Accounting for the Rise in Consumer Bankruptcies*

Igor Livshits and James MacGee
University of Western Ontario
and
Michèle Tertilt
Stanford University

August 31, 2005

Preliminary

Abstract

Personal bankruptcies in the United States have increased dramatically, rising from 1.4 per thousand working age population in 1970 to 8.5 in 2002. We use a heterogeneous agent life-cycle model with competitive financial intermediaries who can observe households' earnings, age and current asset holdings to evaluate several commonly offered explanations. We find that an increase in uncertainty (income shocks, expense uncertainty) cannot quantitatively account for the rise in bankruptcies. Instead, stories related to a change in the credit market environment are more plausible. In particular, we find that a combination of a decrease in the credit market transactions cost together with a decline in "stigma" does a good job in accounting for the rise in consumer bankruptcy. We also argue that the abolition of usury laws and other legal changes have played little role.

Keywords: Consumer Bankruptcy, Life Cycle.

JEL Classifications: E21, E49, G18, K35

*Corresponding Author: Igor Livshits, Department of Economics, University of Western Ontario, Social Science Centre, London, Ontario, N6A 5C2, fax: (519) 661 3666, e-mail: livshits@uwo.ca. We thank Martin Gervais, Jeremy Greenwood, Karen Pence and seminar participants at the SITE 2004 conference, the 2003 Western-Toronto Macro Conference, the SED Meetings in Paris and Florence, the Bank of Canada, the European Central Bank, and Pennsylvania, Rochester, Illinois, York and Queen's Universities for helpful comments. The Economic Policy Research Institute (EPRI) provided generous financial support for this project for which we are very grateful. Livshits acknowledges financial support from the Arts, Humanities & Social Sciences Fund of the UWO. We would like to thank Jie Zhou for excellent research assistance.

1 Introduction

The past thirty years have witnessed an explosive growth in the number of consumer bankruptcy filings in the United States. Personal bankruptcies have increased from 1.4 per thousand of the working age population in 1970 to 8.5 in 2002 (see Figure 1). This dramatic rise in bankruptcies has motivated a large literature on potential explanations. Somewhat surprisingly, little effort has been made to understand the quantitative implications of these stories. In this paper, we address this void and quantitatively evaluate seven commonly offered explanations of the dramatic increase in consumer bankruptcies.

These potential explanations can be grouped into two categories: (i) "uncertainty" has increased leading to an increased number of households in financial trouble or (ii) changes in the credit market environment have made bankruptcy more attractive or expanded households' access to credit. The "uncertainty" category includes three stories. The first two stories involve an increase in idiosyncratic uncertainty at the household level, due to increased labor earnings volatility or an increase in the number of U.S. households without medical insurance (e.g. Barron, Elliehausen, and Staten (2000)). The third story we consider argues that compositional changes in the population – the passing of the baby-boomers through the prime bankruptcy ages and changing family structure – has increased the number of risky households (Sullivan, Warren, and Westbrook (2000)). The second category includes four possible changes to the credit market environment. Perhaps the most common explanation of the rise in bankruptcy filings is that the "stigma" attached to bankrupts has fallen (Gross and Souleles (2002), Buckley and Brinig (1998), Fay, Hurst, and White (2002)). A second possibility is that amendments to the bankruptcy code in the U.S. may have made bankruptcy more attractive to potential filers (Shepard (1984) and Boyes and Faith (1986)). Another explanation is that the removal of interest rate ceilings, following the US Supreme Court's 1978 *Marquette* decision, eased the expansion of credit to higher risk individuals by allowing lenders to charge higher risk premia (e.g. Ellis (1998)). The final channel we consider is that credit market innovations (such as the development and spread of credit scoring) have facilitated the increase in credit granted to households by reducing the transaction costs of lending (e.g. Barron and Staten (2003), Ellis (1998)).

Disentangling these explanations is challenging as several of them are based upon legislative reform and changes in the economic environment that happened at roughly the same time. The main tool that we use to deal with this challenge is an equilibrium

model of consumer bankruptcy. Our approach is based on the premise that any explanation of the rise in bankruptcy filings should be consistent not only with the rise in bankruptcy filings but also with observed changes in the level of household debt, average borrowing interest rates and the characteristics of bankrupts. By using an equilibrium model of consumer bankruptcy we are able to derive the quantitative implications of different explanations along each of these dimensions. We can thus evaluate each explanation by comparing the model's implications to four key empirical observations: the secular increase in the level of bankruptcy filings, the increase in the ratio of unsecured consumer debt to disposable income, little change in the average real interest rate for unsecured lending, and little change in the average debt to income ratio of bankrupts. In addition, we use the comparison with Canada as a basic consistency check of several stories. This comparison is useful since Canada also experienced a similar rise in filings during the 1980s and early 1990s, but did not experience the same legislative changes observed in the U.S.

The equilibrium bankruptcy model we use is a heterogeneous agent life-cycle model with incomplete markets which builds upon Livshits, MacGee, and Tertilt (2005). Each period, households face idiosyncratic uncertainty regarding their income and "expense shocks" (exogenous changes in asset position meant to represent uninsured medical bills, costs of divorce and unwanted children). Upon realization of this uncertainty, households decide whether or not to file for bankruptcy, given some bankruptcy rules. If bankruptcy is not declared, households can borrow (and save) via one period non-contingent bonds with perfectly competitive financial intermediaries. Financial intermediaries can observe each household's earnings process, age and current asset holdings when making loans. An equilibrium result is that the price of debtors' bonds varies with their current income, age and level of borrowing. It should be noted that in this paper we abstract from durable goods and focus solely on the market for *unsecured* consumer credit.

Our main findings are as follows. We argue that the rise in bankruptcy is primarily due to changes in the credit market environment (broadly defined). In particular, our findings suggest that a decline in the utility cost of filing – which we term "stigma" – together with a decline in the cost of extending credit is required in order to match the U.S. experience. While financial market liberalization in the US may have been a necessary condition for the increased access of risky borrowers to credit, we argue that it is not a main driving force. We also conclude that the "uncertainty" based stories play a small role in the rise in bankruptcies. Using our estimate of the changes in expense uncertainty (primarily medical expenses), we find that this channel accounts

for at most 17% of the increase. Increased volatility of household earnings also does not appear to play a significant role in the rise. We find that changes in the age structure of the population are quantitatively unimportant (and much smaller than Sullivan, Warren, and Westbrook (2000) suggest). Finally, our calculations imply that the increase in the number of unmarried (and divorced) people by itself is unlikely to be quantitatively important.

These findings suggest a more nuanced view of the factors associated with the rise in bankruptcies than the existing literature. Our results suggest that papers emphasizing "uncertainty" based stories (such as Warren and Warren Tyagi (2003) and the SMR study summarized in Luckett (2002)) overstate the importance of these factors. Closest in spirit to our work is Moss and Johnson (1999) and Athreya (2004), who each analyze a subset of the alternative explanations (neither considers changes in income or expense uncertainty) analyzed in this paper. All three papers argue that changes in the credit market environment appear to be the primary driving force behind the rise in filings. However, they differ in what exactly these changes mean. Moss and Johnson (1999) base their conclusions on an informal analysis of credit and borrowing data as well as some historical literature. Based on this historical perspective and data, they argue that the main source of the increase in bankruptcies is an increase in the share of unsecured credit held by lower income households.[1] While their arguments seem plausible, they do not attempt to assess these channels quantitatively. Athreya (2004) is closest to this paper in the sense that he also uses an equilibrium model of bankruptcy to examine several stories and evaluates them by comparing observable implications from the model to the data. He argues that a decline in stigma alone would lead to a counterfactual decline in the ratio of revolving debt to disposable income. Athreya also finds that a reduction in the transaction cost of lending can generate the rise in filings. In the experiments he undertakes, however, the fall in the transactions cost leads to a significantly higher debt to income ratio than that observed in the data. In contrast, we find that a "combination" of credit market changes is consistent with both the changes in filings and the change in the ratio of unsecured debt to income.

The equilibrium model of bankruptcy that we use is part of a recent literature (motivated in part by the dramatic rise in bankruptcies and the related policy debates) on equilibrium models of consumer bankruptcy.[2] Both Livshits, MacGee,

[1]The three main reasons they cite are interest-rate deregulation and falling inflation, the rise in home equity lending, and the bankruptcy amendments of 1984 that encouraged creditors to lend more to low income consumers.

[2]See Athreya (2005) for a more detailed survey of recent papers on this topic.

and Tertilt (2003) and Chatterjee, Corbae, Nakajima, and Rios-Rull (2003) outline dynamic equilibrium models where interest rates vary with borrowers' characteristics, and show that for reasonable parameter values, these models can match the level of U.S. bankruptcy filings and debt-income ratios. Athreya (2002) analyzes the welfare implications of different bankruptcy laws while Li and Sarte (2002) analyze the consumers choice of Chapter 7 versus 13 using dynamic equilibrium models of bankruptcy. Despite this recent interest in using numerical models to analyze consumer bankruptcy, little work has been undertaken to use these models to evaluate alternative explanations of the rise in bankruptcies.

The remainder of the paper is organized as follows. We summarize background information on consumer bankruptcy in Section 2. The basic environment for evaluating the stories is presented in Section 3. Section 4 presents our results, and Section 5 concludes.

2 Consumer Bankruptcy in the U.S.

This section provides some background information on consumer bankruptcy in the United States. We also review the available evidence on changes in the characteristics of consumer bankrupts over the past thirty years.

2.1 Overview of Consumer Bankruptcy the United States

The American consumer bankruptcy code is a "fresh start" system.[3] Consumers can file for bankruptcy and receive a discharge of debt in exchange for assets (except for some exempt assets). Legal actions by creditors and most garnishments are halted upon the date of filing for bankruptcy, including phone calls and letters from creditors seeking repayment.

American households can choose between two bankruptcy procedures: Chapter 7 and Chapter 13. Under Chapter 7, all unsecured debt is discharged in exchange for non-collateralized assets above an exemption level. However, debtors are not obliged to use any of their future income to repay debts. Debtors who file under Chapter 7 are not permitted to refile under Chapter 7 for six years, although they may file under Chapter 13. Approximately 70 percent of consumer bankruptcies are filed under Chapter 7. Filers must pay the bankruptcy court filing fee of $200 and fees for legal advice that typically range from $750 to $1,500 (Sullivan, Warren, and Westbrook

[3]See Mecham (2004) for a detailed description of consumer bankruptcy law in the United States.

(2000)). In addition, a debtor filing for bankruptcy has to submit a detailed list of all creditors, amounts owed, all assets, monthly living expenses as well as the source and amount of income. A typical chapter 7 bankruptcy takes about 4 months from start to completion.

Chapter 13 permits debtors to keep their assets in exchange for a promise to repay part of their debt over the next 3 to 5 years. The debtors plan must repay unsecured creditors at least as much as they would have received under a Chapter 7 filing. The plan must be confirmed by the bankruptcy judge, but creditors cannot block the plan. In order to qualify for Chapter 13, individuals must have a regular income and their debts must be within prescribed limits (secured debts must be less than $807,000 and unsecured debt must be less than $270,000).

2.2 Bankrupts over Time: Have They Changed?

Changes in the characteristics of bankrupts can shed important insights into the plausibility of several potential explanations of the rise on consumer bankruptcies. In this section, we briefly review the relevant evidence on changes in the characteristics of bankrupts over the past twenty-five years.

