr>
<td>$I_R$</td>
<td>45</td>
<td>Retirement at age 65.</td>
</tr>
<tr>
<td>$\sigma$</td>
<td>2.0000</td>
<td>Standard in literature.</td>
</tr>
<tr>
<td>$\nu_i$</td>
<td></td>
<td>Household size in family equivalence scale.</td>
</tr>
<tr>
<td>$\phi$</td>
<td>0.5000</td>
<td>Measure of exponential-discounting agents.</td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>1.0000</td>
<td>Definition of exponential-discounting.</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>0.7000</td>
<td>Laibson et al. (2007).</td>
</tr>
<tr>
<td>$\delta_1 = \delta_2$</td>
<td>0.9544</td>
<td>Match D/Y=0.09.</td>
</tr>
<tr>
<td>$\lambda$</td>
<td>0.1000</td>
<td>10 years of punishment.</td>
</tr>
<tr>
<td>$\xi$</td>
<td>0.0280</td>
<td>Cost of filing = 600 dollars</td>
</tr>
<tr>
<td>$\eta$</td>
<td>0.3064</td>
<td>Match number of bankruptcies = 0.84% p.a.</td>
</tr>
<tr>
<td>$r$</td>
<td>0.0200</td>
<td>Annual interest rate.</td>
</tr>
<tr>
<td>$\iota$</td>
<td>0.0600</td>
<td>Transaction cost of loans.</td>
</tr>
<tr>
<td>$\bar{r}$</td>
<td>1.0000</td>
<td>Interest rate limit.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>{e_i}</td>
<td>~</td>
<td>From Gourinchas and Parker (2002).</td>
</tr>
<tr>
<td>\rho_p</td>
<td>0.9500</td>
<td>From Livshits et al. (2010)</td>
</tr>
<tr>
<td>\sigma^2_p</td>
<td>0.0250</td>
<td>From Livshits et al. (2010)</td>
</tr>
<tr>
<td>\sigma^2_t</td>
<td>0.0500</td>
<td>From Livshits et al. (2010)</td>
</tr>
<tr>
<td>\psi_e</td>
<td>0.2000</td>
<td>From Livshits et al. (2010)</td>
</tr>
<tr>
<td>\psi_p</td>
<td>0.3500</td>
<td>From Livshits et al. (2010)</td>
</tr>
<tr>
<td>x_1</td>
<td>0.3960</td>
<td>Size of small exp. Livshits et al. (2007)</td>
</tr>
<tr>
<td>\pi^x_1</td>
<td>0.0237</td>
<td>Prob of small exp. Livshits et al. (2007)</td>
</tr>
<tr>
<td>x_2</td>
<td>1.2327</td>
<td>Size of large exp. Livshits et al. (2007)</td>
</tr>
<tr>
<td>\pi^x_2</td>
<td>0.0015</td>
<td>Prob of large exp. Livshits et al. (2007)</td>
</tr>
</tbody>
</table>
### Baseline Model: Aggregate Statistics

<table>
<thead>
<tr>
<th></th>
<th>U.S. 1995-1999</th>
<th>Baseline Model</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>Exponential</td>
<td>Hyperbolic</td>
</tr>
<tr>
<td>Asset/Income</td>
<td>254-534</td>
<td>97.8</td>
<td>145.4</td>
<td>49.5</td>
</tr>
<tr>
<td>% in debt</td>
<td>11.0-48.4</td>
<td>30.8</td>
<td>18.4</td>
<td>43.1</td>
</tr>
<tr>
<td>Debt/Income</td>
<td>9.0</td>
<td>9.0</td>
<td>3.9</td>
<td>14.2</td>
</tr>
<tr>
<td>Charge-off rate</td>
<td>4.8</td>
<td>4.5</td>
<td>5.7</td>
<td>4.2</td>
</tr>
<tr>
<td>Avg borrowing rate</td>
<td>10.9-12.8</td>
<td>10.1</td>
<td>9.9</td>
<td>10.2</td>
</tr>
<tr>
<td>Total bankruptcies</td>
<td>0.84</td>
<td>0.84</td>
<td>0.46</td>
<td>1.22</td>
</tr>
<tr>
<td>Due to exp shock</td>
<td>–</td>
<td>0.71</td>
<td>0.45</td>
<td>0.98</td>
</tr>
<tr>
<td>Due to inc shock</td>
<td>–</td>
<td>0.13</td>
<td>0.01</td>
<td>0.25</td>
</tr>
</tbody>
</table>

