NBER WORKING PAPER SERIES

ACCOUNTING FOR THE RISE IN CONSUMER BANKRUPTCIES

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Working Paper 13363
http://www.nber.org/papers/w13363

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 2007

We thank Kartik Athreya, Satyajitt Chatterjee, Huberto Ennis, Martin Gervais, Jeremy Greenwood, Karen Pence, Jose-Victor Rios-Rull, Stephen Zeldes and seminar participants at the 2005 Philadelphia Fed Consumer Credit & Payments conference, November 2005 NBER ME conference, the SITE 2004 conference, the 2003 Western-Toronto Macro conference, the SED Meetings in Paris and Florence, the Federal Reserve Banks of Minneapolis, Richmond, and Chicago, the Bank of Canada, the European Central Bank, and UC Davis, Illinois, Iowa, New Brunswick, Pennsylvania, Rochester, Texas-Austin, Wharton, York and Queen's Universities for helpful comments. Livshits acknowledges financial support from the Arts, Humanities & Social Sciences Fund of the UWO. Livshits and MacGee acknowledge financial support from SSHRCC and from the Economic Policy Research Institute. Tertilt is grateful to financial support from NSF grant No. 0519324. We would like to thank Jie Zhou for excellent research assistance. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 13363
September 2007
JEL No. E21,E44,G18,K35

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 increased uncertainty (income shocks, expense uncertainty) cannot quantitatively account for the rise in bankruptcies. Instead, the rise in filings appears to mainly reflect changes in the credit market environment. We find that credit market innovations which cause a decrease in the transactions cost of lending and a decline in the cost of bankruptcy can largely accounting for the rise in consumer bankruptcy. We also argue that the abolition of usury laws and other legal changes are unimportant.

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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), with virtually all of the increase occurring between 1980 and 2000. 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 explanations. In this paper, we address this void and quantitatively evaluate the most 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 (Barron, Elliehausen, and Staten (2000) and Warren and Warren Tyagi (2003)). 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 – have increased the number of risky households (Sullivan, Warren, and Westbrook (2000)).

The second category includes three possible channels via which changes in the credit market environment could significantly influence households incentives to borrow and file for bankruptcy. Perhaps the most common explanation of the rise in bankruptcies is that the cost of filing for bankruptcy has declined (e.g., Gross and Souleles (2002)). A frequently heard version of this story is that the "stigma" attached to bankrupts has fallen (Buckley and Brinig (1998) and Fay, Hurst, and White (2002)), while some have argued that amendments to the bankruptcy code in the U.S. 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 (Ellis (1998)). The final channel we consider is that credit market innovations (such as the development and spread of credit scoring) facilitated the increase in credit granted to households by reducing the transaction costs of lending (Barron and Staten (2003), Ellis (1998)).

Disentangling these explanations is challenging as several of them involve legislative reforms 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 charge-off rate. 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 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 an increase in the charge-off rate. In addition, we use the comparison with Canada as a basic consistency check of several stories. This comparison is useful since Canada experienced a similar rise in filings during the 1980s and early 1990s, but did not undertake the same legislative reforms as 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 (2007). 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.[1] 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 focus on Chapter 7 filings. Therefore, we abstract from durable goods and focus solely on the market for *unsecured* consumer credit.[2]

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 cost of filing for bankruptcy together with a

[1] While some people have advocated behavioral reasons for consumer bankruptcy (see Laibson, Tobacman, and Repetto (2000)), we concentrate on rational models of bankruptcy in this paper.

[2] A study cited by the (National Bankruptcy Review Commission 1997, p.136) found that only 5 percent of Chapter 7 cases yielded assets which could be liquidated to repay creditors. This suggests that abstracting from durable goods is reasonable given our focus on Chapter 7 bankruptcy.

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. Our findings also suggest that "uncertainty" based stories play a relatively 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 20% of the increase in filings (and likely less than 10%). Increased volatility of household earnings also does not appear to play a significant role in the rise. We also 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 have played a quantitatively important role in accounting for the rise in bankruptcies.

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 are Moss and Johnson (1999), Athreya (2004), and Gross and Souleles (2002) who each analyze a subset of the alternative explanations analyzed in this paper (neither considers changes in income or expense uncertainty). While these papers all argue that changes in the credit market environment are the primary driving force behind the rise in filings, 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.[3] While their arguments seem plausible, they do not attempt to assess these channels quantitatively. Gross and Souleles (2002) examine a data set of credit card accounts from 1995 to 1997 and argue that the higher default rate at the end of their sample is consistent with a decline in the cost of bankruptcy. Athreya (2004) argues that a decline in the transactions cost of borrowing alone could have been responsible for the increase in filings for the 1991-1997 period. The reason filings in our set-up are less sensitive to this transactions cost is that our model is a life-cycle

[3]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.

model and because we allow for "expense" shocks in addition to income uncertainty.

The equilibrium model of bankruptcy that we use is part of a recent literature on equilibrium models of consumer bankruptcy (motivated in part by the dramatic rise in bankruptcies and the related policy debates).[4] Both Livshits, MacGee, and Tertilt (2007) and Chatterjee, Corbae, Nakajima, and Rios-Rull (2005) 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 (2006) analyze the consumers choice of Chapter 7 versus Chapter 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 ,resultsis presented in Section 3. Sections 4, 5 and 6 present our results, and Section 7 concludes.

2 Bankruptcy and Consumer Credit in the U.S.

This section provides background information on consumer bankruptcy in the U.S. and changes in unsecured consumer borrowing, average interest rates, charge-off rates on consumer borrowing as well as characteristics of consumer bankrupts between the early 1980s and late 1990s. These facts will play an important role in helping to distinguish between alternative explanations of the rise in consumer bankruptcies. We focus on this time period because most of the rise in filings took place during this twenty year period and also because of data availability.

2.1 Consumer Bankruptcy Law

American households can choose between two bankruptcy procedures: Chapter 7 and Chapter 13.[5] Legal actions by creditors and most garnishments are halted upon filing for bankruptcy, including phone calls and letters from creditors seeking repayment.

[4] See Athreya (2005) for a more detailed survey.

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

Under Chapter 7, all unsecured debt is discharged in exchange for non-collateralized assets above an exemption level, and debtors are not obliged to use future income to repay debts.[6] Chapter 13 permits debtors to keep their assets in exchange for a promise to repay part of their debt over the ensuing 3 to 5 years.

Most bankrupts file under Chapter 7 (approximately 70 percent), which is the focus of our paper. Debtors who file under Chapter 7 are not permitted to refile under Chapter 7 for six years, although they may file under Chapter 13. 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 (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.

2.2 Bankrupts over Time: Have They Changed?

We begin by briefly reviewing the limited evidence on changes in the characteristics of bankrupts over the past twenty-five years. What we find 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. Indeed, if anything, the available evidence suggests that bankrupts today have lower income relative to the median household, slightly higher debt-to-income ratios and hold more unsecured debt, especially credit card debt.

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 as well as the implied debt-to-income ratios. It is worth emphasizing that there is a 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 Appendix B for a description of the samples used in the studies).

The first four rows in Table 1 summarize the data from two surveys conducted and reported by Sullivan, Warren, and Westbrook (2000). These figures are for all bankrupts, and include both Chapter 7 and Chapter 13 filers. Their data indicate

[6] The 2005 bankruptcy reform requires households with income above a threshold to enter into a payment plan. (See White (2007) for details on the 2005 reforms.)

that while the average and median amount owed by bankrupts (in constant dollars) remained roughly constant during the 1980s, debt-to-income ratios increased slightly. The remaining rows in the table summarize data for Chapter 7 filers only. The data on Chapter 7 filers also suggest that the debt-to-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 filers, they do report that the average incomes were between $24,300 and $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.

Table 1: Liabilities and Assets of Bankrupts 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
D/Y*	2.44	1.40	0.98	0.47		
1991	$65,158	$34,795	$26,618	$15,128	$23,927	$21,115
D/Y	2.72	1.65	1.11	0.72		
78/79 D/Y	1.86	0.34	1.14	0.15		
1980 D/Y	1.56	0.78	0.87	0.46		
Ohio 1997	$61,320	$24,303	$29,529	$19,515	$19,641	$18,756
D/Y	3.12	1.30	1.50	1.04		
1997/98	$81,696	$42,810	$43,032	$23,190	$26,568	$22,800
D/Y	3.07	1.87	1.62	1.02		
Utah 1997	$73,327	$31,981	n/a	n/a	$18,864	$16,440
D/Y	3.89	1.95	n/a	n/a		

* Avg = average, Med = median, Uns = unsecured debt, Inc = income, D/Y = ratio of debt to income.
Source: The rows labeled 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 key fact that we take from the (limited) evidence summarized above is that the rise in bankruptcies has been accompanied by an increase in the debt-to-income ratios of bankrupts. We will make use of this fact later in the paper to help evaluate alternative explanations of the rise in consumer bankruptcies. In particular, we will argue that some of the explanations that we explore in this paper counter-factually generate a large *decrease* in the debt-income ratio of bankrupts.

Table 2: Key Observations

Fact	1980-84	1995-99
Chapter 7 filings	0.25%	0.83%
Average borrowing interest rate	10.95 – 12.05%	10.93 – 12.84%
Debt/Income ratio	5%	9%
Charge-off rate	1.9%	4.8%

2.3 Aggregate Data: Bankruptcy and Borrowing 1980-1999

We now take a closer look at the bankruptcy numbers and related changes in credit markets. We summarize four key facts in Table 2. In Sections 4 and 5 we will use these facts to evaluate the stories.

Since our model will abstract from durable goods, the relevant bankruptcies in the data are non-business Chapter 7 filings.[7] The average number of non-business Chapter 7 filings between 1995 and 1999 was roughly 850,000, which is 0.83% 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%.

Contemporaneous with the increase in filings was a substantial growth in consumer borrowing. Figure 2 shows this increase for four different debt measures. 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, this is partially due to the substitution of credit card for installment credit. To correct for this, we constructed an estimate of unsecured credit over 1983-1999. We define unsecured credit as the sum of revolving credit and the unsecured portion of non-automobile non-revolving consumer debt (a more detailed discussion

[7] 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.

