Accounting for the Rise in Consumer Bankruptcies

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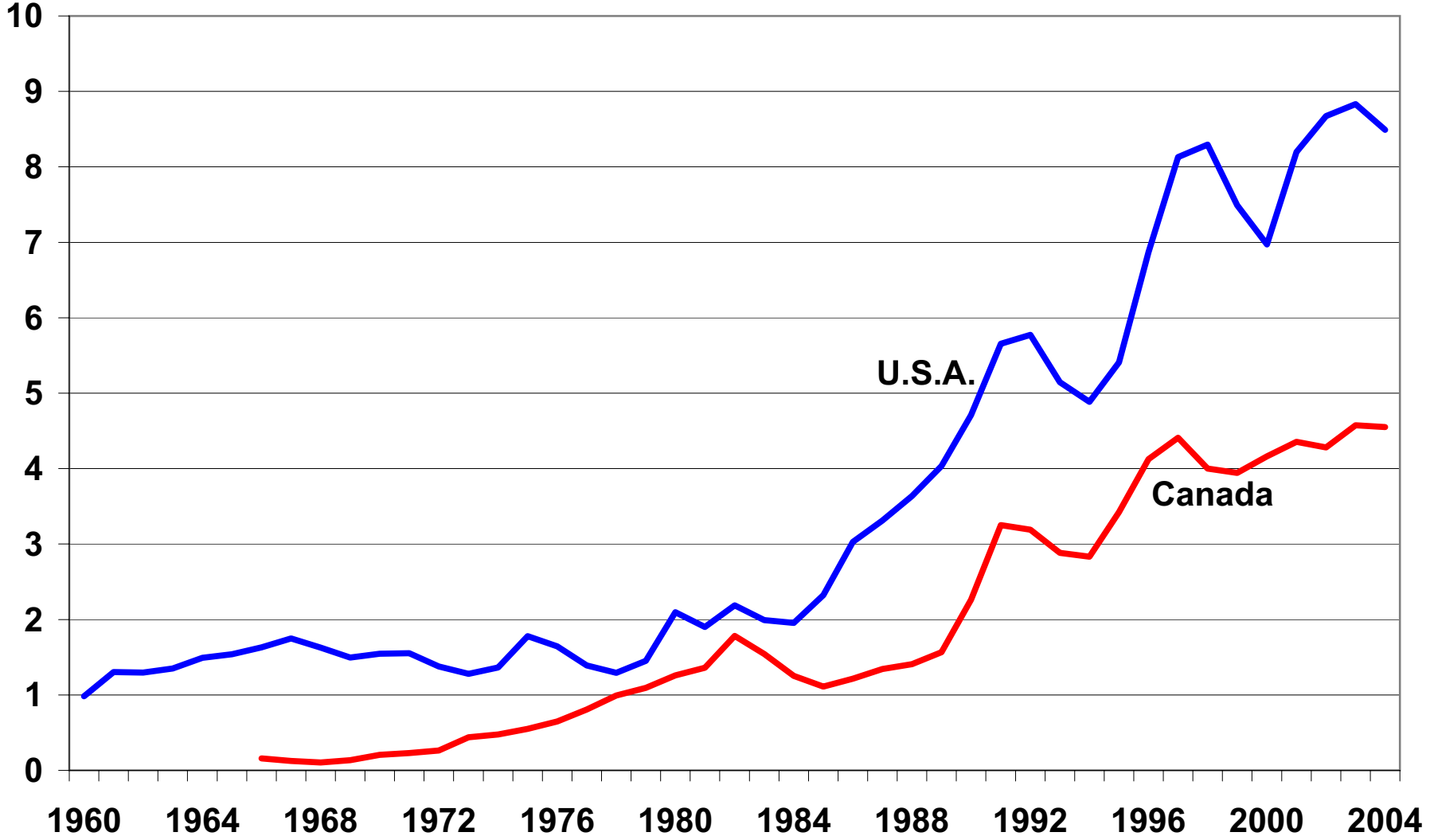
Motivation

1. Substantial increase in consumer bankruptcy filings.
   - 1.4 filings per 1,000 adults in 1970
   - 8.5 filings per 1,000 adults in 2002
   - Similar increases in Canada:
     from 0.2 per 1,000 adults in 1970 to 4.5 in 2004.
2. Debate about what caused the increase in filings.
3. Policy debate about reforming bankruptcy law.