- The baseline model replicates U.S. debt-related statistics.
- ...except asset holding.
- Hyperbolic-discounting agents borrow more and default more.
- Hyperbolic-discounting agents default with income shocks as well.
Baseline Model: Average Life-Cycle Profiles

(a) Consumption

(b) Savings

(c) Debtors

(d) Defaults
In 2005, BAPCPA was enacted, in response to increasing defaults.

- Perception: debtors are abusing the debtor-friendly bankruptcy law.

Two main components (White (2007)):

1. Means-testing (income).
2. Higher cost of filing ($600 → $2500).

We introduce the two components into our calibrated model.
Comments on Welfare

- Social welfare is measured as **ex-ante expected life-time utility**.
  - Expectation with respect to all possible initial conditions.
  - Also look at ex-ante expected life-time utility conditional on preference type.

- **Experienced utility** at the initial age.
  - Value of agents at the initial age with temptation.

- Converted into **CEV** (consumption equivalent variation).
  - Change in flow consumption due to moving from the baseline economy (without the BAPCPA) to the alternative economy.
Effects of the 2005 Bankruptcy Law Reform: Model Implications

<table>
<thead>
<tr>
<th>Model</th>
<th>% Default</th>
<th>D/Y</th>
<th>Charge-off</th>
<th>Avg r</th>
<th>Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0.84</td>
<td>9.0</td>
<td>4.5</td>
<td>10.1</td>
<td>–</td>
</tr>
<tr>
<td>BAPCPA</td>
<td>0.35</td>
<td>11.1</td>
<td>2.4</td>
<td>9.4</td>
<td>−0.34</td>
</tr>
<tr>
<td>Means-testing</td>
<td>0.65</td>
<td>9.5</td>
<td>3.8</td>
<td>10.2</td>
<td>−0.05</td>
</tr>
<tr>
<td>Higher costs</td>
<td>0.49</td>
<td>10.6</td>
<td>3.2</td>
<td>9.7</td>
<td>−0.31</td>
</tr>
</tbody>
</table>

- Lower number of bankruptcies.
- Higher debt.
- Lower average borrowing interest rate.
- Effects of higher filing costs are stronger.
### Effects of 2005 Bankruptcy Law Reform: Decomposition

<table>
<thead>
<tr>
<th>Model</th>
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<tr>
<td>Baseline</td>
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<td>11.1</td>
<td>2.4</td>
<td>9.4</td>
<td>–0.34</td>
</tr>
<tr>
<td>Only $q(.)$</td>
<td>4.45</td>
<td>16.2</td>
<td>45.9</td>
<td>24.3</td>
<td>+1.77</td>
</tr>
<tr>
<td>Means-test $\overline{q}(.)$</td>
<td>0.73</td>
<td>8.0</td>
<td>4.0</td>
<td>10.0</td>
<td>–0.08</td>
</tr>
<tr>
<td>Higher costs $\overline{q}(.)$</td>
<td>0.49</td>
<td>7.9</td>
<td>3.7</td>
<td>9.9</td>
<td>–0.90</td>
</tr>
</tbody>
</table>

- Means-testing prevents high-income agents from defaulting.
- Higher default costs discourage (lower-income) agents from defaulting.
- Both lower probability of defaulting.
- Stronger commitment to repay leads to lower borrowing rate.
- Agents borrow more in response.
Price of discount bonds (default premium) increases (declines) in response to the BAPCPA.
### Effects of the 2005 Bankruptcy Law Reform: Model vs Data