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 also imply a substantial increase between 1983 and 1999 in the unsecured debt to income ratio. This gives a debt-income ratio of roughly 9% for the late 1990s and 5% for the early 1980s.

The Federal Reserve reports two interest rates on unsecured loans for the time periods we examine – 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 using the one-year ahead CPI inflation rate and then compute the average for each of the two periods, 1981-1985 and 1996-2000. This calculation implies an average real cost of unsecured consumer borrowing between 11% and 13% (about 11.0% for personal loans and 13.0% for credit cards). Somewhat surprisingly, there is little change in these interest rates over time.[8]

The small change in real borrowing interest rates is even more surprising given the increased rate of non-repayments on consumer loans. One common measure of non-payment is *charge-off rates*, which measure the value of loans written off (net of recoveries) and charged against loss reserves as a percentage of average loans.[9] Unfortunately, the charge-off rate series constructed by the Board of Governors begins in 1985. To extend this series backwards, we splice this series with a series reported by Ausubel (1991).[10] The average one-year ahead charge-offs on credit cards have increased from about 1.9% to 4.8% between the 1981-85 and 1996-2000 periods. As Figure 4 illustrates, charge-offs move in parallel with the bankruptcy rate.

3 Basic Environment for Evaluating the Stories

In this section, we briefly outline the model used to evaluate the stories, and describe our benchmark parametrization which serves as a starting point for the numerical experiments.

[8] One might expect an increase in the real rate given the high inflation rates during the late 1970s and early 1980s. However, nominal interest rates on personal loans fell during this time (from 17% to 13.7%), while average inflation declined from 5.5% in 1981-85 to 2.5% in 1996-2000.

[9] See Furletti (2003b) for an overview of data sources and measurement methodology of charge-offs. While roughly 40% of credit card charge-offs are due to bankruptcies, the rest is mandatory charge-offs in response to delinquent loans, many of which ultimately end up in bankruptcy.

[10] While the level of the Ausubel series is slightly below that of the Board series, the two series move together for the years they overlap.

3.1 The Model

We extend the "Fresh Start" model of consumer bankruptcy of Livshits, MacGee, and Tertilt (2007) by allowing for three additional costs of bankruptcy (a utility cost, a burning cost and a fixed cost of filing) as well as an interest rate ceiling. These extensions allow us to evaluate several channels via which changes in the credit market environment could potentially have caused the rise in bankruptcies.

The model economy is populated by overlapping generations of J period lived households. Each generation is comprised of measure 1 of households facing idiosyncratic uncertainty. There is no aggregate uncertainty. Markets are incomplete and agents can borrow using non-contingent person-specific one-period bonds and save at an exogenously given interest rate. Households have the option to declare bankruptcy.

Households
Household maximize expected discounted life-time utility from consumption:

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

where β is the discount factor, c_j is household consumption and n_j is the size of a household of age j in equivalence scale units.

The labor income of a household i of age j is the product of an age-dependent labor endowment and productivity shocks:

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

where $\overline{e}_j$ is the deterministic endowment of efficiency units of labor, z_j^i is a persistent shock to the household's earnings, and η_j^i a transitory shock.

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 a finite set of 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.

A household can file for bankruptcy. We model bankruptcy so as to capture the most salient features of Chapter 7 consumer bankruptcy in the U.S. As in Chapter 7, upon filing all debts are discharged, and the household enters the following period with a balance of zero (unless hit by an expense shock that period). Filers also face

several types of "punishment" which proxy for specific features of Chapter 7. First, bankrupts cannot save or borrow during the default period because all assets are seized during a Chapter 7 bankruptcy. Second, bankruptcy cannot be declared two periods in a row.[11] Third, the US bankruptcy code specifies that borrowers must act in "good faith" so that borrowing and immediately filing for bankruptcy is sometimes denied. To capture the requirement that borrowers make a good faith effort to repay their debt, we force bankrupt households to repay a fraction γ of their earnings during the period in which they file.[12]

In our experiments involving potential credit market changes we consider three other potential costs of bankruptcy. The first is a utility cost of filing, χ. This "stigma" may reflect real or psychic ("shame") costs of bankruptcy. The second is the "burning" of a fraction λ of filers' consumption during the bankruptcy period. This is meant to capture the increased cost of consumption (finding an apartment, limited access to credit cards for purchases, etc.) after bankruptcy. Finally, we also allow for a fixed cost ϕ of bankruptcy, which captures the legal costs of filing.

The timing is as follows. At the beginning of the period, each household realizes its productivity and expense shocks. If the household receives an expense shock, then the debt of the household is increased (or savings decreased) by the amount of the shock. The household then decides whether to file for bankruptcy or not. If bankruptcy is declared, creditors garnishee labor income and the consumer is allowed to spend the remaining income. Filers are not allowed to save or borrow, thus, they consume all earnings net of debt-recovery γ (and "burning"). Households who do not declare bankruptcy decide on their asset holdings for the following period and their current consumption.

Financial Intermediaries

Financial markets are perfectly competitive. Intermediaries accept deposits from savers and make loans to borrowers. The risk-free savings rate r^s is given exogenously. Loans take the form of one period non-contingent bond contracts. However, the

[11] In our numerical experiments, each period lasts for 3 years, so this captures the fact that under Chapter 7 households have to wait at least 6 years before filing again.

[12] Prior to 1984, courts had the implicit right to dismiss a case based on "bad faith" behaviour by the debtor. The Bankruptcy Amendments and Federal Judgeship act of 1984 and the 1986 amendments to section 707(b) of the Code formalized this by explicitly allowing bankruptcy trustees to make a motion for dismissal for substantial abuse. While the interpretation of "substantial abuse" has varied across courts, the ability to repay a significant fraction of one's debt has often played a large role in courts' decisions to dismiss debtors' bankruptcy petitions (see Cain (1997) and Wells, Kurtz, and Calhoun (1991)).

bankruptcy option introduces a partial contingency by allowing filers to discharge their debts. The face value of a loan to be repaid next period is denoted by d'. Savings are denoted by $d' < 0$. Intermediaries incur a proportional transaction cost of making loans, τ.

Intermediaries have complete information about borrowers: They observe the total level of borrowing d', the current persistent productivity shock z, and the borrower's age j.This allows intermediaries to accurately forecast the default probability of a borrower, $\theta(d', z, j)$, and price the loan accordingly.

Equilibrium
In equilibrium, perfect competition and complete information imply that intermediaries make zero expected profit on each loan and that cross subsidization of interest rates across different types of borrowers does not occur. Therefore the individual bond price is determined by the default probability of the issuer and the risk-free bond price. Without debt-recovery, 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 debt-recovery, this formula needs to be adjusted. The *unrestricted bond price under debt recovery* is

$$q^{ub}(d', z, j) = (1 - \theta(d', z, j))\overline{q}^b + \theta(d', z, j)E(\frac{\gamma y}{d' + \kappa'})\overline{q}^b \tag{3.3}$$

where $E(\frac{\gamma y}{d'+\kappa'})$ is the expected rate of recovery, assuming that when a household defaults, the amount recovered is allocated proportionately to expense debt and personal loans.

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

$$q^b(d', z, j) = \begin{cases} q^{ub}(d', z, j) & \text{if } q^{ub}(d', z, j) \geqslant \frac{1}{1+\bar{r}} \\ 0 & \text{otherwise} \end{cases} \tag{3.4}$$

Households take the bond price schedule as given when making decisions. The problem of a household is defined recursively using three distinct value functions. V is the value of a "normal period," while $\bar{V}$ is the value of declaring bankruptcy. Although bankruptcy cannot be declared two periods in a row, a household may not be able to repay the realized value of an expense shock in a period following bankruptcy. In this case, the household's current income is garnisheed and its debt is rolled over at a fixed interest rate r^r. The value of this state of the world is W.

The value functions are given by:

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

$$\bar{V}_j(z,\eta) = u\left(\frac{c}{n_j}\right) - \chi + \beta E \max\left\{V_{j+1}(0,z',\eta',\kappa'), W_{j+1}(z',\eta',\kappa')\right\} \\ \text{s.t. } c = (1-\lambda)(1-\gamma)(\bar{e}_j z\eta - \phi) \tag{3.6}$$

$$W_j(z,\eta,\kappa) = u\left(\frac{c}{n_j}\right) - \chi + \beta E \max\left\{V_{j+1}(d',z',\eta',\kappa'), \bar{V}_{j+1}(z',\eta')\right\} \\ \text{s.t. } c = (1-\lambda)(1-\gamma)\bar{e}_j z\eta, \qquad d' = (\kappa - \gamma\bar{e}_j z\eta)(1+r^r) \tag{3.7}$$

An equilibrium is a set of value functions, optimal decision rules for the consumer, default probabilities, and bond prices, such that equations (3.5)-(3.7) are satisfied, and the bond prices are determined by the zero profit condition, taking the default probabilities as given. The model can be solved numerically by backwards induction.

3.2 Benchmark Calibration

Our approach is to choose parameters to match the U.S. economy during the 1995-99 period, and then run experiments to match 1980-84 data (see Table 2). The description below is brief since we largely follow Livshits, MacGee, and Tertilt (2007). However, since we are matching average data over 1995-99 instead of 1996 and have improved upon our earlier measure of unsecured debt, our targets (and hence our parametrization) differ slightly from our earlier work.

Households

Households live for 18 three-year periods. During the first 15 periods (ages 20-65) households receive a stochastic endowment, while the last three periods correspond to retirement in which households do not face any uncertainty. The period utility function is $u(c) = \frac{c^{1-\sigma}-1}{1-\sigma}$. We set the annual discount factor equal to 0.94 and the degree of risk aversion σ equal to 2.[13] Household size measured in equivalence units is taken from Livshits, MacGee, and Tertilt (2007).

[13] We have also investigated somewhat higher and lower degrees of risk aversion ($\sigma = 1.5$ and 2.5) and found that our results are robust to this modification.

