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By  
Igor Livshits  
University of Western Ontario  
James MacGee  
University of Western Ontario  
Michèle Tertilt  
Stanford University  
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Stanford Institute for Economic Policy Research  
Stanford University  
Stanford, CA 94305  
(650) 725-1874

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# Accounting for the Rise in Consumer Bankruptcies\*

Igor Livshits, James MacGee, Michèle Tertilt

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## 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, stories related to a change in the credit market environment are more plausible. In particular, we find that a combination of a decrease in the transactions cost of lending and a decline in the cost of bankruptcy does a good job in accounting for the rise in consumer bankruptcy. We also argue that the abolition of usury laws and other legal changes are unimportant.

Keywords: Consumer Bankruptcy; Uncertainty; Credit Markets; Stigma.

JEL Classifications: E21, E44, G18, K35

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\*Livshits: Department of Economics, University of Western Ontario, Social Science Centre, London, Ontario, N6A 5C2 (e-mail: livshits@uwo.ca); MacGee: Department of Economics, University of Western Ontario, Social Science Centre, London, Ontario, N6A 5C2 (e-mail: jmacgee@uwo.ca); Tertilt: Department of Economics, Stanford University, 579 Serra Mall, Stanford, CA 94305-6072 (email: tertilt@stanford.edu). We thank Martin Gervais, Jeremy Greenwood, Karen Pence, José-Víctor Ríos-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 Bank of Minneapolis, the Bank of Canada, the European Central Bank, and UC Davis, Illinois, Iowa, Pennsylvania, Rochester, Texas-Austin, 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.

# 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 stories. In this paper, we address this void and quantitatively evaluate six 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 changes to the credit market environment. Perhaps the most common explanation of the rise in bankruptcy filings is that the cost of filing for bankruptcy has declined (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 \(2006\)](#). 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.<sup>1</sup> 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.<sup>2</sup>

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 decline in the cost of extending credit is required in order to match the U.S. expe-

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<sup>1</sup>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.

<sup>2</sup>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.

rience. 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. 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). All three papers argue that changes in the credit market environment appear to be the primary driving force behind the rise in filings. However, they differ in what exactly these changes mean. [Moss and Johnson \(1999\)](#) base their conclusions on an informal analysis of credit and borrowing data as well as some historical literature. Based on this historical perspective and data, they argue that the main source of the increase in bankruptcies is an increase in the share of unsecured credit held by lower income households.<sup>3</sup> 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 \(2004\)](#) is closest to our paper in the sense that he also uses an equilibrium model of bankruptcy to examine several stories and evaluates them by comparing observable implications from the model to the data. He argues that a decline in stigma alone would lead to a counterfactual decline in the ratio of revolving debt to disposable income. Athreya

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<sup>3</sup>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.

also finds that a reduction in the transaction cost of lending can generate the rise in filings. In the experiments he undertakes, however, the fall in the transactions cost leads to a significantly higher debt to income ratio than that observed in the data. In contrast, we find that a “combination” of credit market changes is consistent with both the changes in filings and the change in the ratio of unsecured debt to income.

The equilibrium model of bankruptcy that we use is part of a recent literature (motivated in part by the dramatic rise in bankruptcies and the related policy debates) on equilibrium models of consumer bankruptcy.<sup>4</sup> Both [Livshits, MacGee, and Tertilt \(2006\)](#) 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 13 using dynamic equilibrium models of bankruptcy. Despite this recent interest in using numerical models to analyze consumer bankruptcy, little work has been undertaken to use these models to evaluate alternative explanations of the rise in bankruptcies.

The remainder of the paper is organized as follows. We summarize background information on consumer bankruptcy in [Section 2](#). The basic environment for evaluating the stories is presented in [Section 3](#). [Sections 4](#) and [5](#) present our results, and [Section 6](#) 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. Our decision to focus attention on this time period is driven by the fact that most of the rise in filings took place during this twenty year period as well as data availability.

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<sup>4</sup>See [Athreya \(2005\)](#) for a more detailed survey.

## 2.1 Consumer Bankruptcy Law

American households can choose between two bankruptcy procedures: Chapter 7 and Chapter 13.<sup>5</sup> Legal actions by creditors and most garnishments are halted upon filing for bankruptcy, including phone calls and letters from creditors seeking repayment. 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.<sup>6</sup> 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

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<sup>5</sup>See Mecham (2004) for a detailed description of consumer bankruptcy law in the United States.