What the available literature suggests is surprising. Despite the dramatic increase in bankruptcy filings, the typical bankrupt today is remarkably similar to the typical bankrupt of twenty years ago (Sullivan, Warren, and Westbrook (2000), Warren (2002)). A typical bankrupt is lower middle-class (30-50% poorer than the average household), in their thirties with an extremely high debt-to-income ratio (Sullivan, Warren, and Westbrook (2000)). Indeed, if anything, the available evidence suggests that bankrupts today have slightly higher debt-income ratios and hold more unsecured debt, especially credit card debt.[4]

Data on bankrupts' debt and income from several U.S. studies is reported in Table 1. Where possible, we have reported both the average and median values and as well as the implied debt-income ratios. It is worth pointing out that there is a relative paucity of systematic studies of bankrupts over time, and that care should be exercised in interpreting the findings of the available studies as they are based upon samples from different states (see the Appendix for a brief description of the samples used in the studies cited below).

The first four rows summarize the data from two surveys conducted and reported

[4]As we will discuss in section 3.8.1, this is consistent with changes in aggregate debt holdings, as unsecured (especially credit card) debt held by households has increased.

by Sullivan, Warren, and Westbrook (2000). These figures are for all bankrupts, and include both chapter 7 and chapter 13 filers. Their data indicates that the average and median amount borrowed by bankrupts (in constant dollars) remained roughly constant during the 1980s. Their findings suggest that debt-income ratios have increased slightly.[5]

The remaining rows in the table summarize data for chapter 7 bankrupts only. The rows labelled 1978/79 and 1980 are from Domowitz and Eovaldi (1993). Since they do not report the average amounts of debt or income by category, only the debt-income figures appear in the table. The row labelled 1997a is from a sample of bankrupts in Ohio reported in Sullivan, Warren, and Westbrook (2000), the 1997/98 data is from a national sample reported in Bermant and Flynn (1999) while the Utah data is from Lown and Rowe (2002).

Table 1: Liabilities and Assets of Chapter 7 Filers in the U.S. (1997$)

Sample	Avg Debt	Med Debt	Avg Uns*	Med Uns	Avg Inc	Med Inc
1981	$68,154	$37,002	$27,365	$12,452	$27,861	$26,439
Relat.**	2.44	1.40	0.98	0.47	1.00	1.00
1991	$65,158	$34,795	$26,618	$15,128	$23,927	$21,115
Relat.	2.72	1.65	1.11	0.72	1.00	1.00
78/79 Relat.	1.86	0.34	1.14	0.15	1.00	1.00
1980 Relat.	1.56	0.78	0.87	0.46	1.00	1.00
Ohio 1997	$61,320	$24,303	$29,529	$19,515	$19,641	$18,756
Relat.	3.12	1.30	1.50	1.04	1.00	1.00
1997/98	$81,696	$42,810	$43,032	$23,190	$26,568	$22,800
Relat.	3.07	1.87	1.62	1.02	1.00	1.00
Utah 1997	$73,327	$31,981	n/a	n/a	$18,864	$16,440
Relat.	3.89	1.95	n/a	n/a	1.00	1.00

* Unsecured ** Relative to Income

Source: The rows labelled 1981 and 1991 are from Sullivan, Warren, and Westbrook (2000), Table 2.4. The 78/79 and 1980 values are reported by Domowitz and Eovaldi (1993). The Ohio 1997 data are from a survey of Ohio bankrupts reported in Sullivan, Warren, and Westbrook (2000), Table 2.4. The 1997/98 data is reported by Bermant and Flynn (1999). The Utah 1997 data are from Lown and Rowe (2002).

The data on chapter 7 filers also suggest that the debt-income ratios of bankrupts have increased while the average real income of the typical bankrupt has not changed by much. While Domowitz and Eovaldi (1993) do not report average income by category of filer, they do report that the average incomes were between $24,300 and

[5]Warren and Warren Tyagi (2003) reports that the debt-income rations in a follow-up survey conducted in 2001 have continued to climb.

$26,600 (in 1991 $). These figures are close to those reported by Bermant and Flynn (1999), although the average incomes found in the Ohio and Utah studies were substantially lower.

Finally, the available survey evidence also suggests that there has been a substantial increase in the fraction of female bankrupts. Sullivan and Warren (1999a) report that female initiated bankruptcies increased from 17 percent of all bankruptcies in 1981 to 39 percent in 1999. This shift was accompanied by a decrease in joint filings by couples from 57 to 33 percent, while the share of male filings remained roughly constant. Pollak (1997) finds a similar pattern in filing in Nebraska (These figures are for all bankruptcies, although the Chapter 7 figures are similar.).

Table 2: Filings by Gender (U.S.)

	1967	1977	1987	1991	1999
Joint	18.6%	55.0%	50.0%	44.0%	33.0%
Male	66%	33.9%	26.8%	26.0%	28.0%
Female	14.6%	11.1%	22.2%	30.0%	39.0%

Sources: Pollak (1997), Sullivan and Warren (1999b)

3 Basic Environment for Evaluating the Stories

We utilize the model of consumer bankruptcy of Livshits, MacGee, and Tertilt (2005). The framework is an overlapping generations model of households who live for J periods. Each generation is comprised of a continuum of households of measure 1. All households are ex-ante identical. They maximize discounted lifetime utility from consumption. Households face idiosyncratic uncertainty, but there is no aggregate uncertainty. Markets are incomplete: the only assets in this economy are person-specific one-period non-contingent bonds. A crucial element of the model is the household's option to declare bankruptcy.

3.1 Households

Household consume a single good in each period. The preferences are represented by:

$$\sum_{j=1}^{J} \beta^{j-1} u\left(\frac{c_j}{n_j}\right) \tag{3.1}$$

where β is the discount factor, c_j is the total consumption and n_j is the size of a household of age j in equivalence scale units.[6] We assume that $u(\cdot)$ is increasing and concave.

The labor income of household i at age j depends upon its productivity and labor endowment:

$$y_j^i = a_j^i \overline{e}_j = z_j^i \eta_j^i \overline{e}_j, \tag{3.2}$$

where a_j^i is the household's stochastic productivity and $\overline{e}_j$ is the deterministic endowment of efficiency units of labor. The household's productivity is the product of a persistent shock z_j^i and a transitory shock η_j^i. The persistent component z is modelled as a finite Markov chain with an age-independent transition matrix $\Pi(z'|z)$. The productivity of an age 1 household is drawn from the stationary distribution. The transitory component η also has finite support and is iid over time.

Households face a second type of uncertainty: They may be hit with an idiosyncratic expense shock $\kappa \geq 0$, $\kappa \in K$, where K is the finite set of all possible expense shocks. The probability of shock κ_i is denoted π_i. An expense shock directly changes the net asset position of a household. Expense shocks are independently and identically distributed, and are independent of income shocks.

3.2 Financial Markets

The borrowing and lending market is perfectly competitive. Financial intermediaries accept deposits from savers and make loans to borrowers. Loans take the form of one period bond contracts. The face value of these loans is denoted by d. Note that d is the amount that is to be repaid, not the amount received today. We use the convention that $d > 0$ denotes borrowing, and $d < 0$ denotes savings. Loans are non-contingent as the face value of the loan is not contingent on the realization of any variable. However, the bankruptcy/default option introduces a partial contingency because households have the option of lowering the face value of their debt via bankruptcy.

When making loans, intermediaries observe the total level of borrowing, the current productivity shock, and the borrower's age. Thus, the interest rate for borrowers can depend upon age, debt level, and current productivity. Let $q^b(d, z, j)$ be the price of a loan issued to a household of age j, with current productivity shock z, and debt d. If a usury law is in place, there is an added restriction $q^b \geqslant \frac{1}{1+\bar{r}}$, where $\bar{r}$ is the

[6] The importance of changing family size profile in explaining the hump-shaped life cycle consumption profile is widely recognized in the literature (see for example Attanasio and Rios-Rull (1999)).

interest rate ceiling.

Intermediaries maximize expected profits every period. They incur a transaction cost τ of making loans, which is proportional to the size of the loan. In equilibrium, perfect competition assures that intermediaries earn zero expected profits on all loans, which implies that the expected value of repayments must equal the cost of the loan to the intermediary. Perfect competition also implies that in equilibrium, cross subsidization of interest rates across different types of borrowers will not occur. Further, the interest rate paid to savers does not depend upon the level of savings and is equal to the exogenous risk-free bond price q^s.

3.3 Bankruptcy

A household can declare bankruptcy. In that case, all their debts are discharged, and the household starts the following period with zero balance, unless hit by an expense shock that period. An exogenous garnishment rule specifies the fraction of earnings that can be seized by creditors. We consider (costless) linear garnishment of earnings during the default period. The total amount garnisheed and transferred to creditors is $\Gamma = \gamma y$, where y is earnings and $\gamma \in [0, 1]$ is the marginal rate of garnishment.[7]

In addition to losing the seized income, bankrupt debtors face three further "punishments". First, bankrupts cannot save or borrow during the default period.[8] Second, we allow for utility costs ("stigma"), χ, during the bankruptcy period. Finally, we also assume that bankruptcy cannot be declared two periods in a row.

3.4 Timing within the Period

The timing within the period is as follows. At the beginning of the period, each household realizes its productivity and expense shocks. If the household receives an expense shock κ, then the debt of the household is increased (or savings decreased) by κ. The household then decides whether to file for bankruptcy or not. If the agent has filed for bankruptcy, the amount that is garnisheed is deducted from the earnings, and the consumer is allowed to spend the remainder.

[7]The garnishment/repayment rule captures the fact that households typically have to wait some time before defaulting. Bankruptcy codes contain general provisions that borrowers must act in "good faith," so that borrowing and immediately filing for bankruptcy runs some risk of being denied. The parameter γ is intended to capture this fact by requiring that agents must repay at least some fraction of their debt.

[8]Prohibiting saving is meant to capture the seizure of assets in a Chapter 7 bankruptcy. However, we find that this restriction is of little consequence, as most bankrupts have no desire to save.

Households who declare bankruptcy are unable to save in the period they declared bankruptcy, so they consume all earnings net of garnishment. Households who did not declare bankruptcy decide on their net asset holdings for the following period and their current consumption.

3.5 Consumer Problem

At each date, the household chooses whether to default or not, current consumption and next period's debt (savings), taking the bond price schedule as given. We define the consumer's problem recursively. We define four distinct value functions. V is the value of a period that neither follows a bankruptcy nor involves a current bankruptcy while $\bar{V}$ is the value of declaring bankruptcy. Since we assume that bankruptcy cannot be declared two periods in a row[9], we need two more value functions for the period after a bankruptcy: W is the value of the period following a bankruptcy, where a household is not permitted to file again. However, a household may choose to default on the realized value of an expense shock. In this case, the household's current income is garnisheed and its debt is rolled over at the fixed interest rate r^r: the value of this state of the world is $\bar{W}$.