The expense shocks are calibrated using 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: $\kappa \in \{0, \kappa_1, \kappa_2\}$. To calibrate the medical expense shock, we utilize data from the 1996 and 1997 Medical Expenditure Panel Survey (MEPS) as well as the US Health Care Financing Administration (HCFA). MEPS provides detailed data on medical expenses in 1996 and 1997 for a random sample of 19,859 persons (7,435 households). We combine our estimate of these medical expense shocks with an estimate of the cost of divorces and of the cost of an unplanned and unwanted child. Our calculations generate one shock that 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 these shocks are 7.1% and 0.46%, respectively.[14] A more detailed discussion of our benchmark expense calibration is contained in Livshits, MacGee, and Tertilt (2003).

A large literature has estimated the volatility of log earnings using the following structure: $\log y^i = \log z^i + \log \eta^i + \log g(X^i)$, 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. The log of the persistent idiosyncratic shock follows an AR(1) process, $\log z_j^i = \rho \log z_{j-1}^i + \epsilon_j^i$, where $\epsilon_j^i \sim N(0, \sigma_\epsilon^2)$. We set the benchmark annual value of $\rho = 0.95$, $\sigma_\epsilon^2 = 0.025$ 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). To feed these values into our model, we first map the annual values into triennial numbers and then 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, and the initial realizations for newly-born households are 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.

We assume that the (exogenous) income of a retired household is the sum of two parts: an autonomous income of 20% of average earnings in the economy and an additional income of 35% of their own persistent earnings realization in the period before retirement. This leads to a progressive retirement income system with an

[14] Newly-born and retired households are not subject to expense shocks.

average replacement rate of 55%, which is within the range of numbers reported in Butrica, Iams, and Smith (2004). Note that total retirement income is higher as households also have private savings.

Financial Market Parameters
The savings interest rate is set equal to 3.44%, as in Gourinchas and Parker (2002). The rollover interest rate r^r is set to 20% annual. The cost of filing for bankruptcy parameters — the utility cost χ, the fixed cost ϕ, and the fraction of consumption lost λ — are set to 0 in the benchmark economy.

The three remaining parameters — the debt recovery rate γ, transaction cost τ, and the interest rate ceiling $\bar{r}$ — are chosen to match the facts from Table 2 for 1995-1999. This leads to a γ of 0.319.[15] The transactions cost of making loans is 2.56% annually. Together with the risk-free savings interest rate of 3.44%, this implies an annual risk-free lending rate of 6%. Finally, the interest rate ceiling is set to a (high) value of 75% annually. While this value exceeds the current official interest rate ceilings, there are many ways to (partially) get around the official legal ceilings.[16] This ceiling is not binding for almost all of the consumers in our experiments. However, having no ceiling can sometimes lead to a (very) small number of people borrowing large amounts at very high interest rates (with little intention of repaying them), which leads to artificially high average interest rates.

3.3 Quantitative Evaluation of Different Stories

We use the quantitative model to evaluate the various stories for the increase in bankruptcies proposed in the literature. Since we calibrated the model to the 1995-99 period, we go backwards in our experiments and ask what changes in the quantitative model can replicate the data from the "low filings" period 1980-84. In particular, we use the observed changes in the debt ratio, the interest rate, and the charge-off rate described in Table 2 to evaluate the plausibility of the different stories.

We first run experiments to analyze each proposed story individually. For each

[15] Arguably, requiring that debtors repay a substantial fraction of their debts before they could be permitted to default *unless* hit by an adverse income or expense shock would better capture the "good faith" idea. This is more difficult to implement computationally. Nevertheless, as a robustness check we have also run a version of the code which requires that debtors repay the minimum of a fraction of their debt and a fraction of their income. We found that our main conclusions continue to hold under such alternative specification.

[16] Ceilings vary by state from 8 to 30 percent: See http://www.lectlaw.com/files/ban02.htm.

story we ask whether the implied amount of borrowing, the interest rate and the charge-off rate are consistent with the data for the low filing period (Table 2). The next section focuses on uncertainty based stories, while section 5 examines credit market based channels. In Section 6, we build on these experiments and decompose the relative importance of a combination of uncertainty and credit market based stories for the rise in consumer bankruptcies.

4 Did Increased Uncertainty Generate the Rise?

Surveys of bankrupts find that most bankruptcies are triggered by negative shocks to earnings or unexpected "expenses".[17] This has led some to argue that increases in the probability and/or size of these adverse shocks are largely responsible for the rise in filings.[18] 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. Our (surprising) conclusion is that changes in uncertainty cannot account for the rise in consumer bankruptcies. We also argue that demographic changes are unlikely to have played a large role in the rise.

4.1 "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 is required to reduce bankruptcy rates 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 3. Note, however, that this hardly affects the debt/gdp ratio. Eliminating the large expense shock instead has a much smaller impact, decreasing bankruptcies to 0.75% (see experiment 3).

[17] See for example Sullivan, Warren, and Westbrook (2000), Figure 1.2.

[18] A frequently cited report by VISA U.S.A concluded that changes in the growth rate of employment had a significant impact on per capita filing, as did the fraction of the population between 25 and 44 and the divorce rate (VISA USA 1996). More recently, Warren and Warren Tyagi (2003) and Hacker (2006) have argued that increased income uncertainty plays a significant role in the rise of consumer bankruptcies.

Experiments 2 and 3 suggest that an increase in expense shocks alone cannot explain the U.S. experience from 1980 to 2000, as it counter-factually implies little change in the consumer debt to income ratio. Moreover, a drastic change in expense shocks is necessary to achieve a significant increase in bankruptcies. Is this realistic? To assess the contribution of increased expense uncertainty we need to estimate the change in expense uncertainty over the last two decades.

Table 3: Changes in Expense Uncertainty

	Experiment	Ch. 7 Filings	Avg. r^b	Charge-off Rate	Debt / Earnings
1	Benchmark	0.83%	11.35 %	4.9%	9.20%
	U.S. 1995-99	0.83%	10.93 - 12.84%	4.8%	9%
	U.S. 1980-84	0.25%	10.95 - 12.05%	1.9%	5%
2	no small shock	0.25%	8.20%	2.1%	9.77%
3	no large shock	0.75%	11.11%	4.7%	9.21%
4	15% decrease	0.73%	10.83%	4.4%	9.27%

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.[19] Real out-of-pocket (oop) payments per households have increased from $1,477 in 1980 to $1,946 in 1998, a 32% increase.[20] However, oop payments as a fraction of median household income has only increased from 3.55% in 1980 to 4.16% in 1998. That is, in 1980, the fraction of median income spent on oop was 15% lower than in 1998. The percentage of Americans without health insurance has also increased. In 1982, 13.6% of Americans had no health insurance, compared to 16.3% in 1998, an increase of 17 percent.[21] This leads us to believe that rather than individuals paying higher amounts in 1998 compared to 1980, there are *more*

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

[20] These numbers are from the U.S. Statistical Abstracts (U.S. Census Bureau 2000, Table 151). The increase in oop expenditures reported by Center for Medicare and Medicaid Services (2005) is even lower, so we interpret our numbers as an upper bound.

[21] These figures may underestimate the change in health insurance coverage, as a change in the way in which health insurance data was collected after 1987 led to an increase in the fraction of the population reporting health insurance coverage.

people with large out-of-pocket expenditures. Furthermore, (based on unreported experiments), the bankruptcy filing rate in the model is more sensitive to changes in the probability of the shock than its size. Thus, decreasing the expense shock probabilities by 15% should yield an upper bound on how much of the change in the filing rate could come through this channel.[22] Based on experiment 4 in Table 3, we conclude that medical shocks can account for less than 20 percent of the rise in bankruptcies, and cannot account for the increase in consumer debt. Given that defaults do not change much, it is not surprising that this experiment also cannot replicate the large increase in charge-offs.

The comparison with Canada casts further doubt on changes in medical uncertainty being the main driving force behind the rise in filings. Canada is a country with universal health care coverage. Hence, catastrophic medical expenses are unlikely to be the main cause of bankruptcies in Canada, which is consistent with the lower level of bankruptcies relative to the U.S. However, Canada experienced a very similar increase in bankruptcies (see Figure 1), which suggests that a factor common to both countries is primarily responsible. This leads us to conclude that changes in the cost and extent of insurance against catastrophic medical events are not the primary factor driving 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 cited family factors as a main cause of their bankruptcy. The obvious two causes for sudden family related expenses are divorces and unplanned pregnancies.

Has uncertainty regarding these family events gone up and is this responsible for the increase in bankruptcies? The answer to the first question is no. The number of births has decreased slightly from 15.9 per 1,000 population to 14.3 (see Table 4). 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 rise in 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 declined slightly since 1980. Similarly, the fact that the divorce rate has declined, from 5.2 per 1,000 population in 1980 to 4.3 in 1998

[22] This is likely an overestimate, as part of the expense shock is due to family shocks which have changed little over this period (see below).

Table 4: Births and Divorces

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	5.2	4.3

* Intended birth numbers are for 1982 and 1995 respectively.

Source: U.S. Statistical Abstract, various years.

is well documented (e.g. Goldstein (1999)).[23] While the number of divorced (and not remarried) people has increased, new divorces rather than the stock of divorced people is the relevant measure of uncertainty. Overall, this suggests that "demographic uncertainty" has declined during the last two decades. We therefore conclude that family uncertainty did not play an important direct role in the rising bankruptcy rate.

4.2 Demographic Changes

Average family size declined dramatically between the early 1980s and late 1990s. While a proportional fall in family size across all ages has no effect in our model, a shift in the slope of the family size profile could affect bankruptcies by shifting households' desired lifetime consumption and borrowing profile. In the data, the family size profile has flattened slightly as the fall in average family size has been largest for young people, while average family size for ages 57 and older has remained roughly constant. In our experiments we find that this has a small quantitative impact on bankruptcies and borrowing, and goes in the wrong direction. An average family size profile that is larger for the young and almost identical for older people effectively makes the life-cycle earnings profile steeper. This means people borrow more when young, and hence are more vulnerable to shocks.