<sup>6</sup>The 2005 bankruptcy reform requires households with income above a threshold to enter into a payment plan.

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 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



**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	5.0%	9.0%
Charge-off rate	1.9%	4.6%

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.

### 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 the four key facts in Table 2. In Sections 4 and 5 we will use these facts to evaluate the stories.

Since our model abstracts from durable goods, the relevant bankruptcies in the data are non-business Chapter 7 filings.<sup>7</sup> 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

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<sup>7</sup>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.

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 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, 1981-1986 and 1996-2000. This calculation implies an average real cost of unsecured consumer borrowing of between 11.0% and 13.0%. Somewhat surprisingly, this calculation implies very little change in real unsecured borrowing interest rates.<sup>8</sup>

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 from the books (net of recoveries) and charged against loss reserves as a percentage of average loans.<sup>9</sup> 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).<sup>10</sup> Charge-offs on credit cards have increased from about 1.9% to 4.6% between the 1980-84 and 1995-99 periods. As Figure 4 illustrates, charge-offs move in parallel with the bankruptcy rate.

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<sup>8</sup>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.

<sup>9</sup>See Furletti (2003) 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.

<sup>10</sup>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 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.

#### 3.1 The Model

We extend the “Fresh Start” model of consumer bankruptcy of [Livshits, MacGee, and Tertilt \(2006\)](#) 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 stories of changes in the credit market environments as a potential driving force of the rise in bankruptcies.

The model economy is populated by overlapping generations of households who live for  $J$  periods. 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:

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

where  $\beta$  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:

$$y_j^i = \bar{e}_j z_j^i \eta_j^i, \quad (3.2)$$

where  $\bar{e}_j$  is the deterministic endowment of efficiency units of labor,  $z_j^i$  is a persistent shock to the household’s earnings, and  $\eta_j^i$  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  $\kappa_i$  is denoted  $\pi_i$ . 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. In that case, all debts are discharged, and the household enters the following period with a balance of zero (unless hit by an expense shock that period). Bankruptcy filers face several types of “punishment” which are meant to proxy for features of the U.S. Chapter 7. First, a fraction  $\gamma$  of earnings is garnisheed by creditors in the period of filing. Second, filers cannot save or borrow during the default period. Third, bankruptcy cannot be declared two periods in a row.<sup>11</sup>

In our experiments involving potential credit market changes we consider three other potential costs of bankruptcy. The first is a utility cost of filing,  $\chi$ . This “stigma” may reflect real or psychic (“shame”) costs of bankruptcy. The second is the “burning” of a fraction  $\lambda$  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  $\phi$  of filing for bankruptcy, which captures the cost of filing and legal fees.

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 garnishment (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 bankruptcy option introduces a partial contingency by allowing bankrupts to discharge their debts. The face value of a loan to be repaid next period is denoted by  $d$ .

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<sup>11</sup>In our numerical experiments, each period lasts for 3 years, and households cannot file under Chapter 7 more than once in each 6 year period.

Savings are denoted by  $d < 0$ . Intermediaries incur a proportional transaction cost of making loans,  $\tau$ .

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  $j$ .<sup>12</sup> 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 garnishment, without usury law and with full discharge of debt, the zero profit condition is  $q^b(d', z, j) = (1 - \theta(d', z, j))\bar{q}^b$ , where  $\bar{q}^b (= \frac{1}{1+r^s+\tau})$  is the price of a bond with zero default probability.

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

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

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

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

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

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

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<sup>12</sup>The realizations of the transitory shock  $\eta$  and the expense shock  $\kappa$  do not contain any additional information on the default risk.

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:

$$V_j(d, z, \eta, \kappa) = \max_{c, d'} \left[ u\left(\frac{c}{n_j}\right) + \beta E \max \{V_{j+1}(d', z', \eta', \kappa'), \bar{V}_{j+1}(z', \eta')\} \right] \quad (3.5)$$

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

$$\bar{V}_j(z, \eta) = u\left(\frac{c}{n_j}\right) - \chi + \beta E \max \{V_{j+1}(0, z', \eta', \kappa'), W_{j+1}(z', \eta', \kappa')\} \quad (3.6)$$

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

$$W_j(z, \eta, \kappa) = u\left(\frac{c}{n_j}\right) - \chi + \beta E \max \{V_{j+1}(d', z', \eta', \kappa'), \bar{V}_{j+1}(z', \eta')\} \quad (3.7)$$

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

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 1995-99, and then run experiments to match 1980-84 data (see Table 2). The description here will be brief since we closely follow Livshits, MacGee, and Tertilt (2006). 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  $\sigma$  equal to 2.<sup>13</sup> Household size measured in equivalence units is taken from Livshits, MacGee, and Tertilt (2006).