Figure 1: Consumer Bankruptcies per 1000 of 18-64 yr-old



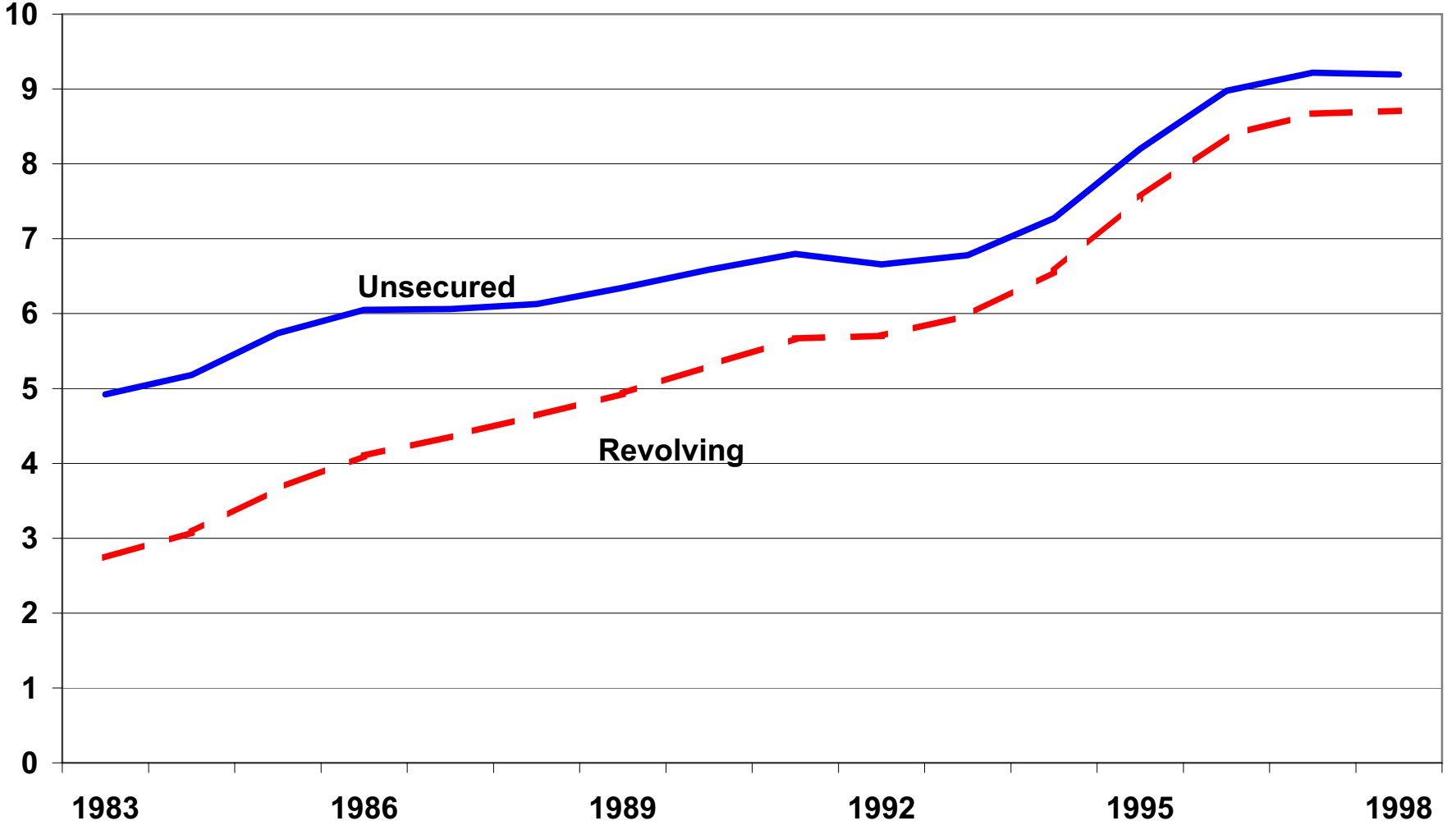
Our Contribution

- 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:

Fact	1980-84	1995-99
Chapter 7 filings (% of HHs)	0.25%	0.83%
Unsecured Debt/Disposable Income	5%	9%
Average borrowing interest rate	11.5-12.7%	11.7-13.1%
Charge-off rate	1.9%	4.8%

Unsecured and Revolving Credit as % Disposable Income



Measurement of Unsecured Debt

- Unsecured debt/disposable income: 9% in aggregate data
  Negative net worth: 0.7-1.5% (SCF).
- Unsecured debt is better measure because:
  - many assets (partially) exempt from bankruptcy.
  - costly to seize assets (e.g. Standard & Poor's estimate of foreclosure costs $\sim$ 20-30% of loan value).
  - Zinman (forthcoming): credit card debt underreported in SCF by $\sim$ 50%.
- Further: credit card debt 9% of income and charge-off rate on credit cards 5%. If only negative net worth could be defaulted upon, would imply an implausibly high charge-off rate of 22.5% and an interest rate of more than 30%.