<table>
<thead>
<tr>
<th></th>
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<th>Avg r</th>
<th>Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U.S.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1999-2004</td>
<td>0.94</td>
<td>9.4</td>
<td>5.3</td>
<td>14.0</td>
<td>–</td>
</tr>
<tr>
<td>2007</td>
<td>0.43</td>
<td>9.5</td>
<td>4.0</td>
<td>13.3</td>
<td>–</td>
</tr>
<tr>
<td>2007-2014</td>
<td>0.67</td>
<td>7.7</td>
<td>5.6</td>
<td>12.6</td>
<td>–</td>
</tr>
<tr>
<td>2014</td>
<td>0.50</td>
<td>6.6</td>
<td>3.2</td>
<td>11.9</td>
<td>–</td>
</tr>
<tr>
<td><strong>Model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Baseline</td>
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<td>4.5</td>
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<tr>
<td><strong>Only exponential-discounting agents</strong></td>
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<tr>
<td>Baseline</td>
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<td>4.8</td>
<td>9.9</td>
<td>–</td>
</tr>
<tr>
<td>BAPCPA</td>
<td>0.38</td>
<td>12.5</td>
<td>2.3</td>
<td>9.2</td>
<td>−0.04</td>
</tr>
<tr>
<td><strong>Only hyperbolic-discounting agents</strong></td>
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<td></td>
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</table>

- Consistent with the U.S. data, especially in 2007.
- Predictions of the baseline model are similar to those of the alternative models with only one type of agents.
## Effects of the 2005 Bankruptcy Law Reform: Heterogeneity

<table>
<thead>
<tr>
<th>Model</th>
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<tbody>
<tr>
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<td>10.1</td>
<td>–</td>
</tr>
<tr>
<td><strong>BAPCPA</strong></td>
<td>0.35</td>
<td>11.1</td>
<td>2.4</td>
<td>9.4</td>
<td>−0.34</td>
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<tr>
<td><strong>Exponential-discounting agents</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.46</td>
<td>3.9</td>
<td>5.7</td>
<td>9.9</td>
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<tr>
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<tr>
<td>Baseline</td>
<td>1.22</td>
<td>14.2</td>
<td>4.2</td>
<td>10.2</td>
<td>–</td>
</tr>
<tr>
<td>BAPCPA</td>
<td>0.54</td>
<td>18.0</td>
<td>2.3</td>
<td>9.4</td>
<td>−0.34</td>
</tr>
</tbody>
</table>

- Not surprisingly, similar effects between two types of agents.
Small negative welfare effects: $-0.34\%$ in CEV.
- Negative!
- Same for both types of agents.

Not working to screen out the abusers.
- Small effects of means-testing.
- Consistent with Albanesi and Nosal (2015).
Welfare Effects of the 2005 Bankruptcy Law Reform

- Various channels of welfare effects:
  1. Some agents cannot default due to means-testing (↓)
  2. Higher costs of defaulting (↓)
  3. Lower borrowing interest rate and resulting better consumption smoothing (↑)
  4. Hyperbolic-discounting agents overborrow (↓)

- Hyperbolic-discounting agents:
  - (1)+(2)+(4) > (3).
  - Nakajima (2012) show that (4) is strong.

- Exponential-discounting agents:
  - (1)+(2) > (3).
  - (3) is weak because not many of them borrow.
Calibrating the Bankruptcy Reform

<table>
<thead>
<tr>
<th></th>
<th>% Default</th>
<th>D/Y</th>
<th>Charge-off</th>
<th>Avg r</th>
<th>Welfare</th>
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</thead>
<tbody>
<tr>
<td><strong>Changing Means-Testing Threshold</strong></td>
<td></td>
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</tr>
<tr>
<td>0%</td>
<td>0.02</td>
<td>26.2</td>
<td>0.1</td>
<td>8.1</td>
<td>+0.55</td>
</tr>
<tr>
<td>50%</td>
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<td>11.5</td>
<td>1.6</td>
<td>9.3</td>
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<td>100% (BAPCPA)</td>
<td>0.35</td>
<td>11.1</td>
<td>2.4</td>
<td>9.4</td>
<td>−0.34</td>
</tr>
<tr>
<td>∞% (Baseline)</td>
<td>0.84</td>
<td>9.0</td>
<td>4.5</td>
<td>10.1</td>
<td>−</td>
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<tr>
<td><strong>Changing Default Cost</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>$0</td>
<td>1.02</td>
<td>8.1</td>
<td>5.1</td>
<td>10.4</td>
<td>+0.11</td>
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<tr>
<td>$600 (Baseline)</td>
<td>0.84</td>
<td>9.0</td>
<td>4.5</td>
<td>10.1</td>
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<tr>
<td>$1200</td>
<td>0.72</td>
<td>9.7</td>
<td>4.1</td>
<td>10.0</td>
<td>−0.11</td>
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<tr>
<td>$2500 (BAPCPA)</td>
<td>0.49</td>
<td>10.6</td>
<td>3.2</td>
<td>9.7</td>
<td>−0.31</td>
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</table>