<sup>13</sup>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. 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 productivity of an age 1 households is drawn from the stationary distribution. When discretizing the transitory shock, we assume that 10% of the population receives a positive (negative) transitory shock each period, and choose the value of the support to match the variance.

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 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%, which is the average real return on municipal bonds for the U.S reported by [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  $\chi$ , the fixed cost  $\phi$ , and the fraction of consumption lost  $\lambda$  — are set to 0 in the benchmark economy.

The three remaining parameters — the garnishment rate  $\gamma$ , transaction cost  $\tau$ , and the interest rate ceiling  $\bar{r}$  — are chosen to match the facts from [Table 2](#) for 1995-1999. This leads to a  $\gamma$  of 0.319. 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 90% annually. While this value exceeds the current official interest rate ceilings, there are many ways to (partially) get around the official legal ceilings.<sup>14</sup> 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 to repaying them), which leads to artificially high average interest rates.

## 4 Quantitative Evaluation of Different Stories

We now 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 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 first subsection focuses on uncertainty based stories, while the second subsection examines credit market based stories. In [Section 5](#), we ask whether a combination of these stories can account for all key facts simultaneously.

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<sup>14</sup>Ceilings vary by state from 0 to 30 percent: See <http://www.lectlaw.com/files/ban02.htm>.



## 4.1 Did Increased Uncertainty Generate the Rise?

Surveys of bankrupts find that most bankruptcies are triggered by negative shocks to earnings or unexpected “expenses”.<sup>15</sup> An increase in the probability or size of these adverse shocks could potentially play an important role in accounting for the rise in filings. Similarly, it has been argued that increased income uncertainty plays a role in the rise of consumer bankruptcies (Warren and Warren Tyagi (2003)). In this section, we document the extent to which uncertainty has changed over the last two decades and use our model to assess the quantitative importance of increased earnings uncertainty and increased “expense” risks. We also argue that demographic changes are unlikely to have played a large role in the rise.

### 4.1.1 “Expense Shocks”

Before assessing the extent to which expense uncertainty has changed in the data, we use our model to ask how large a decrease 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, which is counterfactual. Eliminating the large expense shock instead has a much smaller impact, decreasing bankruptcies to 0.75% (see experiment 3).

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. However, increased expense uncertainty may have contributed to the rise in bankruptcy in combination with other factors. To assess the contribution of increased expense uncertainty we need to estimate the change in expense uncertainty over the last two decades.

#### *Medical Shocks*

Health care spending has been increasing rapidly in most developed countries. In the U.S. total health expenditures have increased from \$247 billion in 1980 to \$1,149 billion in 1998. Relevant for this paper are medical costs born directly by households, net of insurance premia.<sup>16</sup> Real out-of-pocket (oop) payments per households have

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<sup>15</sup>See for example Sullivan, Warren, and Westbrook (2000), Figure 1.2.

<sup>16</sup>Insurance premia are regular payments and are hardly unexpected.

**Table 3: Changes in Expense Uncertainty**

	Experiment	Ch. 7 Filings	Avg. $r^b$	Charge-off Rate	Debt Earnings
1	Benchmark	0.83%	12.05 %	5.4%	9.20%
	U.S. 1995-99	0.83%	10.93 - 12.84%	4.6%	9%
	U.S. 1980-84	0.25%	10.95 - 12.05%	1.9%	5%
2	no small shock	0.25%	8.20%	2.04%	9.77%
3	no large shock	0.75%	11.88%	5.2%	9.21%
4	15% decrease	0.73%	11.48%	4.9%	9.27%

increased from \$1,477 in 1980 to \$1,946 in 1998, a 32% increase.<sup>17</sup> 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.<sup>18</sup> This leads us to believe that rather than individuals paying higher amounts in 1998 compared to 1980, there are *more people* with large out-of-pocket expenditures. Furthermore, (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 filing rate could come through this channel.<sup>19</sup> Based on the result of the experiment 4 in Table 3, we conclude that the increase in medical shocks accounts for less than 20 percent of the increase in consumer bankruptcies, and cannot account for the increase in consumer debt. Given that defaults do not change much, it is not surprising that this experiment cannot replicate the large increase in charge-offs either.