Proposed Explanations

1. Increase in earnings volatility
   (Barron, Elliehausen and Staten 2000)
2. Increase in expense risk (Warren and Warren Tyagi 2003)
3. Demographic changes in the population
   (Sullivan, Warren and Westbrook 2000)
   - Age composition (baby-boomers)
   - Marital status
4. Decrease in cost of bankruptcy – stigma? (Gross and Souleles 2002, Fay, Hurst and White 2002)
5. Removal of interest rate ceilings (*Marquette*) (Ellis 1998)
6. Credit Market Innovation (Barron and Staten 2003)

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, etc.
- 6 years between filings
- roughly 4 months process
- Court fees: $209, legal fees: $750-$1,500

Literature

- Large empirical literature (typically only one story): Sullivan, Warren, and Westbrook (1999, 2000), Boyes and Faith (1986), Buckley and Brinig (1998), Domowitz and Eovaldi (1993), Ellis (1998), Fay, Hurst and White (2002), Gross and Souleles (2002), McKinley (1997), Shepard (1984)
- Quantitative models of bankruptcy: Chatterjee, Corbae, Nakajima, and Rios-Rull (2007), Livshits, MacGee and Tertilt (2007), Athreya (2002), Li and Sarte (2006)
- Closest to ours: Moss and Johnson (1999), Athreya (2004)
- Analysis of financial innovation: Athreya, Tam, and Young (2008), Sanchez (2008), Narajabad (2008), Drozd and Nosal (2008), Livshits, MacGee and Tertilt (2008).

Summary of Our Results

- None of the explanations “works” individually.
- 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 main driving force.

A Model 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,
  $\rightarrow$ interest rate depend on age, current income, total debt.

The Model: Households

- J-period lived households
- Preferences represented by:

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

- **Expense Shocks**
  - Exogenous increase in household's debt
  - Idiosyncratic expense shock: $\kappa \in K$, iid
  - K finite set of possible expense shocks
- **Stochastic Labor Income:** $y_j^i = z_j^i \eta_j^i \bar{e}_j$

Bankruptcy Punishments

1. Cannot save or borrow in default period.
   - Captures seizure of assets.
2. Cannot file following period.
   - Captures 6 year waiting period.
3. Stigma – utility cost χ during default period.
4. Fraction γ of earnings is garnisheed.
   - Lenders receive $\Gamma = \gamma y$.

The Model: Financial Markets

- Incomplete markets: one-period non-contingent bonds only.
- Interest rate on savings exogenous: r^s.
- Risk-free borrowing: $q^b = \frac{1}{1+r^s+\tau}$, where τ is (proportional) transaction cost of making loans.
- Perfectly competitive financial markets.
  - Full information: Default probability $\theta(d, z, j)$ is common knowledge.
  - Zero expected profits on each loan.
  - Risk adjusted bond price:

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

- Usury law: If $q(d, z, j) < \frac{1}{1+\overline{r}}$, then $q(d, z, j)$ is set to 0.

Consumer Problem

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

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

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

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

$$\text{s.t. } c = (1-\gamma)\bar{e}_j z\eta$$

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

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

$$\text{s.t.} c = (1-\gamma)\bar{e}_j z\eta, \quad d' = (\kappa - \gamma\bar{e}_j z\eta)(1+r^r)$$

Equilibrium

Given risk-free bond prices $(q^s, \overline{q}^b)$, a recursive competitive equilibrium is value functions $V, \overline{V}, \overline{W}$, 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:
   $\theta(d', z, j) = E\left(I(d' + \kappa', z', j + 1)\right)$

Methodology

- Calibrate benchmark economy to match late 90's.
  Targets: Filings, unsecured debt, interest rates, charge-off rate.
- Run "backward" experiments trying to match early 80's.
- Consider each story individually.
  - Changes required to match the early 80's.
  - Plausible changes in parameters.
- Can a combination of stories match the data?

Benchmark Parametrization

- 16 periods (3 years each).
- Last period is retirement (= no shocks).
- $u(c) = \frac{1}{1-\sigma}[c^{1-\sigma} - 1]$
- $\sigma = 2$, $\beta = 0.94^3$.
- Interest rate on savings r^s= 3.44%.
  (average return on municipal bonds)

Parameterization: Shocks

Expense Shocks

- Use data on:
  1. Medical bills (MEPS 1996-97)
  2. Divorce (US Vital Statistics, Equivalence Scale)
  3. Unwanted children (US Vital Statistics, USDA)
- Combine to construct two expense shocks:
  1. 82% of avg. earnings with probability 0.46%
  2. 26% of avg. earnings with probability 6%

Income Shocks

- From the literature

Bankruptcy Parameters

- No stigma, $\chi = 0$
- $r^r = 20\%$.
- Remaining 3 parameters ($\bar{r}$, τ, γ) are set to match:

Fact	1995-99
Chapter 7 filings	0.83%
Average borrowing interest rate	11.7-13.1%
Unsecured Debt/Income ratio	9%
Charge-off rate	4.8%

Transaction cost of borrowing: $\tau = 2.56\%$.
Linear garnishment $\gamma = 0.319\%$.
Interest ceiling, $\bar{r} = 75\%$.