The value of repaying debts of an age j consumer with debt d and shock realization (z, η, κ) in a period not following bankruptcy is:

$$\begin{aligned} V_j(d, z, \eta, \kappa) = &\max_{c,d'} \left[u\left(\frac{c}{n_j}\right) + \beta E \max\left\{V_{j+1}(d', z', \eta', \kappa'), \bar{V}_{j+1}(z', \eta')\right\}\right] \\ &\text{s.t. } c + d + \kappa \leqslant \bar{e}_j z\eta + q^b(d', z, j)d' \end{aligned} \tag{3.3}$$

where $\bar{V}$ is the value of bankruptcy:

$$\begin{aligned} \bar{V}_j(z, \eta) = &\ u\left(\frac{c}{n_j}\right) - \chi + \beta E \max\left\{W_{j+1}(z', \eta', \kappa'), \bar{W}_{j+1}(z', \eta', \kappa')\right\} \\ &\text{where } \ c = \bar{e}_j z\eta - \Gamma, \qquad \Gamma = \gamma \bar{e}_j z\eta \end{aligned} \tag{3.4}$$

where W is the value of repaying debts in the period following bankruptcy:

$$\begin{aligned} W_j(z, \eta, \kappa) = &\max_{c,d'} \left[u\left(\frac{c}{n_j}\right) + \beta E \max\left\{V_{j+1}(d', z', \eta', \kappa'), \bar{V}_{j+1}(z', \eta')\right\}\right] \\ &\text{s.t. } c \leqslant \bar{e}_j z\eta + q^b(d', z, j)d' - \kappa \end{aligned} \tag{3.5}$$

[9]In our parameterization, we assume that each period lasts 3 years. To capture the U.S. code, we thus have to prohibit bankruptcy in the period immediately following default.

and $\bar{W}$ is the value of not repaying debts in the period following bankruptcy:

$$\begin{aligned} \bar{W}_j(z,\eta,\kappa) = & \; u\left(\frac{c}{n_j}\right) + \beta E \max\left\{V_{j+1}(d',z',\eta',\kappa'), \bar{V}_{j+1}(z',\eta')\right\} \\ & \text{where} \quad c = \bar{e}_j z\eta(1-\gamma), \qquad d' = (\kappa - \gamma\bar{e}_j z\eta)(1+r^r) \end{aligned} \tag{3.6}$$

When the constraint sets in problems (3.3) and (3.5) are empty, we set the corresponding value function to $-\infty$.

Let $I(d,z,\eta,j)$ denote the decision to declare bankruptcy of a consumer age j with debt holdings d and current productivity shocks (z,η). In equilibrium, borrowers default only if the value of bankruptcy is *strictly* greater than the value of repayment.

3.6 Intermediaries

Competitive financial markets imply zero expected profits on each loan. Since the law of large numbers holds in our model ex-post realized profits also equal zero. Therefore the individual bond price is determined by the default probability of the issuer and the risk-free bond price. Let $\theta(d',z,j)$ denote the probability that a household of age j with current persistent productivity z and total borrowing d' will declare bankruptcy tomorrow. Without garnishment, without usury law and with full discharge of debt, the zero profit condition is $q^b(d',z,j) = (1-\theta(d',z,j))\overline{q}^b$, where $\overline{q}^b \left(= \frac{1}{1+r^s+\tau}\right)$ is the price of a bond with zero default probability.

For positive levels of garnishment, this formula needs to be adjusted. The *unrestricted bond price for loans under wage garnishment* is

$$q^{ub}(d',z,j) = (1-\theta(d',z,j))\overline{q}^b + \theta(d',z,j)E(\frac{\Gamma}{d'+\kappa'}|I=1)\overline{q}^b \tag{3.7}$$

where $E(\frac{\Gamma}{d'+\kappa'}|I=1)$ is the expected rate of recovery through garnishment. We follow the convention that when a household defaults, the amount garnisheed is allocated proportionately to the repayment of expense debt and personal bonds.

Lastly, taking into account the interest rate ceiling $\bar{r}$, the *bond price for loans* is

$$q^b(d',z,j) = \begin{cases} q^{ub}(d',z,j) & \text{if } q^{ub}(d',z,j) \geqslant \frac{1}{1+\bar{r}} \\ 0 & \text{otherwise} \end{cases} \tag{3.8}$$

3.7 Equilibrium

Definition 3.1. *Given a bankruptcy rule and risk-free bond prices $(q^s, \overline{q}^b)$, a recursive competitive equilibrium is value functions $V, \bar{V}, W, \bar{W}$, policy functions c, d', $I(d,z,\eta,j)$, a default probability $\theta(d',z,j)$, and a pricing function q^b such that:*

1. *The value functions satisfy the functional equations (3.3) - (3.6), and c, d' and I are the associated optimal policy functions.*

2. *The bond prices q are determined by the zero profit conditions.*

3. *The default probabilities are correct:* $\theta(d', z, j) = E\left(I(d' + \kappa', z', \eta', j + 1)\right)$

The proof of the existence of equilibrium is provided in Livshits, MacGee, and Tertilt (2003). We find the equilibrium numerically by backward induction. We solve the households' problems given the equilibrium prices which incorporate the default decisions in the following period (starting with the last period of life). We compute the optimal decisions using a grid for the possible asset holdings.

3.8 Benchmark Parametrization

In this section, we outline our choice of functional forms and parameters.

Households live for 16 periods. Life begins at age 20 and the length of each of the first fifteen periods is 3 years. The last period corresponds to "retirement" and lasts 6 years. Households face no uncertainty during the terminal period of their life. The period utility function is $u(c) = \frac{c^{1-\sigma}-1}{1-\sigma}$, where $1/\sigma$ is the intertemporal elasticity of substitution. We set the annual discount factor equal to 0.94 ($\beta = 0.94^3$) and $\sigma = 2$. We use 1990 U.S. Census data to compute household sizes over the life cycle. We combine the household sizes with equivalence scales (ES) estimates reported in Fernandez-Villaverde and Krueger (2000) to construct an ES life cycle profile, n_j.[10]

To calibrate the expense shock, we look at data on expenses that are both unexpected and frequently cited by bankrupts as the proximate cause of their bankruptcy. We consider three different sources of shocks: medical bills, divorces and unplanned pregnancies. In our experiments, the expense shocks can take on three values: $\kappa \in \{0, \kappa_1, \kappa_2\}$. We assume that one shock is 26.4% of (one model period) average income in the economy while the other shock is equal to 82.18% of average income in the economy. The probabilities of being hit by such a shock are 6% and 0.46% respectively.[11]

A large literature has estimated the volatility of log earnings using the following structure:

$$\log y^i = \log z^i + \log \eta^i + \log g(X^i) \tag{3.9}$$

[10] We use the average of several ES estimates reported in Fernandez-Villaverde and Krueger (2000).

[11] A more detailed discussion of our benchmark expense calibration is contained in Livshits, MacGee, and Tertilt (2003).

where $g(X)$ captures the deterministic component of earnings, and z and $\eta \sim N(0, \sigma_\eta^2)$ are respectively persistent and transitory random components.[12] The log of the persistent idiosyncratic shock follows an AR(1) process:

$$\log z_j^i = \rho \log z_{j-1}^i + \epsilon_j^i \tag{3.10}$$

where $\epsilon_j^i \sim N(0, \sigma_\epsilon^2)$. We set the benchmark annual value of $\rho = 0.96$, $\sigma_\epsilon^2 = 0.014$ and $\sigma_\eta^2 = 0.05$. These values are within the range of values reported by Storesletten, Telmer, and Yaron (2004), Hubbard, Skinner, and Zeldes (1994), and Carroll and Samwick (1997).

We map the annual values into triennial. We discretize the idiosyncratic income shocks using the Tauchen method outlined in Adda and Cooper (2003). The persistent shock is discretized as a five state Markov process, with support $\{z_1, z_2, z_3, z_4, z_5\}$ and age independent transition matrix $\Pi(z'|z)$. The productivity of an age 0 consumer is drawn from the stationary distribution. When discretizing the transitory shock, we assume that 10% of the population receives a positive (negative) transitory shock each period, and choose the value of the support to match the variance.

The savings interest rate is set equal to 3.44%, which is the average real return on municipal bonds for the U.S reported by Gourinchas and Parker (2002). This implies that the risk free return on savings for a three year period is 10.68%.

3.8.1 Benchmark Targets and Calibrated Bankruptcy Parameters

In parameterizing our experiments, our basic strategy is to choose the bankruptcy and transaction cost parameters to match three key observations of the "high bankruptcy filing" period of 1995-1999. We then evaluate the proposed stories by checking how well they are able to replicate the "low bankruptcy filing" period of 1980-1984. The three key empirical observations are: the bankruptcy filings, the debt-income ratio and and the average borrowing interest rates. This section describes how we compute these facts for both periods and the parameters chosen to match the facts for the second time period.

Since our model abstracts from durable goods, the relevant number from the data is non-business Chapter 7 bankruptcy filings.[13] The average number of non-business

[12] We are abusing notation here, as the variables defined earlier are discrete, whereas here they are continuous.

[13] The filings data is an upper bound on consumer bankruptcies, since some households are counted twice when partners choose to file separately and because some filings caused by the failure of unincorporated small businesses are counted as chapter 7 non-business filings.

chapter 7 filings between 1995 and 1999 was roughly 850,000, which is roughly 0.84% of all households. Filings over 1980-1984 were much lower, averaging $210,000$ per annum, which corresponds to an annual filing rate per household of 0.25%

Given our focus on Chapter 7 filings, the relevant target for our model is unsecured debt. Unfortunately, the reported data does not break out secured versus unsecured measures of consumer credit. Consumer credit – which includes secured loans for vehicles, student loans as well as unsecured loans such as credit cards, installment loans and lines of credit – has remained roughly constant relative to disposable income in the U.S. between 1970 and the mid 1990s. The closest reported measure of unsecured consumer debt is revolving credit, which consists mainly of credit card debt and outstanding balances on unsecured revolving lines of credit. While revolving credit has increased dramatically, part of this is due to the substitution of credit card for installment credit. To correct for this, we constructed an estimate of unsecured credit over 1983-1999 as follows:[14] We define unsecured credit as the sum of revolving and the unsecured portion of non-automobile non revolving debt. We used the fraction of personal loans of nonrevolving debt reported by Dynan, Johnson, and Pence (2003) from the SCF for 1983, 1989, 1992, 1995 and 1998 (a more detailed discussion is in Appendix A). The estimates are plotted in Figure 3 as a percentage of personal disposable income, along with revolving credit. While our calculations suggest that the rise in revolving debt significantly overstates the increase in unsecured debt, they indicate that there has been a substantial increase in the unsecured debt to income ratio – an increase of roughly 40% between 1983 and 1999.[15] This gives a debt-income ratio of 9% for the high filing period and 5% for the low filing period.

The Federal Reserve reports two interest rates on unsecured loans for the time periods we are examining – the average (nominal) interest rate for two year personal loans and the average interest rate on credit cards. We compute the real rate of interest by subtracting the average CPI inflation rate in the U.S. for 1981-1986 and 1996-2000 from the average nominal borrowing rates for 1980-1985 and 1995-1999, respectively. This calculation implies an average real cost of unsecured consumer borrowing of between 11.7% and 13.1%. Table 3 summarizes the facts.

The bankruptcy parameters that need to be specified are the transactions cost of making loans τ, the lending rate ceiling $\overline{r}$, the bankruptcy garnishment rate γ, the

[14]This series ends in 1999 since after that data consumer credit (in G.19) was reported as either revolving or nonrevolving, whereas prior to 1999 nonrevolving credit was reported as automobile (non-revolving) and other nonrevolving.

[15]It is worth noting that this increase does not include the substantial increase in student loans. Student loan debt are not dischargeable except when sufficiently old or if cause undue hardship.

Table 3: 3 Key Observations

Fact	1980-84	1995-99
Chapter 7 filings	0.25%	0.83%
Average borrowing interest rate	11.5-12.7%	11.7-13.1%
Debt/Income ratio	5%	9%

utility cost χ and the roll-over interest rate, r^r. We initially set the interest rate ceiling to a (high) value of 100% annually, the utility cost of filing equal to zero, and the annual rollover interest rate to 20%.