We now briefly discuss two additional demographic stories: changes in the age composition and marital status of the U.S. population. These changes cannot be evaluated using our model as we do not distinguish between different types of house-

[23] 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.

holds (single vs. married) nor do we allow changes in cohort size. However, some back-of-the envelope calculations suggest that these are not important contributors to the increase in consumer bankruptcies.

Table 5 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 5 contrasts the constructed filings rates per 1,000 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 age composition.

Table 5: 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).[24]

The second change is the dramatic rise in the share of bankruptcies filed by women.[25] The percentage of bankruptcies filed by women has increased from less than 15% in 1967 to almost 40% in 1999. However, filing rates by gender 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, marital status data 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 6 shows that a higher fraction of singles and especially of divorced people file for bankruptcy compared to married people. Since the fraction of singles and divorcees

[24] These filing rates differ slightly from those used in the paper as they include Chapter 13 filings.
[25] See Sullivan and Warren (1999) and Pollak (1997).

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 6: 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 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 6. Changes in the marital composition of the U.S. can account for a modest increase from 4.7 bankruptcies per 1,000 in 1980 to 5.3 in 2001. This is a small fraction of the actual increase from 2.2 in 1980 to 7.9 in 2001.[26]

4.3 Income Uncertainty

There is a broad consensus that the variance of log earnings increased in the U.S. from the late 70s to the early 90s and then decreased substantially again in the mid 90s (Moffitt and Gottschalk (2002), Meghir and Pistaferri (2004), Blundell, Pistaferri, and Preston (2005)). For example, Moffitt and Gottschalk (2002) report that the variance of log earnings roughly doubled between 1980 and 1992, but fell again by about a third between 1991 and 1996. Meghir and Pistaferri (2004) report a more modest increase in the variance of log earnings.

Livshits, MacGee, and Tertilt (2007) find that persistent and transitory income shocks have very different implications for bankruptcy filings. Unfortunately, there is much less consensus about the relative importance of the permanent, persistent, and

[26] One caveat is in order here. We cannot rule out a combination of more singles together with increased uncertainty particularly for singles.

transitory components in accounting for the increased variance of log earnings. Moffitt and Gottschalk (2002) argue that the variance of the permanent shock increased by roughly 50 percent between 1980 and 1996, while the variance of transitory shocks doubled from 1980 to 1985, levelled off until about 1992, after which it declined sharply by about 50 percent. Meghir and Pistaferri (2004), on the other hand, find a sharp increase in the variance of the permanent shock between the mid 70s and 1985, after which it fell and by 1987 was back to its 1978 level. Blundell, Pistaferri, and Preston (2005) find that the variance of the permanent shock doubled between 1980 and 1985, then declined, and that the transitory variance increased by roughly 50 percent from 1980 to 1987, followed by a fall. Finally, Heathcoate, Storesletten, and Violante (2004) analyze log hourly wages, rather than earnings, and decompose them into permanent, persistent, and transitory components for the years 1967 to 1996. Their estimates imply that the variance of the transitory shock increased by 25 to 30 percent (depending on which years one uses), while the variance of the persistent shock remained constant or decreased slightly.

In the experiments we run, we take the most generous estimates of the increase in persistent and transitory income uncertainty to get an upper bound on the impact of income uncertainty. We investigate an increase in the variance of the transitory shock in excess of 30%. Since we do not have permanent shocks in the model, we increase the variance of persistent shocks to represent possible increases in both persistent and permanent uncertainty in the data. To obtain an upper bound on the impact of these shocks, we increase the variance of the persistent shock by 150%. We then shut down the income shocks completely to show that income uncertainty cannot account for a large part of the rise in filings. The results are reported in Table 7.

Experiment 1 shows that lowering the variance of the transitory income shocks by 25% (i.e., a 33% increase over the two decades) has almost no effect – in fact, it slightly increases filings. Experiment 2 illustrates that even shutting down the transitory income shock completely does not change the number of filings. This 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 60% (corresponding to a 2.5-fold increase over the two decades). This decline in the variance decreases the filings to 0.80%, while driving the unsecured debt up to almost 15% of earnings. Experiment 4 shows that lowering the variance of the persistent shocks by another 60% only reduces filings to 0.78%. Finally, shutting down persistent shocks

Table 7: Changes in Income Uncertainty (1995-99 Benchmark)

	Experiment	σ_η^2	σ_ϵ^2	Ch. 7 Filings	Avg. r^b	Charge-off Rate	Debt / Earnings
	Benchmark	0.05	0.025	0.831%	11.35%	4.9%	9.20%
	U.S. 1995-99			0.83%	10.93-12.84%	4.8%	9%
	U.S. 1980-84			0.25%	10.95-12.05%	1.9%	5%
1	Transitory 1	**0.0375**	0.025	0.834%	10.29%	3.9%	9.79%
2	Transitory 2	**0**	0.025	0.830%	8.83%	2.7%	12.25%
3	Persistent 1	0.05	**0.01**	0.800%	8.26%	2.1%	14.87%
4	Persistent 2	0.05	0.004	0.781%	7.39%	1.4%	20.88%
5	Persistent 3	0.05	**0**	0.676%	6.99%	01.0%	27.48%
6	$\rho = 0.98$	0.05	0.025	0.934%	15.48%	8.3%	4.82%
7	$\rho = 0.98$	0.05	0.01	0.847%	8.42%	2.3%	10.58%
8	No inc. risk	**0**	**0**	1.182%	7.26%	1.2%	51.01%

completely only reduces filings to 0.68%, while driving the debt-income ratio up to 27.5 percent. Thus, a change in the variance of persistent income shocks cannot quantitatively account for the rise in filings, and generates counterfactual changes in unsecured debt. However, shutting down all income uncertainty leads to a large *increase* in filings (see Experiment 8), which is driven by the dramatic rise in the debt-income ratio to 51 percent.

The recent literature on turbulence (e.g., Kambourov and Manovskii (2004)) suggests that, perhaps, the persistence of income has gone down over the last few decades. Experiments 6 and 7 in Table 7 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 the 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 summarize, 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 (in the wrong direction) on debt. The inability of realistic changes in transitory income shocks to generate large changes in filings is not surprising. Households tend to smooth transitory income shocks over time through borrowing and saving rather than by declaring bankruptcy. Since borrowing and saving are not as useful in smoothing persistent income shocks, they can in principle have a large effect on filings. However, households borrowing decisions are also sensitive to changes in persistent income uncertainty. Due to market incompleteness, increased persistent income uncertainty pushes up the desired level of precautionary savings, which has a large negative effect on the amount borrowed. While increased persistent income uncertainty makes borrowers more likely to default on any given amount of debt in response to a negative income shock (because the shock is bigger), the reduction in equilibrium borrowing has a strong offsetting effect on filing rates.

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 1980-84 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 Table 10 in Appendix C.

5 Innovations in Consumer Credit Markets

The past thirty years have witnessed substantial technological innovation in consumer credit markets. Many of these changes have been driven by the rapid improvements in information technology, which have led to large increases in information sharing and reduced the cost of processing information (Barron and Staten (2003)).[27] Technological innovations are frequently cited as playing a key role in the rapid spread of credit cards (Evans and Schmalnsee (1999)) as well as reducing the transaction costs associated with lending (Mester (1997)). Several papers have argued that these financial innovations are largely responsible for the rise in unsecured credit and bankruptcy filings (Baird (2007)). In addition, there have been several legal changes which could have had important implications for consumer credit markets. Bankruptcy reform during the late 1970s may have made bankruptcy more attractive (Shepard (1984)),

[27] Berger (2003) carefully documents several forms of technological innovation in banking and provides evidence consistent with the hypothesis that advances in IT and financial technologies led to significant productivity growth. Furletti (2003a) documents new pricing methods in the credit card industry following the adoption of new technologies in the early 1990s.

while the Supreme Court's *Marquette* decision, that led to the removal of state interest rate caps, may have facilitated the extension of credit to higher risk borrowers.

To assess the importance of these changes, we consider three different channels via which these credit market changes could potentially affect bankruptcies and borrowing. First, we evaluate the impact of a decline in bankruptcy costs. This proxies for both the direct costs of bankruptcy as well as the indirect costs associated with higher cost of accessing credit after bankruptcy. The second channel we consider is a fall in the transaction cost of making loans (τ). This captures both direct reductions in processing costs of loans as well as a decline in the costs of funds to credit card companies. Finally we introduce tight interest rate ceilings so as to evaluate the effect of the abolishment of usury laws. We also investigate whether a combination of these credit market channels can account for the rise. Our conclusion is that credit market innovations are the primary factor in accounting for the rise in bankruptcies.[28]

5.1 A Decline in the Cost of Bankruptcy

A common explanation of the rise of bankruptcies is that bankruptcy has become less costly to bankrupts and hence more attractive (Gross and Souleles (2002), Zywicki (2005)). A decline in the cost of filing can mean a variety of different things. Several studies argue that a change in social norms leading to a decline in social "stigma" associated with bankruptcy is responsible for the soaring bankruptcies (Buckley and Brinig (1998), Fay, Hurst, and White (2002)).[29] Alternatively, legal changes, such as the 1978 bankruptcy amendments, may have made filing for bankruptcy easier and thereby reduced the cost of filing (Shepard (1984)). The overall cost of bankruptcy may have also fallen due to the reduced cost of accessing credit after bankruptcy (Staten (1993)).

The idea behind all of these stories is simple: a decline in the cost of filing increases the value of filing for any level of debt and income. We consider three different ways of introducing bankruptcy costs in the model to investigate the plausibility of this class of stories. First, we consider a utility cost associated with an individual filing for bankruptcy, χ. Although this most closely captures the idea of a decline in social

[28] In a related paper, Narajabad (2006) investigates how technological improvements which provide lenders with more accurate signals as to a borrower's type affect bankruptcies, and also finds that this is an important channel.

[29] This explanation is also common among non-academics. For example, Alan Greenspan testified before the Congress in 1999 that "personal bankruptcies are soaring because Americans have lost their sense of shame."