- Interpretation of γ. (also, lower γ would imply more defaults, less debt, and much higher interest rates.)

Benchmark Results: Cause of Bankruptcy

Income Shock	Small Exp.	Large Exp.	No Exp.	Total
None	48.32%	7.93%	13.50%	69.75%
Bad Persist.	11.01%	2.22%	6.95%	20.18%
Trans.	5.35%	0.90%	1.53%	7.78%
Pers + trans.	1.23%	0.25%	0.80%	2.28%
Total	65.91%	11.31%	22.78%	100%

Experiments

Can Stories Work Alone?

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

Combining the Stories

Stigma, lending cost, expense shock, and income volatility

Experiment 1: Income Shocks

- Variance of shocks has increased
  HSV (2004): σ_η^2 up 25%, σ_ϵ^2 up 42%
- Persistence of income has decreased

Experiment	Defaults	$\frac{\text{Debt}}{\text{earnings}}$	avg. r^b	charge-off
1995-99 (model/data)	0.84%	9.04%	11.7%	4.9%
1980-84 data	0.25%	5%	11.5%	1.9%
$\sigma_\eta^2 \downarrow, \sigma_\epsilon^2 \downarrow$	0.822%	12.1%	9.8%	3%
$\sigma_\eta = 0$	0.83%	12.25%	8.83%	2.7%
$\sigma_\epsilon = 0$	0.68%	27.5%	6.99%	1%

Conclusion: Cannot generate large change in filings.

Experiment 2: Expense Shocks

Aim: Decrease expense shocks to match 1980-84 filings

Experiment	Defaults	Debt/earnings	avg. r^b
1995-99 (model/data)	0.84%	9.04%	11.7%
1980-84 data	0.25%	5%	11.5%
No small shock	**0.25%**	8.91%	8.6%
No large shock	0.74%	8.89%	11.5%

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 $\rightarrow$ \$1,946 in 1998.
- As fraction of median income: 3.55% $\rightarrow$ 4.16%.
- Fraction of uninsured HHs: 13% in 1987 $\rightarrow$ 16% in 1998.

Experiment: Decrease magnitudes and probabilities by 15%.

Experiment	Defaults	Debt/earnings	avg. r^b
1995-99 (model/data)	0.84%	9.04%	11.7%
1980-84 data	0.25%	5%	11.5%
15% decrease	**0.73%**	**9.03%**	10.9%

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%.

Experiment	Defaults	Debt/earnings	avg. r^b
1995-99 (model/data)	0.84%	9.04%	11.7%
1980-84 data	0.25%	5%	11.5%
Stigma	**0.25%**	12.89%	7.9%

Conclusion: Can match the change in filings rates
but generates counterfactual debt/income and interest rates.
Robustness: get very similar results with non-utility costs.

Decline in Bankruptcy Cost – Interpretation

- Changes in social norms – reduced stigma (Fay, Hurst and White 2002).
- Legal changes – 1978 bankruptcy amendments (Shepard 1984).
- Reduced cost of accessing credit after bankruptcy (Staten 1993).

Experiment 4: Transaction Cost

Experiment: Increase transaction cost τ (benchmark = 2.56%).

Experiment	Defaults	Debt/earnings	avg. r^b
1995-99 (model/data)	0.84%	9.04%	11.7%
1980-84 data	0.25%	5%	11.5%
$\tau = 4.81\%$	0.79%	6.00%	15.89%
$\tau = 5.81\%$	0.78%	5.00%	17.97%
$\tau = 6.81\%$	0.77%	4.22%	20.08%

Conclusion:

- Small effect on filings.
- Too large change in average interest rate.

Is a Large Fall in τ reasonable?

- Lender's zero-profit condition: charge-off rate $= \frac{r-(r^s+\tau)}{1+r}$.
- Using data: τ falls roughly from 6 to 3, a large decline.
- May not be relevant decline for consumers: Altig and Davis (1992): 1986 Tax Reform eliminated tax deductability of interest rates.
- Redo calculations with decline in average marginal tax rate from 24.7% to 0%: much smaller decline in τ.
- Stango (1999): 60% of tax filers do not itemize (no tax deduction). Also, lower income households pay lower taxes, so deduction is lower.
- We also want to interpret τ more broadly, capturing other borrowing costs that would not show up as wedge in data (e.g. fixed cost of obtaining a loan).
- Clearly more work is needed here.

Experiment 5: Usury Law

1978 *Marquette* Decision essentially removed any interest caps.