The two remaining bankruptcy parameters γ, τ are chosen to match the 3 facts from Table 3 for 1995-1999. This leads to a γ of 0.283. The transactions cost of making loans is 3.56% annually.[16] Together with the risk free savings interest rate of 3.44%, this implies an annual risk free lending rate of 7% and a three year rate of 22.5%.

4 Results

We use the quantitative model to evaluate the different stories for the increase in bankruptcies proposed in the literature. Since we calibrated the model to the late 1990s, we have to go backwards in our experiments and ask what changes can replicate the data from the low filings period 1980-84 in the model.

We first run experiments to analyze each proposed story individually. For each story we ask whether the implied amount of borrowing, the interest rates and the characteristics of bankrupts are consistent with the data for the "low filing period" (Table 3). The first subsection focuses on uncertainty based stories, while the second subsection examines credit market based stories. At the end, we ask whether a combination of these stories can account for the rise in filings as well as the observed increase in unsecured consumer debt relative to disposable income, the lack of change in average borrowing interest rates and the economic characteristics of bankrupts.

[16]This is also close to the average operating cost per outstanding credit card loan less interchange revenue reported by Evans and Schmalnsee (1999). Operating costs in 1997 were of 5.3% of outstanding credit card balances, while interchange revenue averaged 1.9% of outstanding debt.

4.1 Did Increased Uncertainty Generate the Rise?

Survey evidence of bankrupts find that most bankruptcies are triggered by negative shocks to earnings or unexpected "expenses". An increase in the probability or size of these adverse shocks could potentially play an important role in accounting for the rise in filings. Similarly, it has been argued that increased income uncertainty plays a role in the rise of consumer bankruptcies. In this section, we document the extent to which uncertainty has changed over the last two decades and use our model to assess the quantitative importance of increased earnings uncertainty and increased "expense" risks. We also briefly argue that demographic changes are unlikely to have played a large role in the rise.

4.1.1 "Expense Shocks"

Before assessing the extent to which expense uncertainty has changed in the data, we use our model to ask how large a decrease in uncertainty is required to bring bankruptcy rates down to the 1980 level. Since our model has 4 parameters describing the expense shocks (two shock sizes and two probabilities) there is not a unique way to decrease expense uncertainty. One way of bringing bankruptcies down to their 1980 level is to eliminate the small expense shock entirely, which is reported as experiment 2 in Table 4. Note, however, that this hardly affects the debt/gdp ratio, which is counterfactual. Eliminating the large expense shock instead decreases bankruptcies only to 0.74%, as reported in experiment 3.

The above experiments shows that an increase in expense shocks alone cannot explain the U.S. experience from 1980 to 2000, as it counterfactually implies that debt relative to GDP should have stayed roughly constant. This leaves open the question of how large a contribution increased expense uncertainty had in the rise. To do this, we now estimate the extent to which expense uncertainty has indeed changed over the last two decades.

Medical Shocks

Health care spending has been increasing rapidly in most developed countries. In the U.S. total health expenditures have increased from $247 billion in 1980 to $1,149 billion in 1998. Relevant for this paper are medical costs born directly by households, net of insurance premia.[17] Real out-of-pocket (oop) payments per households have increased from $1,477 in 1980 to $1,946 in 1998, a 32% increase.[18] Note that median

[17] Insurance premia are regular payments and are hardly unexpected.

[18] These numbers are from the U.S. Statistical Abstracts (2000), Table 151. The increase in oop expenditures reported by Center for Medicare and Medicaid Services (2005) is even lower, so we

Table 4: Changes in Expense Uncertainty

	Experiment	Ch. 7	Avg. r^b	d/y Filers	$\frac{\text{Debt}}{\text{Earnings}}$
1	Benchmark	0.840%	11.69 %	2.38	9.04%
	U.S. 1995-99	0.83%	11.7 - 13.1%	-	9%
	U.S. 1980-84	0.25%	11.5 - 12.7%	-	5%
2	no small shock	0.25%	8.55%	2.65	8.91%
3	no large shock	0.74%	11.47%	2.23	8.98%
4	15% decrease	0.73%	10.94%	2.33	9.03%

household income has also gone up. To assess the ability to pay unexpected bills, we are interested in oop payments as a fraction of income. This has increased only slightly, from 3.55% in 1980 to 4.16% in 1998. That is, in 1980, the fraction of median income that was spent on oop was 15% lower than in 1998. The percentage of Americans without health insurance has also increased. In 1987 12.9% of Americans had no health insurance, compared to 16.3% in 1998, an increase of 26 percent. This leads us to believe that rather than individuals paying higher amounts in 1998 compared to 1980, there are *more people* with large out-of-pocket expenditures. Furthermore, from experiments not reported here, we know that the bankruptcy filing rate is more sensitive to the shock probability than the shock size. Thus, decreasing the expense shock probabilities by 15% gives an upper bound on how much of the change in filings rate could come through this channel.[19] We report these results as experiment 4 in Table 4. We conclude that a realistic increase in medical shocks contributes at best a modest amount to the increase in consumer bankruptcies, while, as pointed out above, leaving open the question why the debt over GDP ratio has almost doubled.

Moreover, the comparison with Canada casts further doubt on changes in medical uncertainty being the main driving force. Canada is a country with universal health care coverage. Hence, catastrophic medical events can hardly be the main cause of bankruptcies in Canada, which is consistent with the level of bankruptcies being lower in Canada than the United States. However, Canada has experienced a very similar increase in bankruptcies as the U.S. (see Figure 1). One might thus suspect that

interpret our numbers as an upper bound for the change.

[19]Note also, that this is a generous estimate, as part of the expense shock is due to family shocks, see discussion below, which has not become more uncertain.

a factor common to both countries would be the main cause of the increase. This suggests that catastrophic medical events are not the primary driver of the rise in bankruptcies.

Family Shocks

Sullivan, Warren, and Westbrook (2000) emphasize the importance of unexpected family-related events for bankruptcy. In their 1991 bankruptcy survey, 22% of respondents mentioned family as a reason for bankruptcy. The obvious two causes for sudden expenses related to family are divorces and unplanned pregnancies. The number of divorces in the U.S. in 2000 was 4.1 per 1,000 population. The number of births per 1,000 women of child-bearing age was 64.3, of which roughly a third was unintended and roughly ten percent were truly unwanted.

Has uncertainty regarding these family events gone up and is this responsible for the increase in bankruptcies? We find that the answer to the first question is no. For example, the number of births has decreased slightly from 15.9 per 1,000 population to 14.3 (see Table 5). The fraction of births that were intended has gone up from 61.9% in 1982 to 69% in 1995. On the other hand, births to unmarried women have gone up by almost 50%. However, since unintended births have declined, it seems hard to interpret the births by unmarried women as an increase in unplanned events. Moreover, births to other demographic groups typically associated with unplanned pregnancies (like the teenage birth rate) have actually declined slightly since 1980.[20] Similarly, divorce rates have declined as well from 5.3 divorces per 1,000 population in 1980 to 4.1 in 2000. The fact that divorce rates have stopped rising in the last two decades of the 20th century is well-documented in the literature (e.g. Goldstein (1999)).[21] It is true that the number of divorced (and not remarried) people have gone up, but new divorces is the relevant measure of uncertainty, not the stock of divorced people. Together, all this seems to imply that, if there was any change at all, "demographic uncertainty" has declined not increased during the last two decades. We therefore conclude that family uncertainty did not play an important role in the rising bankruptcy rate.

[20] Going back to 1970, the teenage birth rate has declined quite substantially, from 68.3 births per 1,000 women aged 15-19 in 1970 down to 43 in 2002.

[21] Goldstein (1999) also shows that the decrease in the divorce rate is not simply driven by the rise of cohabitation and the higher break-up rates for cohabiting couples.

Table 5: Demographic Changes

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
Intended Births*	61.9%	69%
Births per 1,000 unmarried women	29.4	43.3
Births per 1,000 teenagers (15-19 yrs old)	53.0	50.3
Divorces per 1,000 population	5.3	4.1#

* Intended birth numbers are for 1982 and 1995 respectively.

This is from 2000.

4.1.2 Demographic Changes

We now briefly discuss two potential stories that cannot be analyzed using our model: changes in the age composition of the U.S. population and changes in the marital status of the U.S. population. These changes cannot be evaluated using our model as we do not distinguish different types of households (single vs. married) nor do we allow changes in the size of cohort. However, some back-of-the envelope calculations suggest that these are not important factors in the increase in consumer bankruptcies.

Table 6: Filings per 1,000 adults by age in the U.S.

Age	< 25	25-34	35-44	45-54	55-64	65 +	avg.
1991	3.4	6.8	6.5	5.2	2.7	0.6	4.6
2001	3.8	8.9	9.8	8.1	4.1	2.0	6.6

Source: Sullivan, Thorne, and Warren (2001), Table 1 (primary petitioners only).[22]

Table 6 shows that bankruptcy filing rates are a hump-shaped function of age. Sullivan, Warren, and Westbrook (2000) argue that the aging of the baby-boomers through the high risk age groups accounts for 18% of the increase in bankruptcies between 1981 and 1991. We redid their analysis and constructed the implied bankruptcy rates between 1980 and 2001, holding age specific filings rates constant at their 1991 and 2001 levels respectively. Figure 4 contrasts the constructed filings rates per 1,000

[22]The filings rates they use are slightly different from those we report in the paper for two reasons. First, they added Chapter 13 filings (roughly 5,000 in 2001) to the total nonbusiness filings we used. Second, their 2001 data is for July 1, 2000 - June 30, 2001, whereas we use calender year figures.

households with the actual numbers. The graph shows that changes in the age structure alone had no impact on the aggregate filings rates. The discrepancy between our results and Sullivan, Warren, and Westbrook (2000) is due to the distinction between an increase in *total filings* and filings per 1,000 population. The total number of bankruptcies increases because the U.S. population grew by 17% between 1981 and 1991, but this is unrelated to changes in the age composition.

The second change is the dramatic rise in the share of bankruptcies filed by women. The percentage of bankruptcies filed by women has increased from less than 15% in 1967 to almost 40% in 1999. However, filing rates by sex are hard to interpret. Married couples can choose to file jointly, separately, or only one spouse could file. Therefore, the link between increases in the filing rate of women and the increased number of single women is not obvious. Filing rates by marital status are more meaningful in this context. Unfortunately information of marital status is not routinely collected by bankruptcy courts. Some evidence comes from Sullivan, Warren, and Westbrook (2000), who asked about marital status in their 1991 survey of bankrupts. Table 7 shows that a higher fraction of singles and especially of divorced people file for bankruptcy compared to married persons. Since the fraction of singles and divorcees has increased substantially during the last two decades, it seems plausible that these demographic changes are in part responsible for the trend in bankruptcies.

Table 7: Filings by Marital Status in the U.S. (1991)

marital status	filings per 1,000 persons
currently married	4.2
never married	7.07
widowed	1.92
divorced	11.97

Source: Sullivan, Warren, and Westbrook (2000)

In 1980, 7.4% of American adults age 25 and older were divorced and 4.7% were never married. In 1998, these numbers increased to 11% and 14.1% respectively. Since the filing rate for divorced people is roughly triple the filing rate for married people, small changes in the number of divorced people can potentially lead to large increases in bankruptcy rates. To evaluate the potential of this story, we construct an aggregate bankruptcy rate for all years between 1980 and 2000 based solely on changes in the fraction of people of each marital status, holding marital status specific filing rates constant. The results can be seen in Figure 5. Changes in the marital composition

of the U.S. can explain a modest increase from 4.7 bankruptcies per 1,000 in 1980 to 5.3 per 1,000 in 2001. This is only a small fraction of the actual increase from 2.2 in 1980 to 7.9 in 2001.[23]

4.1.3 Income Uncertainty

Heathcoate, Storesletten, and Violante (2004) have argued that the variance of the transitory as well as the permanent shocks has increased in the United States over the last two decades. Using their numbers, we find that the increase in the variance of the transitory shock ranges from 17% to 25% and the increase in the variance of the persistent shock ranges from 13% to 42%.[24] To give this story the best shot at explaining the increase in filing rates, we take the upper bound of both ranges. The corresponding experiments are reported in Table 8, experiments 1 and 3.