"stigma", it can also be interpreted as a reduced form way of introducing real costs associated with filing for bankruptcy. The second mechanism we consider is a cost that is proportional to consumption in the bankruptcy period which we term "burning". This is motivated by reports that bankrupts face increased transaction costs when purchasing goods. Finally, we consider the possibility that the fixed cost of filing for bankruptcy has fallen. This corresponds directly to a decline in filing fees caused by legal changes or a reduction in the cost of acquiring information about bankruptcy due to increased advertising by lawyers.

Since there is no direct measures of these bankruptcy costs, we use the model to back out how large a change in each of these costs *individually* is required to reduce filings to the early 80s level (holding all other parameters fixed and assuming each of these costs equaled zero in the late 1990s). The results are reported in rows 2a, 2b, and 2c of Table 8. It is worth noting that the costs are significant. The value of stigma required to match the 1980-1984 filing level corresponds to the ex-ante utility loss from a reduction in the life-time consumption stream of roughly 11.5% in the benchmark economy. The burning experiment involves a consumption tax of 31% of the bankrupts consumption during the (3-year) period they file. The fixed cost of filing is 12% of the (3-year) average household income, which corresponds to roughly $\$15,000$ in 1998 dollars.

Our numerical results show that while it is possible to generate the observed rise in bankruptcies simply by changing the cost of bankruptcy, this comes at the cost of several counterfactual implications. First, a decline in bankruptcy costs implies that the level of borrowing should have also declined by a large amount, and that the average borrowing interest rate should have increased significantly.[30] Both of these implications are counterfactual. In addition, the experiments generate a decline in the average debt to income ratio of bankrupts over the past twenty years, while there has been an increase in this ratio in the data (see Section 2.2). These results are very robust to our three different ways of modelling bankruptcy costs, as all three have almost identical implications for the change in the debt/gdp ratio, the average borrowing interest rate and charge-offs. These counterfactual implications lead us to conclude that a decline in the cost of bankruptcies by itself is not the whole story.

[30]It is important to point out one caveat. In general, the relationship between the cost of filing and the level of borrowing is not monotonic, since at very high levels a decline in the cost may lead to higher borrowing. As a result, it is possible to construct examples where a decline in the cost of filing 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.

Table 8: Credit Market Changes

	Experiment	Ch. 7 Filings	Avg. r^b	Charge-off Rate	Debt / Earnings
1	Benchmark	0.83%	11.36 %	4.9%	9.20%
	U.S. 1995-99	0.83%	10.93 - 12.84%	4.8%	9%
	U.S. 1980-84	0.25%	10.95 - 12.05%	1.9%	5%
2a	Stigma (χ) $\uparrow$	0.25%	7.04%	0.97%	14.00%
2b	Burning $\uparrow$	0.25%	7.04%	0.98%	14.69%
2c	Fixed cost $\uparrow$	0.25%	7.02%	0.95%	12.54%
3a	$\tau = 4.56\%$	0.79%	15.28%	6.32%	6.33%
3b	$\tau = 5.56\%$	0.78%	19.24%	8.59%	5.26%
3c	$\tau = 6.56\%$	0.78%	19.57%	8.00%	4.37%
4a	$\bar{r} = 10\%$	0.68%	7.48 %	1.38%	9.12%
4b	$\bar{r} = 8\%$	0.66%	7.43%	1.33%	8.99%
4c	$\bar{r} = 7\%$	0.54%	6.77%	0.72%	1.12%
5	Stigma (χ) $\uparrow$ and (τ) $\uparrow$	0.25%	11.83%	1.19%	5.02%

5.1.1 Legal Changes: The 1978 Bankruptcy Law Amendments

A potential explanation for a decrease in the cost of bankruptcy is legal reform. 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 to some households by increasing the value of exempt assets and permitting joint filing by spouses (McKinley (1997), Boyes and Faith (1986), Shepard (1984)). These amendments coincided with a 1977 U.S. Supreme Court decision removing restrictions on advertising by lawyers, which may have reduced the cost of acquiring information about bankruptcy (McKinley (1997)). Given that one can interpret these changes as a decline in the cost of filing, our experiments suggest that legal changes alone are not a complete explanation. There are also three additional arguments which cast doubt on the importance of legal changes in the rise in filings. First, the U.S. reforms were relatively minor (see Moss and Johnson (1999)). Second, Domowitz and Eovaldi (1993) analyze data on the

characteristics of bankrupts before and after the 1978 amendments, and conclude that the amendments did not play a significant role in the rise in consumer bankruptcies. Finally, there were no corresponding changes to the bankruptcy law in Canada, and yet filing rates in Canada also increased dramatically.[31]

5.2 Decline in Lending Costs

Technological progress has had a significant effect on the working of consumer credit markets. One way of capturing many important elements of these changes in the model is via a decline in the transactions cost of making loans (the wedge between the safe borrowing rate and the saving rate). This has a direct counterpart in the observed decline in the costs of processing consumer loans due to increased use of credit scoring (Mester (1997)). Financial innovations such as securitization have also lowered the cost of funds to financial intermediaries (Furletti (2002)), which in our framework translates into a reduced transactions cost of borrowing. An additional possibility is that increased competition in the banking sector led to a decline in the profits of credit card providers and thus reduced the wedge between the borrowing and lending rate.[32]

Although there are no direct measurements of the transaction costs, the following back-of-the-envelope calculation gives a rough idea of the magnitude. In the model, charge-offs, the borrowing interest rate and the risk-free borrowing rate are tied together by the zero profit condition. Abstracting from aggregation issues due to borrower heterogeneity, the charge-offs are roughly equal to $\frac{r-(r^s+\tau)}{1+r}$, where r denotes the average borrowing interest rate, r^s is the saving interest rate and τ is the wedge between the saving rate and the safe borrowing rate. We can use this relationship to back out the implied wedge. Based on the data from the end of the late 1990s (charge-offs $= 0.048$, $r^s = 0.0344$, and $r \in [0.1093, 0.1284]$), the implied borrowing wedge is between 2.2 and 4 percent.[33] Using the early 1980s data instead gives a τ of between 5.4 and 6.8 percent. The implied decline in the transactions cost is roughly 3 percentage points.

[31] There are two caveats. First, there were potentially important administrative changes that may have increased access to the bankruptcy system for low income households during the early 1970s. Second, 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)).

[32] Dick and Lehnert (2006) argue that the removal of barriers to interstate branch banking increased competition between banks.

[33] Note that our calibrated $\tau = 2.56\%$ falls right into this range.

We report the results for increases in the transaction cost of lending centered about our back-of-the-envelope estimate (of two, three and four percentage points) in rows 3a, 3b, 3c in Table 8. Surprisingly, none of these changes has a large effect on filings. However, variations in the transaction cost of lending have a large effect upon aggregate borrowing, the average borrowing interest rate, and the charge-off rate. 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. Our interpretation of these results is that this channel of financial market innovations is unlikely to have played a large *direct* role in the increase in filings, but is an important factor in the rise in unsecured borrowing.

These results are quite different from Athreya (2004), who reports that reductions in the transaction cost of lending can generate a substantial increase in both filings and debt. The small effect we find on filings stems from two differences between our models. First, Athreya (2004) abstracts from expense uncertainty, which drives a large fraction of the defaults in our framework. Expense uncertainty implies that reductions in the cost of borrowing not only encourage more borrowing – which makes households more likely to file for bankruptcy given shocks – but also makes borrowing so as to pay off expense shocks over time more attractive relative to filing for bankruptcy. Secondly, the life cycle nature of our model makes risky young borrowers less sensitive to changes in borrowing rates, and thus generates their continued participation when the transaction costs are high.

One other issue worth highlighting is that we assume that the risk free rate is fixed in all of our experiments, while the transaction cost of lending varies. Our rationale is that the return to saving in the model is a proxy for the return on capital in the economy, which McGrattan and Prescott (2003) argue has remained roughly constant over 1980-2000. In effect, we take the view that the opportunity cost of funds to the lenders should be equal to the return on capital, and load all of the costs of intermediation into the τ. To check the robustness of this approach, we also undertook experiments where we increased the risk-free rate (r^s) while holding the transaction cost of lending (τ) fixed. As one would expect, although a slightly smaller increase in r^s is needed to generate the same decrease in borrowing as a given change in τ, these experiments yielded similar results to those reported in Table 8. This suggests that whether borrowing became cheaper due to efficiency gains in the lending sector, or due to other macroeconomic factors that lowered the aggregate interest rate is not important for our results. Instead, what is key is that credit markets changes led to

an effective reduction in borrowing costs for consumers.

5.3 Removal of Usury Laws

Until the late 1970's, most states imposed (tight) ceilings on nominal interest rates for consumer loans. These laws were relaxed in the early 1980s as a result of the 1978 Supreme Court decision involving Marquette National Bank of Minneapolis to permit banks from 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 regulate interest rates of lenders located in other states. Subsequently in the early 1980s, large credit card issuers relocated to states (notably Delaware and South Dakota) with the highest interest rate ceiling (Evans and Schmalnsee (1999)). This was followed by a rapid growth in high interest rate credit card debt, which coincided with the rise in consumer bankruptcies. This has led some to suggest that the *Marquette* decision contributed to the rise in bankruptcy by facilitating the expansion of credit to riskier borrowers.

We report the results of numerical experiments for three alternative ceilings in Table 8, all of which lie below the average borrowing interest rate in the benchmark economy and above the risk-free lending rate of 6% (experiments 4a-4c). Even a very tight interest rate ceiling of 7% can only account for roughly half of the rise in filings. This result is driven by the fact that bankruptcies in the model are caused by bad realizations of expense and income uncertainty. A tight borrowing constraint dramatically reduces borrowing (by preventing the extension of credit to "risky" borrowers and placing tight restrictions on the amount that can be borrowed). Lower borrowing in turn reduces the incentive for households to default in response to bad realizations of expense and income shocks. Offsetting this is the fact that tight borrowing constraints associated with low interest rate ceilings significantly limits households ability to borrow to smooth negative shocks. This in turn pushes some households who would not have defaulted in the absence of the tight interest rate ceiling to default, and this limits the effect of interest rate ceilings on defaults.