Experiment	Defaults	Debt/earnings	avg. r^b
1995-99 (model/data)	0.84%	9.04%	11.7%
1980-84 data	0.25%	5%	11.5%
$\bar{r} = 10\%$	0.68%	8.9%	8.25%
$\bar{r} = 8\%$	0.59%	2.04%	7.79%

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

Experiment	Defaults	$\frac{\text{Debt}}{\text{earnings}}$	avg. r^b	charge-off
1995-99 (Model/Data)	0.84%	9.04%	11.7%	4.8
1980-84 Data	0.25%	5.0%	11.6%	1.9
Combo	**0.25%**	**5.24%**	**11.77%**	**1.4**
No Δ Exp.	0.31%	5.21%	11.94%	1.5
No Δ Stigma	0.71%	4.35%	18.18%	6.1
No Δ τ	0.31%	12.74%	7.93%	1.0
No Δ Transitory	0.27%	5.25%	11.82%	1.4

Conclusion:

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

Welfare Implications of Rise in Bankruptcies

Welfare measure: Equivalent Consumption Variation
Compare preferred combo with benchmark: early 1980s to late 1990s.

comparison	ECV
full	+ 0.57%
only $\tau \downarrow$	+ 1.19%
only $\chi \downarrow$	+ 0.27%
τ and $\chi \downarrow$	+ 1.17%
only expense risk $\uparrow$	– 0.29%
only earnings risk $\downarrow$	– 0.33%