Table 8: Changes in Income Uncertainty (1995-99 Benchmark)

	Experiment	σ_η^2	σ_ϵ^2	Ch. 7	Avg. r^b	d/y Filers	Debt / Earnings
	Benchmark	0.05	0.014	0.840%	11.69 %	2.38	9.04%
	U.S. 1995-99			0.83%	11.7 - 13.1%	-	9%
	U.S. 1980-84			0.25%	11.5 - 12.7%	-	5%
1	Transitory 1	**0.04**	0.014	0.837%	11.24%	2.36	9.50%
2	Transitory 2	**0**	0.014	0.818%	9.38%	2.32	11.67%
3	Persistent 1	0.05	**0.009**	0.814%	9.75%	2.10	11.37%
4	Persistent 2	0.05	0.0003	0.755%	8.07%	1.73	19.42%
5	Persistent 3	0.05	**0**	0.633%	8.01%	1.83	20.58%
6	$\rho = 0.98$	0.05	0.014	0.917%	12.92%	2.54	5.97%
7	$\rho = 0.98$	0.05	0.007	0.848%	9.41%	2.06	9.98%
8	$\sigma_\eta^2 \downarrow, \sigma_\epsilon^2 \downarrow$	**0.04**	**0.009**	0.822%	9.77%	2.14	12.14%
9	No inc. risk	**0**	**0**	1.219%	8.15%	1.78	43.10%

Experiment 1 shows that lowering the variance of the transitory income shocks by

[23] One caveat is in order here. What we cannot rule out here is a combination of more singles together with increased uncertainty aimed particularly at the singles.

[24] We take an average for the late 70s and the mid 90s. The increase changes with the exact years included in the average, which explains the wide range.

20% (which corresponds to the 25% increase over the two decades) has almost no effect – lowering the filings from 0.840% to 0.837%. Experiment 2 illustrates that even shutting down transitory income shocks completely only brings the number of filings down to 0.818%. This strongly suggests that a change in transitory income uncertainty cannot be a driving force behind the increase in bankruptcy filings.

In experiment 3, we lower the variance of the persistent shocks by 33% (corresponding to a 50% increase over the two decades). A decline in the variance decreases the filings to 0.814%, while driving the unsecured debt up to 11.37% of earnings. Experiment 4 shows that even lowering the variance of the persistent shocks to almost zero brings the filings only down to 0.755%, while driving the debt up to almost 20% of earnings. Thus, changes in the variance of persistent income shocks are not quantitatively important and generate counterfactual changes in unsecured debt.

The recent literature on turbulence suggests that, perhaps, the persistence of income has gone down over the last few decades. Experiments 6 and 7 in Table 8 show little promise in explaining the rise in bankruptcies through this channel. Increasing the persistence without adjusting the variance of the shocks actually increases the number of filings due to more compressed income distribution under the lower persistence (see experiment 6). Adjusting the variance, to produce the same income dispersion as in the benchmark, brings the number of filings right back to the benchmark level.

To sum up, changes in transitory income shocks have almost no effect, changes in persistence generate small changes in the wrong direction, and changes in the variance of persistent shocks have a quantitatively small effect on the filings and large effect on debt, which goes the wrong way.

One might suspect that the unresponsiveness of bankruptcies to changes in income uncertainty is artificial since most bankruptcies in the benchmark economy are driven by expense shocks. To check the robustness of these results, we calibrated the model to 1980 and then asked whether an increase in income uncertainty can lead to an increase in bankruptcies. We find that our results are robust to this "reverse experiment." Details on these experiments are reported in Appendix C.

4.2 Changes in the Consumer Credit Markets Environment

In this section, we consider four channels related to the credit market environment: a fall in "stigma", changes to the bankruptcy code, the abolishment of usury laws, and a fall in the transaction cost of making loans.

4.2.1 A Decline in Stigma

A decline in the "stigma" of bankruptcy is perhaps the most common explanation of the rise in bankruptcy filings (Buckley and Brinig (1998), Gross and Souleles (2002)).[25] The idea is that a decline in the cost of being a bankrupt leads to more people choosing to file, given any level of debt and income. However, while a decline in the cost of filing is consistent with households being more likely to file, it should also generate a change in lenders' willingness to lend. As a result, changes in stigma also have implications for the debt-income ratio and average borrowing interest rates.

While there are several interpretations of what "stigma" is, we model it as a utility cost associated with an individual filing for bankruptcy, χ. In experiment 2 in Table 9, we choose stigma so as to reduce filings to the level observed in the early 80s – holding all other parameters fixed. The value of stigma required to match the 1980-1984 filing level corresponds to a reduction in the consumption stream of roughly 28% in the benchmark economy.

Our numerical results support the view that a fall in the stigma of bankruptcy can generate the rise. However, a decline in stigma has counterfactual implications along other dimensions. For our parameter values, we find that the fall in stigma implies that the level of borrowing should have also declined,[26] and that the average borrowing interest rate should have increased. Both of these implications are counterfactual. The second problem is that the experiment implies that the average debt to income ratio of bankrupts should have declined over the past twenty years. The available data (see 2.2) suggests that there has been little change in the debt-income ratio of bankrupts, which leads us to conclude that a fall in stigma by itself is inconsistent with the rise in bankruptcies.

It is important to point out one caveat. The relationship between stigma and the level of borrowing is not monotonic, since for very high levels of stigma a decline may lead to higher borrowing. As a result, it is possible to construct examples where a decline in stigma leads to an increase in the debt-income ratio. However, this does not occur at our calibrated parameters, and the numerical results reported are robust to various sensitivity exercises we have conducted.

[25] This explanation is also common among non academics. For example, Alan Greenspan argued that "Personal bankruptcies are soaring because Americans have lost their sense of shame."

[26] Athreya (2004) makes a similar argument.

Table 9: Changes in Credit Market Environment

	Experiment	Ch. 7	Avg. r^b	d/y Bankrupts	$\frac{\text{Debt}}{\text{Earnings}}$
1	Benchmark	0.84%	11.69 %	2.38	9.04%
	U.S. 1995-1999	0.83%	11.71 - 13.11%	-	9.0%
	U.S. 1980-1984	0.25%	11.55 - 12.71%	-	5 %
2	Stigma (χ)	0.26%	7.9%	3.28	12.89%
3	$\bar{r} = 10\%$	0.68%	8.25%	2.05	8.90%
4	$\bar{r} = 9\%$	0.67%	8.24%	2.06	8.87%
5	$\bar{r} = 8\%$	0.59%	7.79%	1.70	2.04%
6	$\tau = 5.56\%$	0.82%	15.84%	2.34	6.01%
7	$\tau = 6.56\%$	0.82%	17.83%	2.30	4.94%
8	$\tau = 7.56\%$	0.81%	20.16%	2.29	4.06%

4.2.2 The 1978 Amendments to Bankruptcy Law

Several authors have argued that the 1978 amendments (which came into effect in October, 1979) to the U.S. bankruptcy code played a key role in the rise of consumer bankruptcies by making bankruptcy more attractive (McKinley (1997), Boyes and Faith (1986), Shepard (1984)). We do not find this a very convincing explanation for three reasons. First, as Moss and Johnson (1999) point out, the U.S. reforms were relatively minor. Second, Domowitz and Eovaldi (1993) analyze data of bankrupts before and after the 1978 amendments and conclude that the amendments did not play a significant role for the rise in consumer bankruptcies. Finally, there were no changes to the bankruptcy law in Canada in the 1980s and early 1990s, during which filings rates increased dramatically in a similar fashion to the United States.[27] We therefore do not pursue this explanation any further in this paper.

4.2.3 Usury Laws

Until the late 1970's, most states imposed ceilings on interest rates for consumer loans. These laws were removed by the early 1980s as a result of the Supreme court decision involving Marquette National Bank of Minneapolis v. First Omaha Service

[27] Although the flattening of Canadian bankruptcy filings after the tightening of the code in 1997 suggest that legislative changes can have a significant impact upon filings (Ziegel 1997).

Corporation, 439 US 299 (1978) which permitted banks in Nebraska to offer loans to residents of Minnesota at rates in excess of the maximum allowed under Minnesota legislation. This ruling effectively removed the ability of individual states to limit interest rates. Subsequently, large credit card issuers relocated to states (notably Delaware and North Dakota) with the highest interest rate ceiling (Evans and Schmalnsee (1999)). This period was followed by a rapid growth in high interest rate credit card debt which coincides with the rise in consumer bankruptcies. The removal of interest rate ceilings could contribute to a rise in bankruptcy by leading to the expansion of credit to riskier borrowers.

We conduct numerical experiments to analyze the impact of deregulation on bankruptcies and consumer borrowing. We report the results in Table 9 for three alternative ceilings, all of which lie below the average borrowing interest rate in the benchmark economy and above the risk-free lending rate of 7% (experiments 3-5). Even a very tight interest rate ceiling of 8% can account for only 40% of the rise in filings. While a relaxation of the ceiling is consistent with a rise in the debt-income ratio, it also implies a substantial increase in the average borrowing interest rates. In the data, however, there appears to be little change in the average borrowing interest rate.

There are two additional observations which cast some doubt on the importance of usury laws. First, as pointed out by Ellis (1998), Canada has also experienced a rapid rise in consumer bankruptcies but did not experience a deregulation of credit markets around the same time.[28] Second, it is unclear whether interest rate ceilings were effectively binding in the United States. Peterson (1983) argues that one way around interest rate ceilings is for the seller of a good to sell at a higher price on credit. He examines data from 1979 for four states with different interest rate ceilings, and finds that the state with the lowest ceiling (Arkansas) had a higher share of installment credit offered directly by retailers than borrowers in the other states. Interestingly, this argument is consistent with the observed shift of credit away from store based to general purpose lending after the removal of interest rate ceilings.

Our conclusion is that while the Marquette decision may have contributed indirectly to the rise in bankruptcy by permitting continued lending to high risk consumers, it was not in itself a significant cause of the rise in filings.

[28]Interest rate ceilings on bank loans were formally removed in Canada through the Bank Act of 1967, although these ceilings were largely ineffective, as borrowers were free to "voluntarily" agree to pay higher interest rates in the form of an upfront charge at the time of the loan (Scholnick (2000)).

4.2.4 Decline in Lending Costs

The past thirty years have witnessed substantial credit market innovations which are frequently cited as playing a key role in the rapid spread of credit cards (Evans and Schmalnsee (1999)) as well as a rapid increase in the "sub-prime" credit market, which provides credit to high risk consumers. Many of these changes have been driven by the rapid improvements in information technology, which has led to large increases in information sharing and reduced the cost of processing information (Barron and Staten (2003)). In this section, we explore one avenue through which these financial innovations could impact consumer borrowing: a reduction in the transaction cost of borrowing (Berger (2003)).