- Tighter means-testing threshold yields welfare gain.
- Lower default cost yields welfare gain (possibly just higher cons).
# Effects of Usury Law

<table>
<thead>
<tr>
<th></th>
<th>% Default</th>
<th>D/Y</th>
<th>Charge-off</th>
<th>Avg r</th>
<th>Welfare</th>
</tr>
</thead>
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<td><strong>All Agents</strong></td>
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<tr>
<td>Baseline (100%)</td>
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<td>9.0</td>
<td>4.5</td>
<td>10.1</td>
<td>–</td>
</tr>
<tr>
<td>Usury law (20%)</td>
<td>0.83</td>
<td>9.0</td>
<td>4.5</td>
<td>10.1</td>
<td>+0.02</td>
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<td>Usury law (10%)</td>
<td>0.74</td>
<td>4.8</td>
<td>6.0</td>
<td>9.6</td>
<td>−0.98</td>
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</tr>
<tr>
<td>Baseline (100%)</td>
<td>0.46</td>
<td>3.9</td>
<td>5.7</td>
<td>9.9</td>
<td>−</td>
</tr>
<tr>
<td>Usury law (20%)</td>
<td>0.46</td>
<td>3.9</td>
<td>5.7</td>
<td>9.9</td>
<td>−0.00</td>
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<tr>
<td>Usury law (10%)</td>
<td>0.46</td>
<td>1.7</td>
<td>10.0</td>
<td>9.5</td>
<td>−1.08</td>
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<td><strong>Hyperbolic-Discounting Agents</strong></td>
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</tr>
<tr>
<td>Baseline (100%)</td>
<td>1.22</td>
<td>14.2</td>
<td>4.2</td>
<td>10.2</td>
<td>−</td>
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<tr>
<td>Usury law (20%)</td>
<td>1.21</td>
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<td>4.2</td>
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<td>+0.03</td>
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<td>7.9</td>
<td>5.1</td>
<td>9.6</td>
<td>−0.89</td>
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</table>

- Not-too-tight usury law improves welfare, for hyperbolic-discounting agents.
- Tighter usury law hurts both types of agents.
The optimal level of income garnishment upon default ($\eta$) is 0.84 (highest feasible level).

- Welfare improvement when $\eta$ is very high or very low.
- Exponential-discounting agents prefer higher $\eta$.
- Hyperbolic-discounting agents prefer lower $\eta$ (overborrowing).
The model with only exponential-discounting agents imply a large welfare gain from tight $\eta$.

The model with only hyperbolic-discounting agents imply a moderate welfare gain from lax $\eta$. 

---

**Optimal Level of Default Punishment: Alternative Models**

- **Baseline: All agents**
- **Model with agents without temptation**
- **Model with agents with temptation**

![Graph showing welfare in consumption growth (%) against $\eta$ (Income garnishment rate).](image-url)
Concluding Remarks

- I develop a quantitative model with:
  - Equilibrium default.
  - Hyperbolic-discounting / temptation
  - Coexistence of exponential- and hyperbolic-discounting agents.

- I evaluate the recent bankruptcy law reform with the model.
  - The model implies that BAPCPA successfully reduces bankruptcies.
  - But with negative welfare effect.

- Effects of changing punishment upon default.
  - Exponential-discounting agents prefer severe punishment of default (stronger commitment to repay).
  - Hyperbolic-discounting agents prefer lax punishment that leads to less credit (stronger commitment not to overborrow).
References