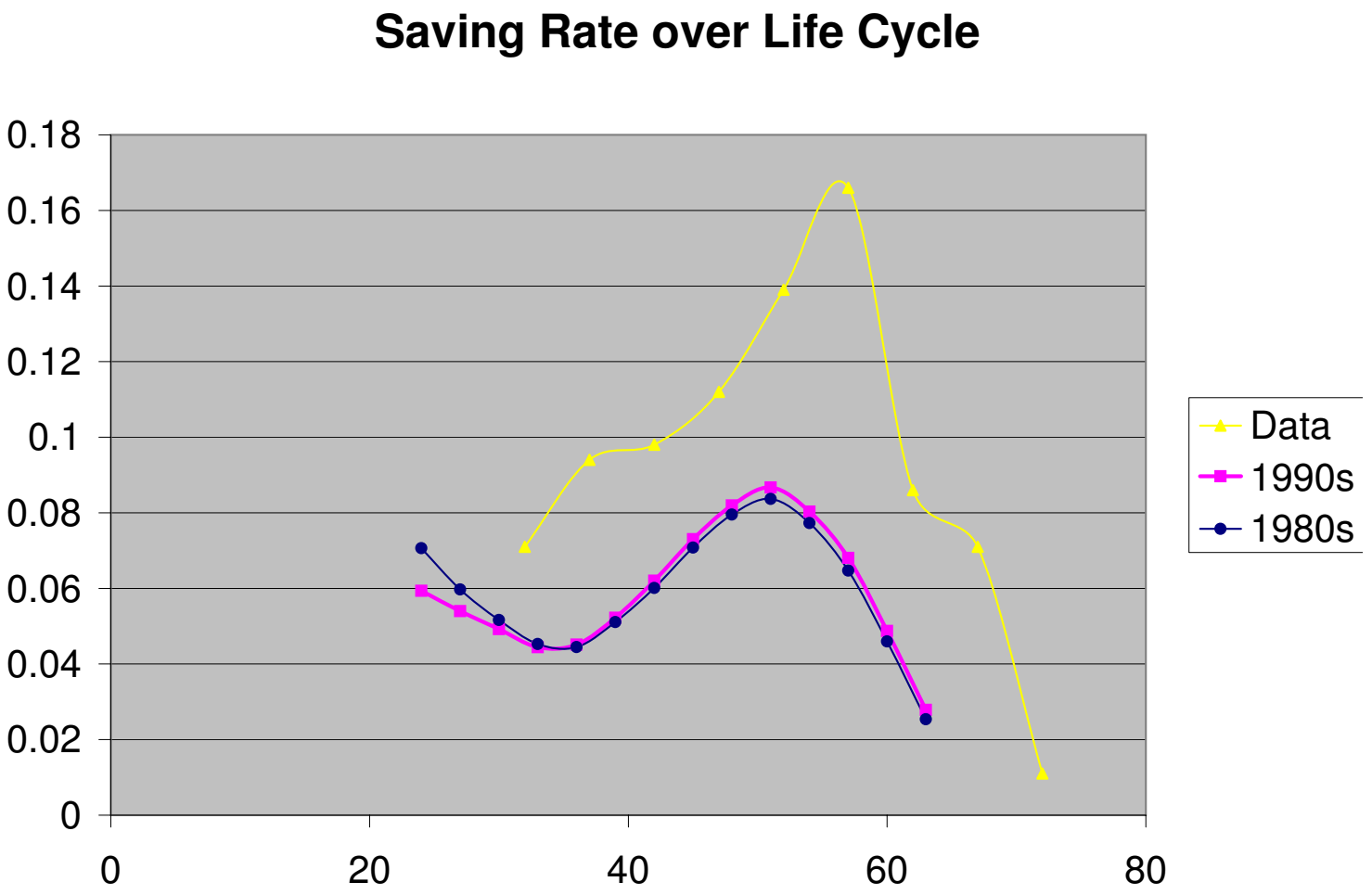
Savings in Model vs. Data

- Stylized fact: decline in household savings rate.
- Model has little to say about aggregate savings rate (always zero, because no growth).
- Look at net worth instead.

median net worth/median income	1984	1998	% change
data	1.24	0.89	28% fall
model	0.60	0.40	34% fall

Note: no housing, no bequest motive in model.

Savings over the Life Cycle



Conclusion

- 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 small role quantitatively.
- Demographic changes are quantitatively unimportant.

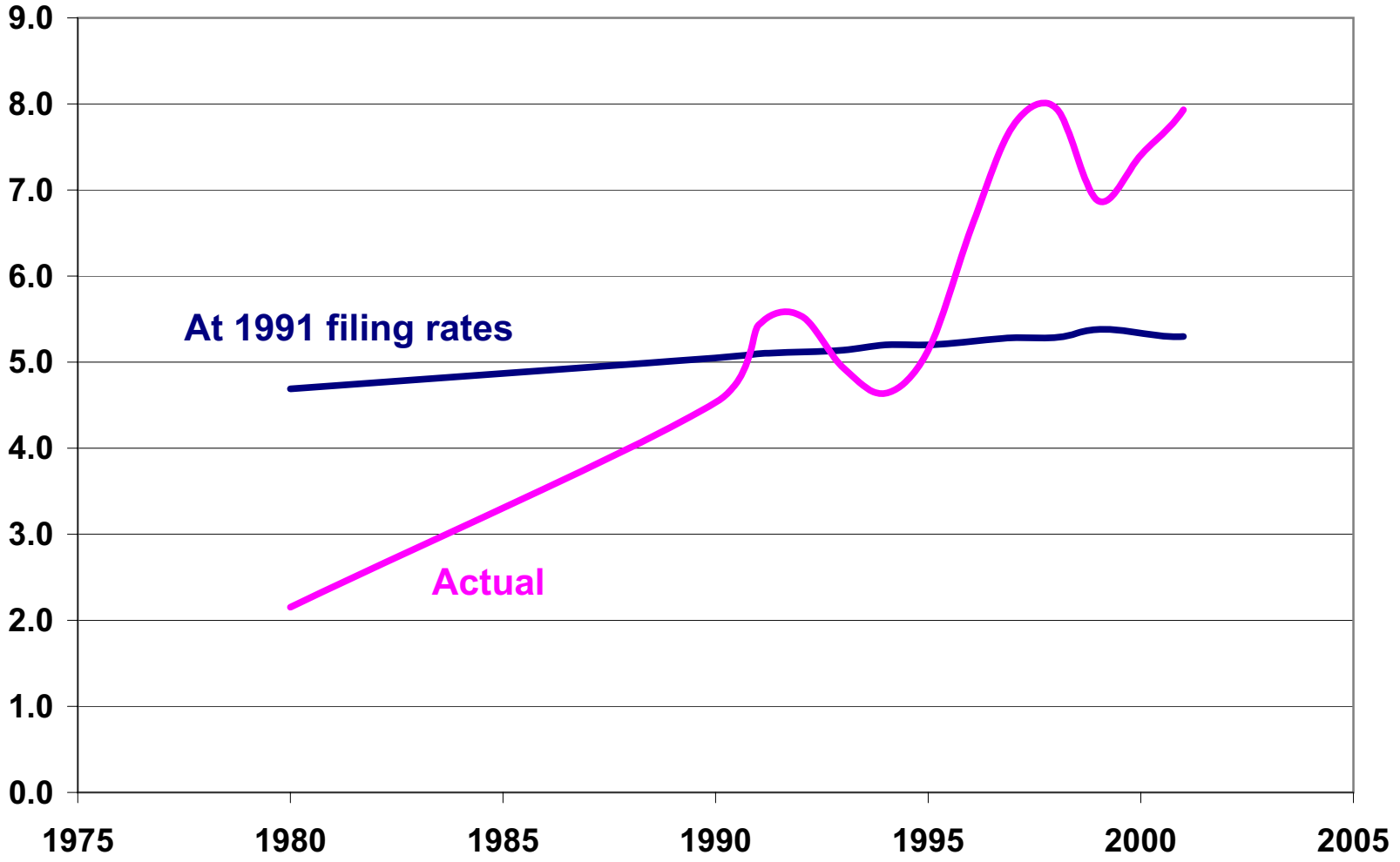
We view $\tau \downarrow$ and $\chi \downarrow$ as reduced form ways of modeling technological progress in financial sector.