We report the results for three experiments in rows 6-8 in Table 9. Experiment 6 involves an increase in the transaction cost of lending of two percent relative to the benchmark, while experiment 7 involves an increase of three percent and experiment 8 an increase of four percent. Surprisingly, none of these changes have a significant effect on filings. However, variations in the transaction cost of lending have a large effect upon both the average borrowing interest rate and on borrowing. For all three experiments, the increase in average borrowing interest rates exceeds the increase in the risk-free borrowing interest rate. This is due to the fact that lower risk households reduce their borrowing, which leads to an increase in the average risk premium on lending. It is also worth noting that a decrease of roughly three percentage points in the transactions cost is consistent with the observed increase in borrowing.

Our results lead us to conclude that a reduction in the transactions cost of lending alone cannot account for the rise in filings. However, it may play an important role in accounting for the rise in borrowing.

4.3 Can a Combination of Stories Match the Data?

Our conclusion from sections 4.1 and 4.2 is that none of the stories individually can generate a substantial rise in bankruptcy while matching the observed changes in borrowing and average borrowing interest rates. While this is a somewhat surprising negative result, we now turn to the question of whether a combination of these stories can match the observed changes in consumer credit markets.

The combination we choose is guided by our earlier results, and is a combination of both uncertainty and credit market stories. We incorporate two uncertainty stories: an increase in expense uncertainty and an increase in transitory income uncertainty. A reasonable upper bound on the change in expense uncertainty is that the probabilities

in the early 1980s were roughly 85% of the late 1990s. In our experiment, we thus scale down the benchmark probabilities of expense shocks by 0.85. To capture changes in income volatility, we scale down the variance of the transitory shock by 25% (which is at the upper limit of the values suggested by Heathcoate, Storesletten, and Violante (2004)). Given these changes, we then choose the values of stigma and the transaction cost of borrowing so as to match filings, average borrowing interest rates and debt-earning ratio in the early 1980s.

The results of this experiment are reported in the third row of Table 10. In this experiment, the transaction cost is increased by 3.8% (to 7.36% from 3.56%), while the stigma parameter is set equal to five-sixths of its value in the stigma only experiment.

As can be seen, this combination of stories is able to closely replicate the level of filings, average borrowing interest rates and debt-earning ratio observed in the early 1980s. The one dimension in which this experiment misses is that it predicts a decline in the average debt-income ratio of bankrupts. However, the predicted decline is much smaller than that generated by the stigma only story (see Table 9).

Table 10: Combination of Stories

	Experiment	Ch. 7	Avg. r^b	d/y Bankrupts	$\frac{\text{Debt}}{\text{Earnings}}$
1	Benchmark	0.84%	11.69 %	2.38	9.04%
2	U.S. 1980 -1984	0.25%	11.55 % - 12.71 %	-	5.0%
3	all, see text	0.26%	11.77%	2.65	5.24%
4	No Δ Exp.	0.31%	11.94%	2.65	5.21%
5	No Δ Stigma	0.71%	18.18%	2.26	4.35%
6	No Δ τ	0.31 %	7.93 %	2.96	12.74 %
7	No Δ Trans. Inc	0.27 %	11.82 %	2.66	5.25 %

This experiment reinforces our interpretation of the earlier results that none of the stories can individually account for the rise in bankruptcies. To better understand the relative contribution of each of these factors, in Table 10 we also report experiments where we dropped each of the four changes we consider. As can be seen from Table 10, the increase in expense and transitory income uncertainty play a small role along all dimensions. The main factor in the rise in filings is a decline in stigma, which accounts for roughly 75% of the rise in filings. In contrast, the decline in the transaction cost has a very small effect on filings, but counteracts the increase in interest rates and

the decline in borrowing predicted by a decline in stigma.

5 Conclusion

In this paper, we quantitatively evaluate the extent to which the seven most commonly offered explanations of the rise in bankruptcies can account for the rise in filings, the observed increase in unsecured consumer debt relative to disposable income, the lack of change in average borrowing interest rates, and the economic characteristics of bankrupts. Our first finding is a negative one. Our results suggest that none of the stories we consider can *individually* account for the rise in consumer bankruptcies and changes in credit markets. Our second finding is a positive one. A combination of four of these stories does a very good job of accounting for the key facts. Our experiments suggest that the most important factors are related to changes in the credit market environment. These changes involve both a reduction in the cost (the "stigma") of bankruptcy and the cost of credit.

These results are different from various papers which have argued for a monocausal explanation of the rise. The spirit of our results are close to those of Athreya (2004) and Moss and Johnson (1999), in that we view credit market changes as playing the key role in the rise. However, our results suggest that a decline in the stigma of bankruptcy plays a much more important role in the rise than these papers would suggest. Of course, this finding raises the question of how to incorporate serious theories of stigma in credit markets. We view the formalization of stories of how credit market innovations have reduced the cost of accessing credit after bankruptcy (a story documented by Staten (1993)) as holding particular promise. Our results also indicate the need for further work along the lines of Chatterjee, Corbae, and Rios-Rull (2005) that can can improve our understanding of the working of consumer credit markets.

References

Adda, J., and R. Cooper (2003): *Dynamic Economics*. MIT Press, Cambrudge, Massachusetts.

Athreya, K. (2002): "Welfare Implications of the Bankruptcy Reform Act of 1999," *Journal of Monetary Economics*, 49, 1567–1595.

——— (2004): "Shame as it Ever Was: Stigma and Personal Bankruptcy," *Federal Reserve Bank of Richmond Economic Quarterly*, 90(2), 1–19.

——— (2005): "Equilibrium Models of Personal Bankruptcy: A Survey," *Federal Reserve Bank of Richmond Economic Quarterly*, 91(2), 73–98.

Attanasio, O., and J.-V. Rios-Rull (1999): "Consumption Smoothing in Island Economies: Can Public Insurance Reduce Welfare?," University of Pennsylvania, mimeo.

Barron, J. M., G. Elliehausen, and M. E. Staten (2000): "Monitoring the Household Sector with Aggregate Credit Bureau Data," *Business Economics*.

Barron, J. M., and M. Staten (2003): "The Value of Comprehensive Credit Reports," in *Credit Reporting Systems and the International Economy*, ed. by M. J. Miller, pp. 273–310. MIT Press.

Berger, A. (2003): "The Economic Effects of Technological Progress: Evidence from the Banking Industry," *Journal of Money, Credit and Banking*, 35(2), 141–176.

Bermant, G., and E. Flynn (1999): "Incomes, Debts and Repayment Capacities of Recently Discharged Chapter 7 Debtors," American Bankruptcy Institute, http://www.usdoj.gov/ust/press/articles/ch7trends-01.htm.

Boyes, W., and R. L. Faith (1986): "Some Effects of the Bankruptcy Reform Act of 1978," *Journal of Law and Economics*, XXIX, 139–149.

Buckley, F., and M. F. Brinig (1998): "The Bankruptcy Puzzle," *The Journal of Legal Studies*, XXVII, 187–207.

Carroll, C., and A. Samwick (1997): "The Nature of Precautionary Wealth," *Journal of Monetary Economics*, 40(4), 41–71.

Center for Medicare and Medicaid Services (2005): "National Health Expenditures Aggregate and per Capita Amounts, Percent Distribution, and Average Annual Percent Growth, by Source of Funds: Selected Calendar Years 1980-2003," http://www.cms.hhs.gov/statistics/nhe/historical/.

Chatterjee, S., D. Corbae, M. Nakajima, and J.-V. Rios-Rull (2003): "A Quantitative Theory of Unsecured Consumer Credit with Risk of Default," *University of Pennsylvania, mimeo.*

Chatterjee, S., D. Corbae, and J.-V. Rios-Rull (2005): "Credit Scoring and Competitive Pricing of Default Risk," *University of Texas at Austin, mimeo.*

Domowitz, I., and T. L. Eovaldi (1993): "The Impact of the Bankruptcy Reform Act of 1978 on Consumer Bankruptcy," *The Journal of Law and Economics*, XXXVI, 803–835.

Domowitz, I., and R. L. Sartain (1999): "Determinants of the Consumer Bankruptcy Decision," *The Journal of Finance*, 54(1), 403–420.

Dynan, K., K. Johnson, and K. Pence (2003): "Recent Changes to a Measure of U.S. Household Debt Service," *Federal Reserve Bulletin*, pp. 417–426.

Ellis, D. (1998): "The Effect of Consumer Interest Rate Deregulation on Credit Card Volumes, Charge-Offs and the Personal Bankruptcy Rate," *FDIC Bank Trends*, 98(5).

Evans, D., and R. Schmalnsee (1999): *Paying with Plastic: The Digital Revolution in Buying and Borrowing*. MIT Press, Cambridge, Massachusetts.

Fay, S., E. Hurst, and M. j. White (2002): "The Household Bankruptcy Decision," *American Economic Review*, 92(3), 706–718.

Fernandez-Villaverde, J., and D. Krueger (2000): "Consumption and Saving over the Life Cycle: How Important are Consumer Durables?," *mimeo.*

Goldstein, J. (1999): "The Leveling of Divorce in the United States," *Demography*, 36(3), 409–414.

Gourinchas, P.-O., and J. Parker (2002): "Consumption over the Life Cycle," *Econometrica*, 70(1), 47–89.

Gross, D., and N. Souleles (2002): "An Empirical Anaylsis of Personal Bankruptcy and Delinquency," *The Review of Financial Studies*, 15(1), 319–347.

Heathcoate, J., K. Storesletten, and G. Violante (2004): "The Cross-Sectional Implications of Rising Wage Inequality in the United States," *New York University, mimeo*.

Hubbard, R., J. Skinner, and S. P. Zeldes (1994): "The Importance of Precautionary Motives in Explaining Individual and Aggregate Saving," *Carnegie-Rochester Conference Series on Public Policy*, 40, 59–125.

Li, W., and P.-D. Sarte (2002): "Chapter 7 or Chapter 13: An Analysis of U.S. Consumer Bankruptcy Choice," *mimeo, Federal Reserve Bank of Richmond*.

Livshits, I., J. MacGee, and M. Tertilt (2003): "Consumer Bankruptcy: A Fresh Start," *Federal Reserve Bank of Minneapolis Working Paper*.

——— (2005): "Consumer Bankruptcy: A Fresh Start," *SIEPR Discussion Paper No. 04-11*.

Lown, J. M., and B. R. Rowe (2002): "A Profile of Consumer Bankruptcy Petitioners," *mimeo, Utah State University*.

Luckett, C. (2002): *Personal Bankruptcies*vol. The Impact of Public Policy on Consumer Credit, pp. 69–102. Kluwer Academic Punlishers.

McKinley, V. (1997): "Ballooning Bankruptcies," *Regulation*, pp. 33–40.

Mecham, L. R. (2004): *Bankruptcy Basics*. Administrative Office of the United States Courts.

Moss, D. A., and G. A. Johnson (1999): "The Rise of Consumer Bankruptcy: Evolution, Revolution or Both?," *American Bankruptcy Law Journal*, 73, 311–352.

Peterson, R. L. (1983): "Usury Laws and Cosnumer Credit: A Note," *The Journal of Finance*, pp. 1299–1304.

Pollak, O. B. (1997): "Gender and Bankruptcy: An Empirical Analysis of Evolving Trends in Chapter 7 and Chapter 13 Bankruptcy Filings 1967-1997," *Commercial Law Journal*, 102(3), 333–228.

Scholnick, B. (2000): "Regulation, Competition and Risk in the market for Credit Cards," *Canadian Public Policy*, XXVI(2), 171–181.