The numerical experiments indicate that the interest rate deregulation story is not consistent with observed interest rates. 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, Canada has also experienced a rapid rise in consumer bankruptcies but did not experience a deregulation of credit markets around the same time (see also Ellis (1998)).[34] Second, it is unclear whether interest rate ceilings were effectively binding in the United States. For example, 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 other states. 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 bankruptcies by permitting continued lending to high risk consumers, it was not in itself a significant cause of the rise in filings.

5.4 Can a Combination of Credit Market Channels Generate the Rise?

Thus far we have considered the impact of changes in each of the three credit market channels separately. However, credit market innovations likely affected all of these channels. Moreover, the results reported above for each channel individually suggest that credit market innovations which made both borrowing and filing less costly could lead to a large extension of debt as well as a dramatic increase in filings. Could credit market innovations which led to reduction in both the transaction cost τ and the cost of bankruptcy χ account for the observed experience?

The answer is yes. Experiment 5 in Table 8 reports the results of an increase in the transaction cost of 4.5 percentage points (from 2.56% to 7.06%) and an increase of the stigma parameter to roughly three quarters of its value in the "stigma only" experiment (line 2a in Table 8). With these values, the model closely replicates the level of filings, the average borrowing interest rate and the debt-to-earnings ratio observed in the early 1980s. The model also predicts a sizable increase in the charge-off rate from the 1980s to the late 1990s in line with the data: an increase from 1.2% to 4.9% in the model, compared to a slightly lower increase in the data, from 1.9%

[34]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)).

to 4.8%.

The intuition for the success of this experiment is as follows. The reduction in the cost of filing makes bankruptcy more attractive which decreases the bond price schedule (i.e., interest rates are higher for any level of borrowing). This leads to a decline in borrowing and an increase in average borrowing interest rates (see experiment 2 in Table 8). The fact that a decline in the transactions costs of lending can offset the changes in interest rates and borrowing is not obvious. The direct effect of a lower τ is to increase the bond price schedule, thereby increasing desired borrowing by households. The lower interest rate schedule reduces the cost of repaying one's loans for any level of debt, which increases the value of repaying relative to the value of bankruptcy. The lower interest rate schedule also increases the cost of being excluded from borrowing during the bankruptcy period. The overall effect is to increase both the fraction of young households who borrow and the amount borrowed by borrowers. Due to these forces, lower transaction costs significantly increase borrowing while lowering the incentive to default for a given level of borrowing. As a result, the realized average default rate is only slightly changed by the change in the transactions cost.

6 Decomposing the Relative Importance of Uncertainty and Credit Market Channels

The results from the previous two sections suggest that credit market changes are largely responsible for the rise in filings, while uncertainty plays only a minor role. However, in principle, the various channels might interact and reinforce each other. To better evaluate the relative importance of credit market changes, we now analyze a combination of uncertainty and credit market changes simultaneously. This allows us to assess the contribution of each story, while allowing for interaction effects.

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 those the late 1990s. 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 choose

the values of the cost of bankruptcy and the transaction cost of borrowing so as to match filings and the debt-income ratio in the early 1980s.

This "combination" is Experiment 2 in Table 9. The required increase in the transaction cost is 4.15 percentage points (from 2.56% to 6.71%), while the stigma parameter is set equal to slightly less than half of its value in the "stigma only" experiment (line 2a in Table 8). With these values (given the changes in expense and transitory income uncertainty), this experiment can closely replicate the level of filings, the average borrowing interest rate and the debt-to-earnings ratio observed in the early 1980s. The model also predicts a sizable increase in the charge-off rate from the 1980s to the late 1990s in line with the data: an increase from 1.4% to 4.9% in the model, compared to a slightly lower increase in the data, from 1.9% to 4.8%.

To identify the contribution of each mechanism, we shut-down each story individually and look at the impact this has on aggregate variables (experiments 3 – 6 of Table 9). The experiments show that the increase in expense and transitory income uncertainty play a small role along all dimensions. In experiment 7 we shut down both the uncertainty channels, with very similar results. The decomposition highlights the primary role of credit market changes in the rise. The main channel driving the rise in filings is the decline in the costs of filing (modeled as stigma in this experiment), which accounts for roughly two-thirds of the rise. In contrast, the decline in the transaction cost has a small effect on filings, but counteracts the increase in interest rates and the decline in borrowing predicted by the decline in stigma.

Experiments 8 and 9 of Table 9 report the results for the two alternative bankruptcy costs: burning and the fixed costs of filing. As in section 5.1, these experiments indicate that the implications for the aggregate variables of a reduction in the cost of bankruptcy are robust to alternative specifications of the cost. However, the implications of these types of costs do differ in terms of their implications for the change in the average debt-to-income ratio of bankrupts. Both the burning and the fixed cost experiments generate an increase in the average debt-to-income ratio of bankrupts, while the stigma experiment predicts a small decline. This suggests that with better data on changes in the characteristics of bankrupts over time, one could potentially attempt to better identify the nature of the changes in bankruptcy costs.

These experiments reinforce our interpretation of the earlier results that shifts in uncertainty are not the primary driving force behind the rise in bankruptcies. Instead, it leads us to conclude that credit market innovations are responsible for roughly 90% of the rise on filings and for virtually all of the increase in unsecured borrowing.

Table 9: Decomposing Uncertainty and Credit Market Stories

	Experiment	Ch. 7 Filings	Avg. r^b	Charge-off Rate	Debt / Earnings
1	Benchmark	0.83%	11.36 %	4.9%	9.20%
	U.S. 1995-99	0.83%	10.93 - 12.84%	4.8%	9%
	U.S. 1980-84	0.25%	10.95 - 12.05%	1.9%	5.0%
2	All, see text	0.25%	11.66%	1.4%	5.05%
3	No Δ Expense	0.30%	11.85%	1.5%	4.99%
4	No Δ Stigma	0.64%	17.32%	6.11%	4.22%
5	No Δ τ	0.31%	7.06%	1.0%	13.64%
6	No Δ Transitory Income	0.26%	11.72 %	1.4%	4.90%
7	No Δ Uncertainty	0.30%	11.92%	1.58%	4.84%
8	Burning, all, see text	0.25%	11.33%	1.02%	5.70%
9	Fixed Cost, all, see text	0.25%	11.37%	1.10%	5.29%

As a further test of the plausibility of this conclusion, we also examined the implications of our experiments for household savings. The combination experiments generate a fall in savings relative to income. The implied decline in net worth in experiment 2 of Table 9 between the early 1980s and the late 1990s is roughly 6%. About one third of the decline in net worth in the model is due to increased debt, while the rest is driven by a reduction in assets held for precautionary reasons. The increased attractiveness of borrowing (caused by the fall in τ) and the reduced cost of bankruptcy lower the value of precautionary savings to households. This fall is qualitatively consistent with the well documented decline in the private savings rate in the U.S. over the last several decades (Gale and Sabelhaus (1999)). The ratio of median net worth relative to median income fell by roughly 25%, from 1.24 in 1984 to 0.89 by 1998.[35] This suggests that the credit market changes explored in our paper could have played a significant role in the reduction of savings observed in the U.S.

[35]We look at median rather than average net worth since the upper tail of the income distribution accounts for a significant share of average asset holdings, and our numerical experiments do not have income realizations which would correspond to the top of the income distribution in the data. Net worth is based on data from SIPP as reported by the U.S. Census Bureau, see http://www.census.gov/hhes/www/wealth/detailed_tables.html. Median income is from the Report of the President, see http://www.gpoaccess.gov/usbudget/fy01/sheets/b_31.xls.

7 Conclusion

In this paper, we quantitatively evaluate the extent to which the most commonly offered explanations can account for the rise in personal bankruptcy filings as well as the increase in unsecured consumer debt relative to disposable income, the lack of change in average borrowing interest rates, and the rise in charge-off rates. Our results suggest that uncertainty-based stories cannot account for the rise in consumer bankruptcies and increase in unsecured borrowing. Instead, our experiments suggest that at least three quarters of the rise in filings are due to changes in credit markets. Hence, our paper suggests that credit market innovations which have reduced the cost ("stigma"?) of bankruptcy and as well as the cost of borrowing have played an essential role in the rise of bankruptcies and unsecured consumer borrowing.

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 cost of bankruptcy plays a much more important role in the rise in filings than these papers would suggest. Of course, this finding leaves open the question of what exactly has caused the decline in the cost of bankruptcy. We believe that endogenizing these bankruptcy costs is an important challenge for future research. One hypothesis is that this cost has declined because of the reduced cost of accessing credit markets after bankruptcy – a story documented by Staten (1993). This could be due to improved forecasting of a person's bankruptcy risk caused by technological innovation in the financial sector. With little information about a debtor's "type," bankruptcy is an important signal to creditors about future default risk. However, if banks have full information about a creditor ex-ante, then bankruptcy is simply an instance of bad luck and does not contain further information about a person's type, in which case, bankruptcy should not increase the person's cost of borrowing. We therefore believe that further work along the lines of Chatterjee, Corbae, and Rios-Rull (2006) is important to improve our understanding of the working of consumer credit markets.

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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 data from 1979 and before is from Table 1 of McKinley (1997), while the number of filings from 1980 to 2004 are from the ABI website. 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 (after 1999, G.19 reports consumer credit as either revolving or nonrevolving, which is why our constructed series ends in 1999). 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 10 confirm our findings: Plausible changes in uncertainty only generate an tiny increase in filings, from 0.25% to 0.26% while lowering the debt-to-earnings ratio somewhat. We also 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 increasing even increasing the variance of the transitory shocks by a factor of 50 does not deliver the desired increase in bankruptcy rates, but implies an average interest rate of almost 50% and charge-offs of 25%. The variance of the persistent shock has to be increased 8-fold to get the bankruptcy rate to increase to the late 90's level. This "success" has the debt level collapsing to 0.46% and the average interest rate exceeding 32%.