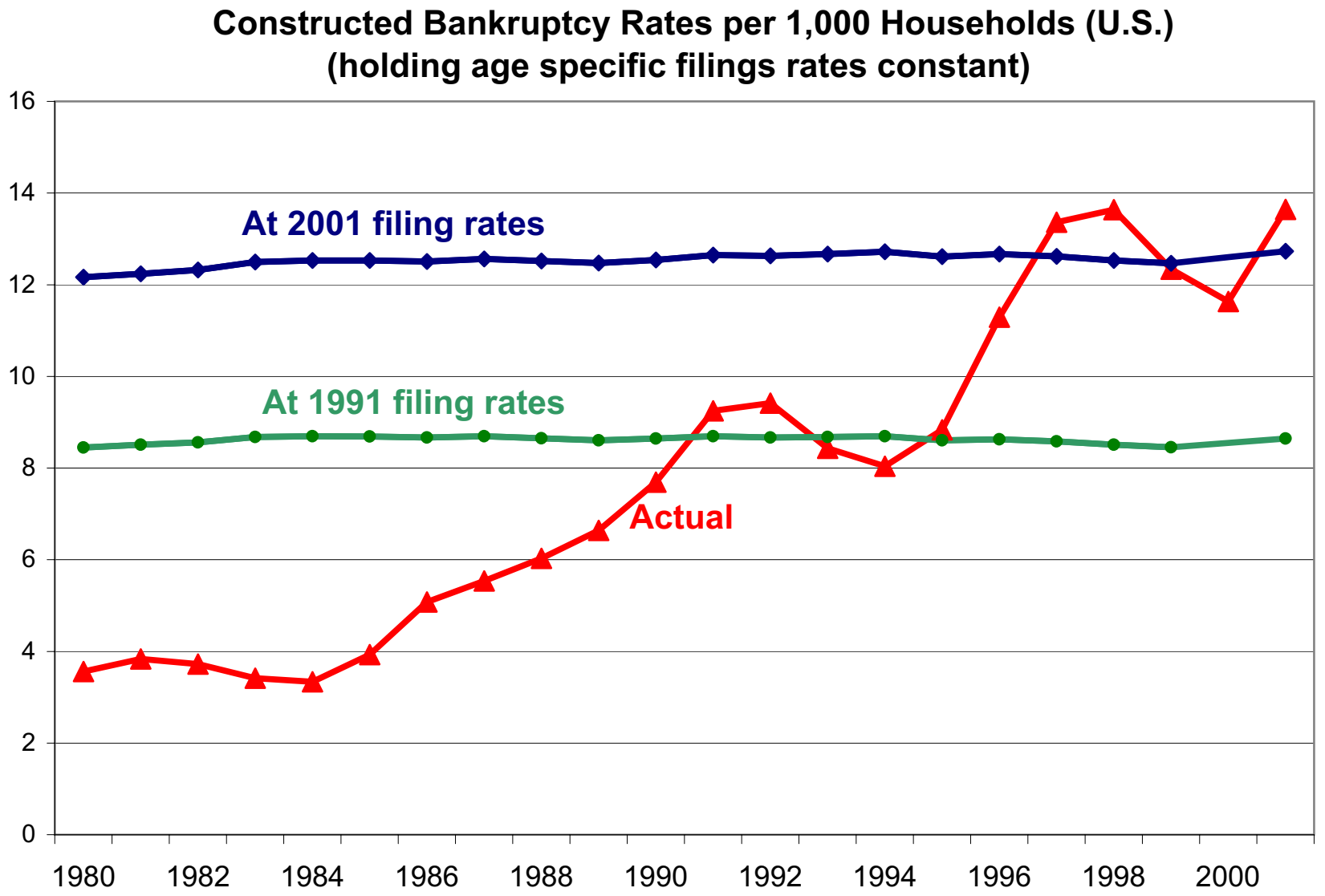
Current work: better understanding of financial innovation (credit scoring = better information processing).