Shepard, L. (1984): "Personal Failures and the Bankruptcy Reform Act of 1978," *Journal of Law and Economics*, XXVII, 419–437.

Staten, M. (1993): "The Impact of Post-Bankruptcy Credit on the Number of Personal Bankruptcies," *Credit Research Centre Working Paper No 58*.

Storesletten, K., C. Telmer, and A. Yaron (2004): "Consumption and Risk Sharing over the Life Cycle," *Journal of Monetary Economics*, 51, 609–633.

Sullivan, T., D. Thorne, and E. Warren (2001): "Young, Old and In Between: Who Files for Bankruptcy?," *Norton Bankruptcy Law Adviser*.

Sullivan, T., and E. Warren (1999a): "The Changing Demographics of Bankruptcy," *Norton Bankruptcy Law Adviser*.

Sullivan, T., and E. Warren (1999b): "Women in Bankruptcy," *American Bankruptcy Institute Journal*, July 1999.

Sullivan, T. A., E. Warren, and J. L. Westbrook (1999): *As We Forgive Our Debtors: Bankruptcy and Consumer Credit in America*. Beard Books, Washington, D.C.

——— (2000): *The Fragile Middle Class*. Yale University Press, New Haven and London.

Warren, E. (2002): "Financial Collapse and Class Status: Who Goes Bankrupt?," *Osgoode Hall Law Journal*, 41, 115–146.

Warren, E., and A. Warren Tyagi (2003): *The Two Income Trap: Why Middle-Class Mothers & Fathers Are Going Broke (With Surprising Solutions That Will Change Our Children's Futures)*. Basic Books, New York.

Ziegel, J. S. (1997): "Canadian Perspectives on the Challenges of Consumer Bankruptcy," *Journal of Consumer Policy*, 20(2), 199–221.

A Figures

Figure 1: Bankrupts per 1000 18-64.

U.S. Consumer bankruptcies are the sum of non-business Chapter 7 and Chapter 13 filings. The denominator is the estimate of the U.S. population between the ages of 18 and 64 as of July 1.

Canada: Consumer Bankruptcies plus consumer proposals. The numerator is the total number of *bankruptcy petitions* filed. Joint filing is permitted when two people have interrelated finances, so this may understate the total number of bankrupts.

Figures 2 and 3: Debt as % of Disposable Income

Total debt is the summation of mortgage debt and consumer debt. Mortgage debt is from the Flow of Funds of Account, Table D.3. The mortgage data gives the end of period balance outstanding quarterly, and has been converted to annual by averaging. Consumer credit is the summation of revolving and nonrevolving consumer credit balances outstanding reported in G.19. The original data was monthly, and was converted to annual by averaging. The data we report is based on the 2004 revision and includes student loans outstanding in nonrevolving credit. Personal disposable income is from the Bureau of Economic Analysis, Table 2.1. Personal Income and Its Disposition [Billions of dollars].

The unsecured credit measure in Figure 3 over 1983-1999 was constructed as follows. Before 1999, G.19 reported consumer credit in the following three categories: revolving, automobile (non-revolving) and other nonrevolving. To estimate unsecured consumer credit, we: (1) Constructed a non-automobile non-revolving debt measure by subtracting the automobile debt series from the updated non-revolving series (this series contains student loans issued by the federal government); (2) Used linear extrapolation to construct a measure of the fraction of non-auto non-revolving debt that is personal using the values reported by Dynan, Johnson, and Pence (2003) from the SCF for 1983, 1989, 1992, 1995 and 1998; and (3) Finally, we construct our measure of unsecured consumer credit by summing: revolving + non-auto non-revolving * fraction personal.

B Surveys of Bankrupts

While there are several empirical studies of U.S. bankrupts, one must be careful in comparing them due to differences in their approach to sample selection. The most well known are those associated with the work of Sullivan, Warren, and Westbrook

(1999) and Sullivan, Warren, and Westbrook (2000).

1. Sullivan, Warren, and Westbrook (1999): The 1981 study involved a sample of 1,550 debtors from ten judicial districts in three states: Illinois, Pennsylvania and Texas. This study was based upon what was reported in the bankruptcy file. They converted their raw data to 1997 $ using the CPI.

2. Sullivan, Warren, and Westbrook (2000): This is a 1991 study of bankrupts in 16 federal districts in Illinois, Pennsylvania, Texas, California and Tennessee. In this study, written surveys were used to collect information on each bankrupt. In addition, financial data on bankrupts in five of the districts were collected from court records. They converted their raw data to 1997 $ using the CPI.

3. Based on court records, Domowitz and Sartain (1999) examine a sample of households who filed for bankruptcy before and after the 1978 Bankruptcy Law Amendments came into effect. Their data includes 580 Chapter 7 households who filed for bankruptcy between October 1978 and March 1979 and 670 Chapter 7 bankrupts who filed between April and September 1980 from Southern and Eastern New York, Southern Ohio, Eastern Kentucky and Central California. They report that mean income was between $24,300 and $26,600 (in 1991 $).

4. Bermant and Flynn (1999) looked at a sample of approximately 2000 chapter 7 cases closed during the first half of 1998. They restricted attention to no-asset chapter 7 cases, and report that of the 975,370 consumer chapter 7 cases filed in 1997 all but 10,000 were closed as no-asset cases.

5. Lown and Rowe (2002) examine a sample of bankrupts in Utah from 1997. Their data is based on a sample of 1486 Chapter 7 and 1081 Chapter 13 filed in U.S. Bankruptcy Court in Utah in 1997. Their data indicates that the average and median debts of chapter 13 filers were larger than those of chapter 7 filers. However, the median and average debt-income ratios were lower since the average incomes of chapter 13 filers were higher than those of chapter 7.

C More on Income Uncertainty

We start with a new benchmark parametrization that matches the 1980 bankruptcy rate, interest rate, and debt/gdp ratio and increase income uncertainty. The experiments reported in Table 11 confirm our findings. Plausible changes in uncertainty

only generate an increase in filings from 0.249% to 0.325% while lowering the debt from 5% to below 4% of earnings. Lastly, we conduct the following thought experiment: If one wanted to replicate the observed increase in filings solely through a change in income uncertainty, how far does one have to go? Experiment 3 shows that even increasing the variance of the transitory shocks by a factor of 20 does not deliver the desired increase in bankruptcy rates. The variance of the persistent shock has to be increased 10-fold to get the bankruptcy rate to increase to the late 90's level. This "success" has the debt level collapsing to 0.4% and the average interest rate exceeding 40%.

Table 11: Changes in Income Uncertainty (1980 Benchmark)

	Experiment	σ_η^2	σ_ϵ^2	Ch. 7	Avg. r^b Filers	d/y Bankrupts	Debt / Earnings
1	Benchmark	0.05	0.014	0.249%	12.07 %	2.87	5.10%
	U.S. 1980-84			0.25%	11.5 - 12.7%	-	5%
	U.S. 1995-99			0.83%	11.7 - 13.1%	-	9%
2	Transitory 1	**0.06**	0.014	0.257%	12.12%	2.87	5.09%
3	Transitory 2	**1.13**	0.014	0.775%	51.85%	7.18	1.86%
4	Persistent 1	0.05	**0.021**	0.325%	12.39%	2.89	3.97%
5	Persistent 2	0.05	**0.14**	0.858%	40.52%	7.47	0.39%
6	$\sigma_\eta^2 \uparrow, \sigma_\epsilon^2 \uparrow$	**0.06**	**0.021**	0.325%	12.44%	2.90	3.92%