Table 10: Changes in Income Uncertainty (1980 Benchmark)

	Experiment	σ_η^2	σ_ϵ^2	Ch. 7 Filings	Avg. r^b	Charge-off Rate	Debt / Earnings
1	Benchmark	0.0375	0.025	0.25%	11.38 %	1.11%	5.02%
	U.S. 1980-84			0.25%	10.95-12.05%	1.9%	5%
	U.S. 1995-99			0.83%	10.93-12.84%	4.8%	9%
2	Transitory 1	**0.05**	0.025	0.259%	11.46%	1.17%	4.86%
3	Transitory 2	**1.93**	0.025	0.76%	47.34%	25.2%	1.62%
4	Persistent 1	0.0375	**0.05**	0.37%	11.94%	1.6%	3.01%
5	Persistent 2	0.0375	**0.2**	0.84%	32.52%	16.9%	0.46%

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

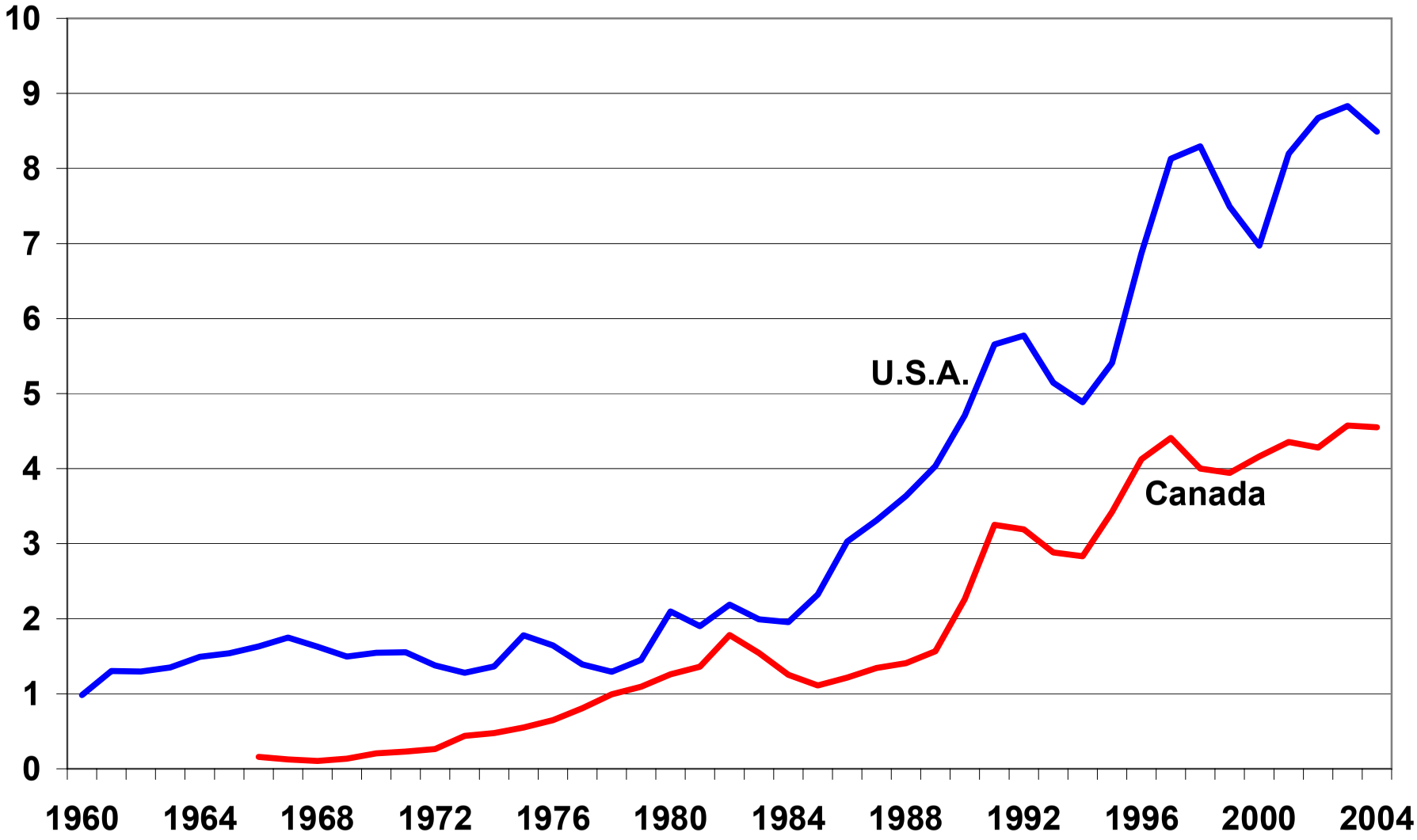