Summary of Experiments

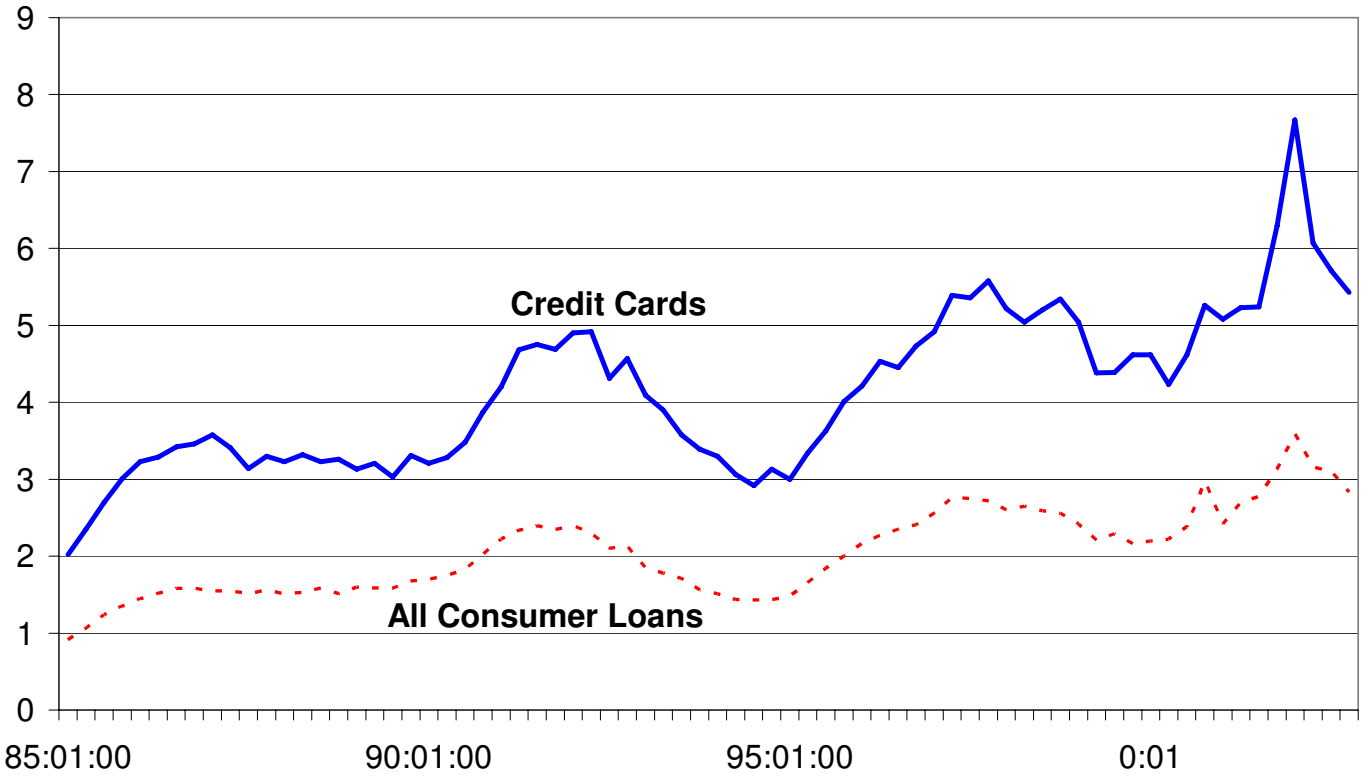
Experiment	Defaults	Debt/earnings	avg. r^b
1995-99 (model/data)	0.84%	9.04%	11.7%
1980-84 data	0.25%	5%	11.5%
Realistic Income	0.822%	12.1%	9.8%
No Transitory	0.818%	11.7%	9.4%
No Persistent	0.63%	20.6%	8.01%
Realistic Expense	0.73%	9.03%	10.9%
No small shock	**0.25%**	8.91%	8.6%
Stigma	**0.25%**	12.89%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

Implied Bankruptcy Rates (per 1,000 25+ adults), U.S.
(holding marital status specific filing rates constant)




Constructed Bankruptcy Rates per 1,000 Households (U.S.)
(holding age specific filings rates constant)
16
14
12
10
8
6
4
2
0
At 2001 filing rates
At 1991 filing rates
Actual
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000

Charge-offs at U.S. Banks (% outstanding)



“Family” Expense Shocks

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

U.S.	1980	1998
Births per 1,000 population	15.9	14.3
Births per 1,000 women aged 15-44	68.4	64.3
Births per 1,000 unmarried women	29.4	43.3
Intended Births	61.9%	69%
Births per 1,000 teenagers (15-19 yrs old)	53.0	50.3
Divorces per 1,000 population	5.3	4.1

Labor Income Process

- Age profile of earnings (Gourinches and Parker (2002))
- 5 persistent productivity shock values:
  $z \in \{z_1, z_2, z_3, z_4, z_5\}$.
  Tauchen method to discretize AR(1).
  $\log z_j^i = \rho \log z_{j-1}^i + \epsilon_j^i$
  where $\rho = 0.96$, $\sigma_\epsilon^2 = 0.014$.
- 3 transitory shock values: $\eta \in \{\eta_1, 1, \eta_3\}$
  $\sigma_\eta^2 = 0.05$.
  Support: $\pi_1 = \pi_3 = 0.1$