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

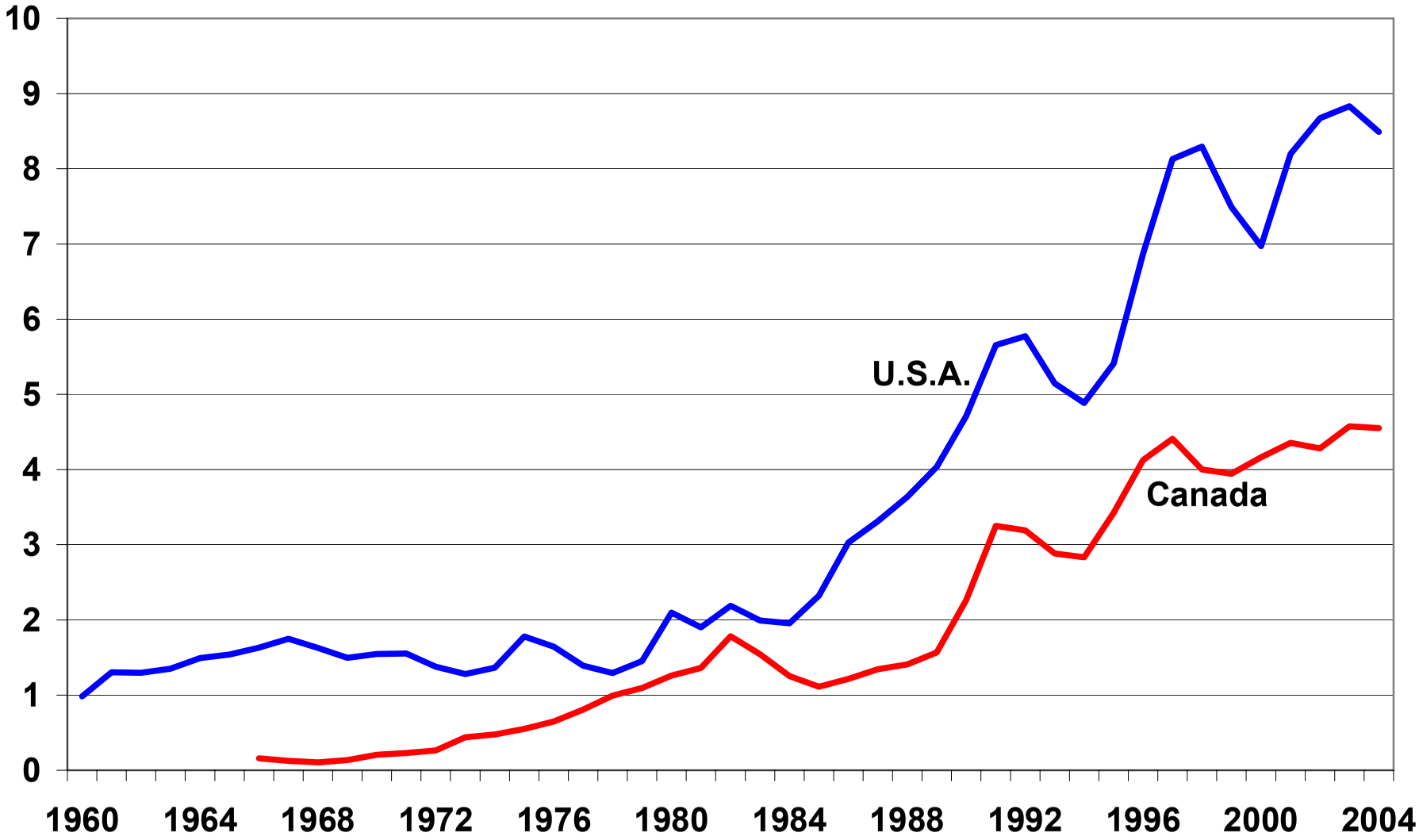

Figure 2: Debt as % of Disposable Income, USA

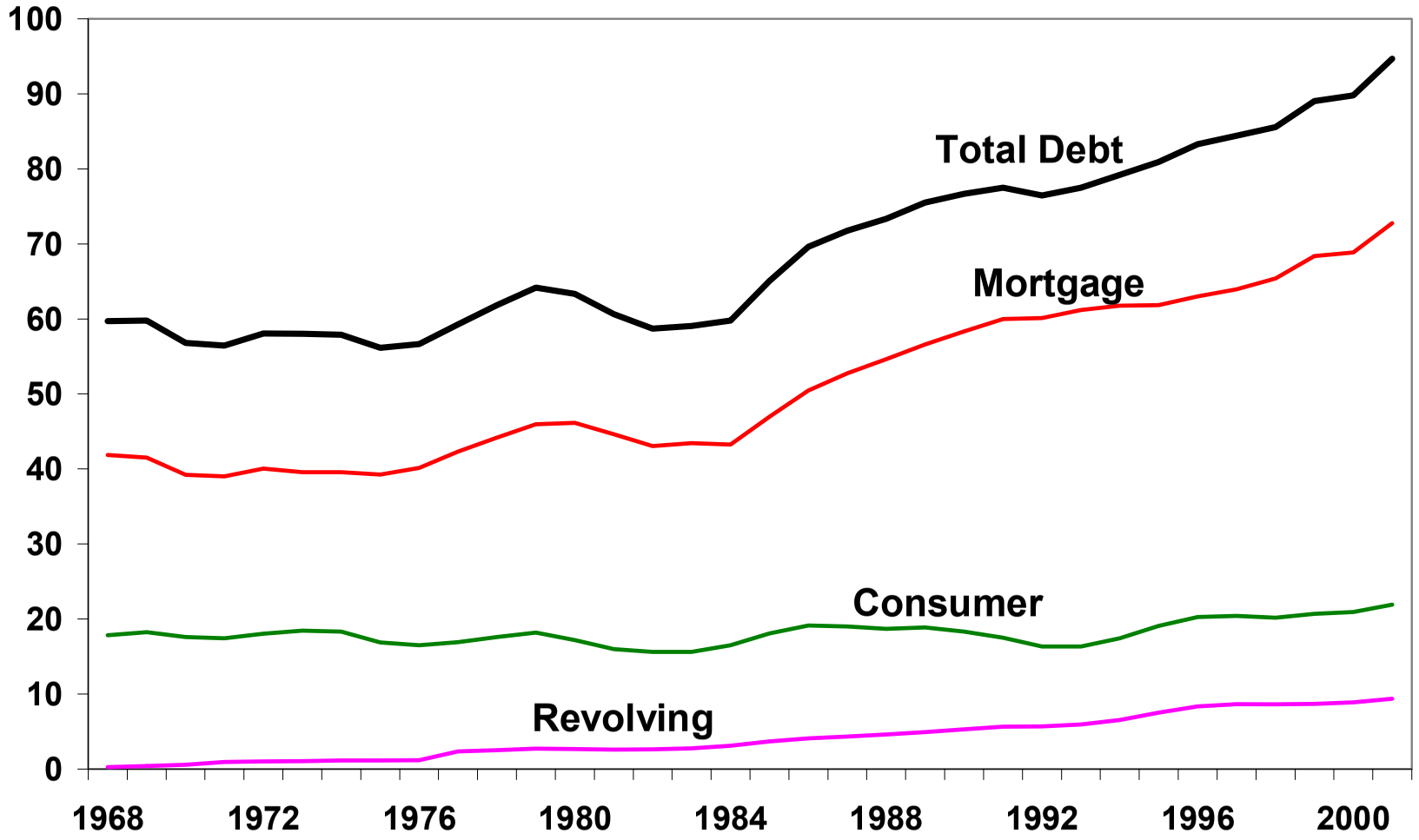

Figure 3: Unsecured and Revolving Credit as % Disposable Income

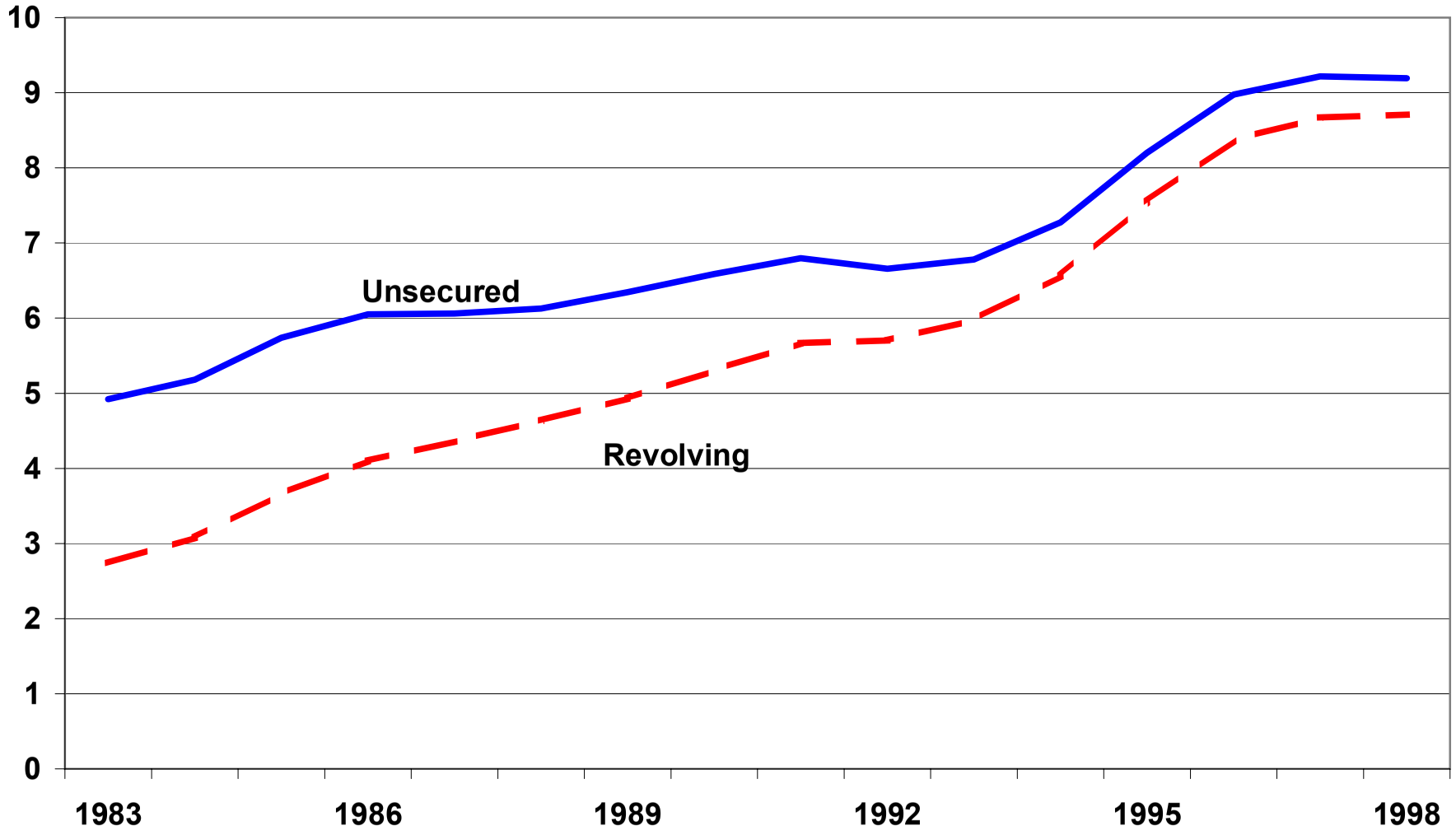

Figure 4: Constructed Bankruptcy Rates per 1,000 Households (U.S.)
(holding age specific filings rates constant)

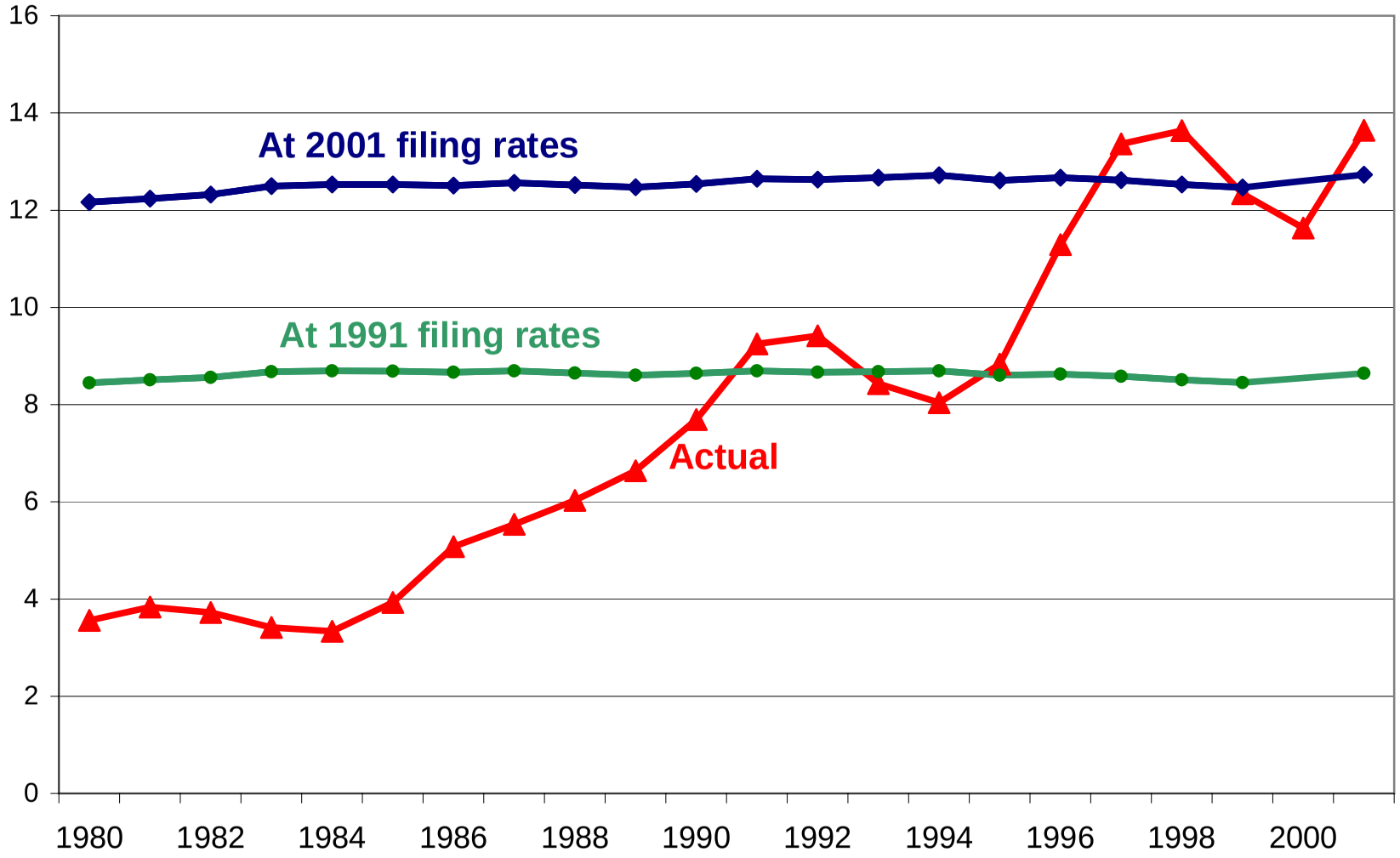

Figure 5: Implied Bankruptcy Rates (per 1,000 25+ adults), U.S.
(holding marital status specific filing rates constant)