Figure 2: Debt as % of Disposable Income, USA

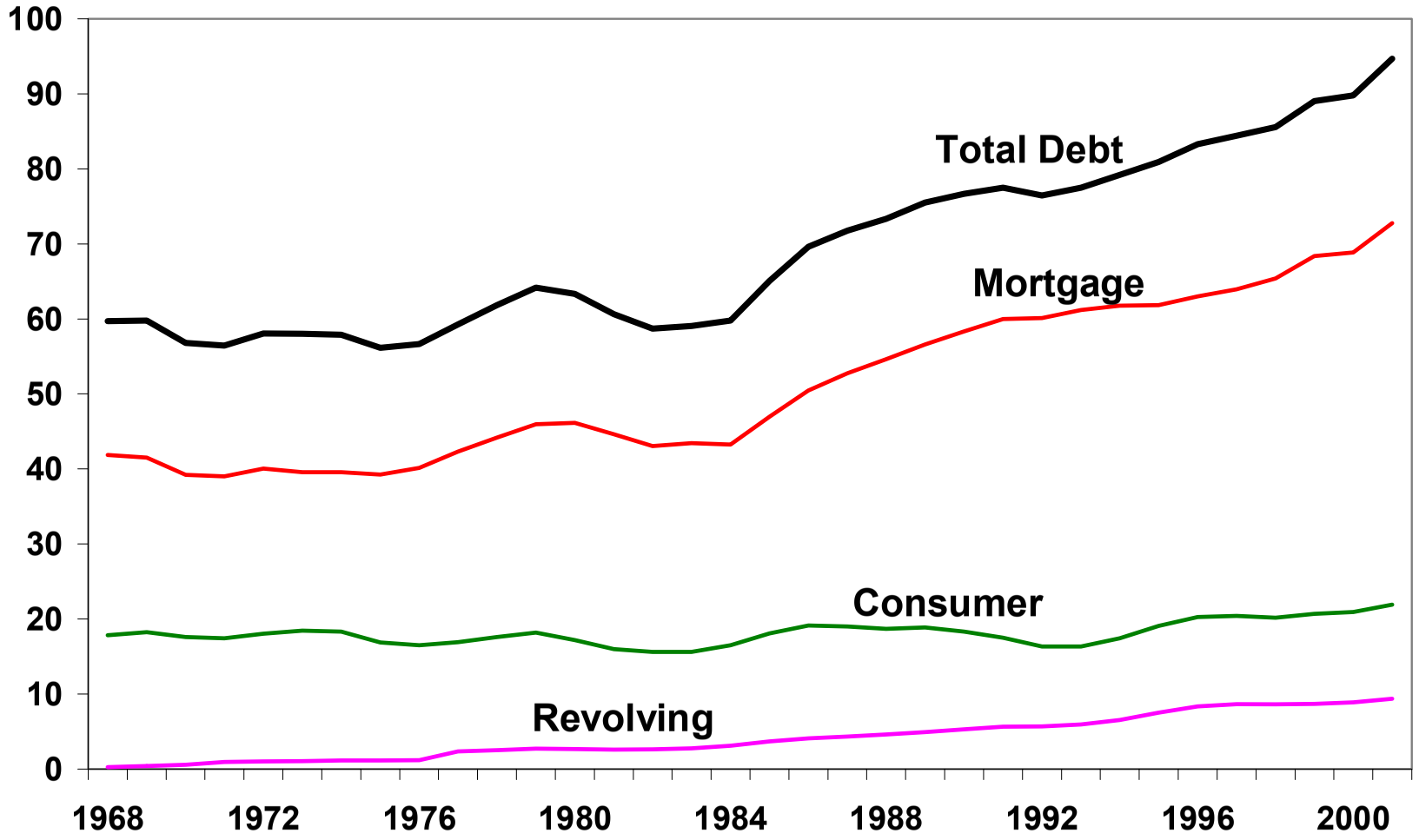

Figure 3: Unsecured and Revolving Credit as % Disposable Income

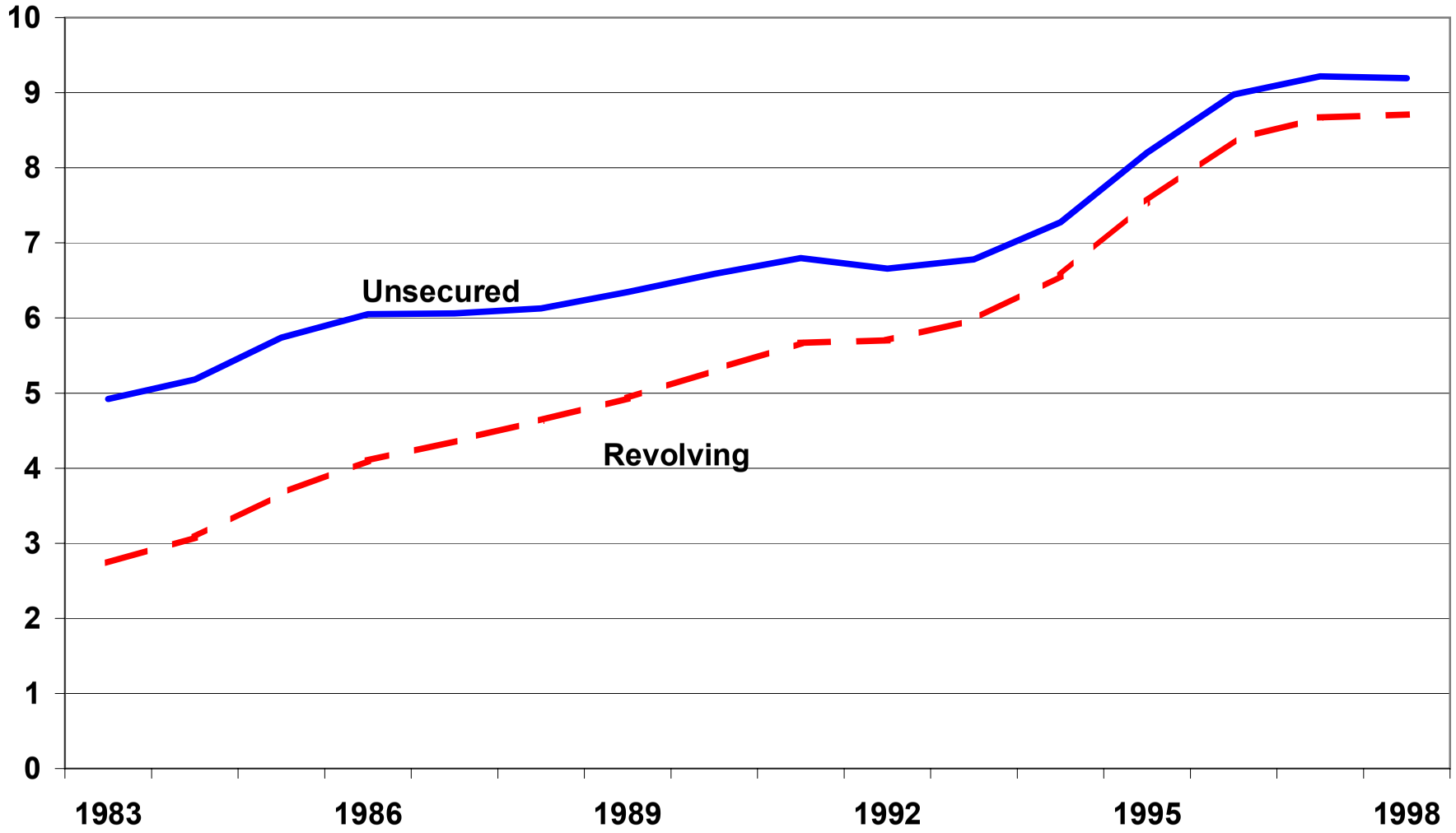

Figure 4: Chapter 7 Filings & Credit Card Charge Off Rates, %

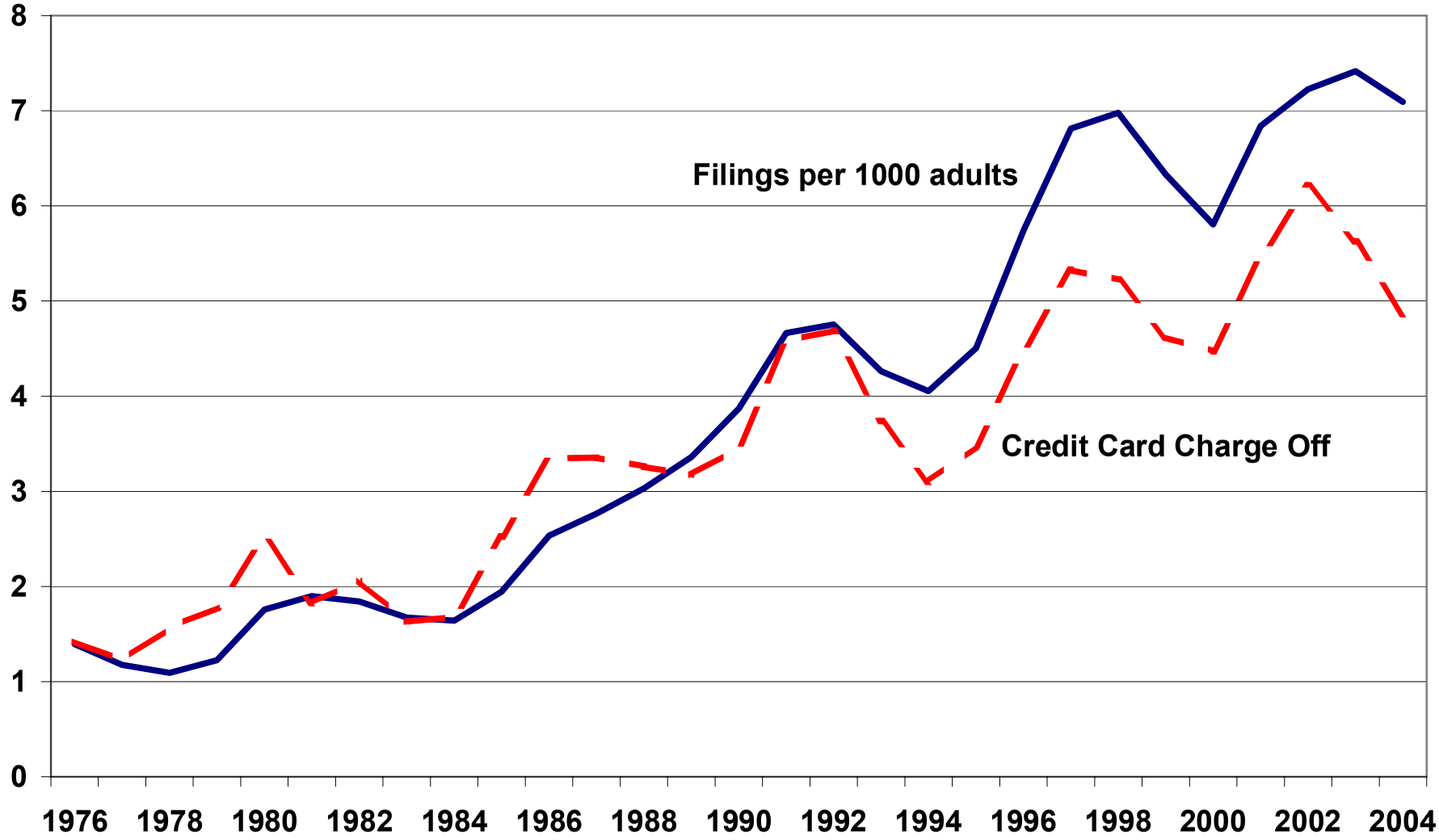

Figure 5: Constructed Bankruptcy Rates per 1,000 Households (U.S.)
(holding age specific filings rates constant)

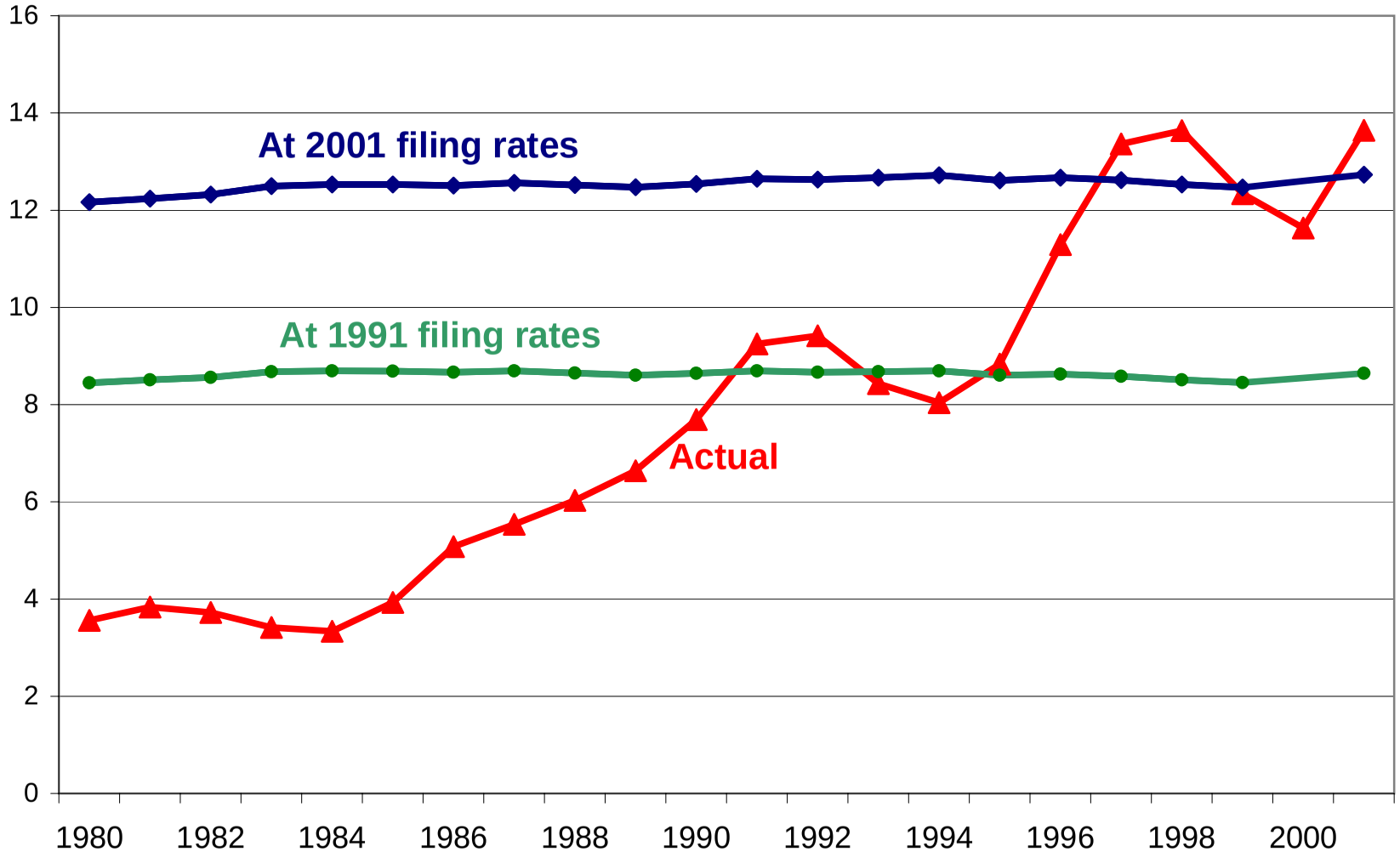

Figure 6: Implied Bankruptcy Rates (per 1,000 25+ adults), U.S.
(holding marital status specific filing rates constant)