The comparison with Canada casts further doubt on changes in medical uncertainty

<sup>17</sup>These numbers are from the U.S. Statistical Abstracts (2000), Table 151. The increase in oop expenditures reported by [Center for Medicare and Medicaid Services \(2005\)](#) is even lower, so we interpret our numbers as an upper bound.

<sup>18</sup>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.

<sup>19</sup>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).

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 expenses related to family are divorces and unplanned pregnancies.

Has uncertainty regarding these family events gone up and is this responsible for the increase in bankruptcies? We find that the answer to the first question is no. 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 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 divorce rates has declined, from 5.2 per 1,000 population in 1980 to 4.3 in 1998. The fact that divorce rates have stopped rising in the last two decades of the 20th century is well-documented in the literature (e.g. [Goldstein \(1999\)](#)).<sup>20</sup> 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 seems to imply that, if there was any change at all, “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.

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<sup>20</sup>[Goldstein \(1999\)](#) also shows that the decrease in the divorce rate is not simply driven by the rise of cohabitation and the higher break-up rates for cohabiting couples.

**Table 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.

#### 4.1.2 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 become slightly flatter 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 households (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).<sup>21</sup>

The second change is the dramatic rise in the share of bankruptcies filed by women.<sup>22</sup> 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 has increased substantially during the last two decades, it seems plausible that these demographic changes are in part responsible for the trend in bankruptcies.

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

<sup>21</sup>These filing rates are slightly different from the ones we use in the paper as they include Chapter 13 filings.

<sup>22</sup>See [Sullivan and Warren \(1999\)](#) and [Pollak \(1997\)](#).

**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 \(2000\)](#)

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.<sup>23</sup>

### 4.1.3 Income Uncertainty

There is a broad consensus that the variance of log earnings has increased in the U.S. from the late 70s to the early 90s and then decreased substantially again by the mid 90s ([Moffitt and Gottschalf \(2002\)](#), [Meghir and Pistaferri \(2004\)](#), [Blundell, Pistaferri, and Preston \(2005\)](#)). For example, [Moffitt and Gottschalf \(2002\)](#) 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.

As we know from the analysis in [Livshits, MacGee, and Tertilt \(2006\)](#), persistent and transitory income shocks have very different implications for bankruptcy filings. There is, however, much less consensus about the relative importance of the permanent, persistent, and transitory components in accounting for the increased variance of log earnings. [Moffitt and Gottschalf \(2002\)](#) 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, leveled 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

<sup>23</sup>One caveat is in order here. We cannot rule out a combination of more singles together with increased uncertainty particularly for singles.

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](#).

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

	Experiment	$\sigma_{\eta}^2$	$\sigma_{\epsilon}^2$	Ch. 7 Filings	Avg. $r^b$	Charge-off Rate	Debt / Earnings
	Benchmark	0.05	0.025	0.83%	12.05%	5.4%	9.20%
	U.S. 1995-99			0.83%	10.93-12.84%	4.6%	9%
	U.S. 1980-84			0.25%	10.95-12.05%	1.9%	5%
1	Transitory 1	<b>0.0375</b>	0.025	0.838%	11.66%	5.1%	9.79%
2	Transitory 2	<b>0</b>	0.025	0.831%	9.31%	3.0%	12.26%
3	Persistent 1	0.05	<b>0.01</b>	0.802%	8.85%	2.6%	14.88%
4	Persistent 2	0.05	0.004	0.783%	7.53%	1.4%	20.88%
5	Persistent 3	0.05	<b>0</b>	0.676%	6.99%	0.9%	27.48%
6	$\rho = 0.98$	0.05	0.025	0.939%	17.28%	9.6%	4.82%
7	$\rho = 0.98$	0.05	0.01	0.851%	8.81%	2.6%	10.58%
8	No inc. risk	<b>0</b>	<b>0</b>	1.182%	7.26%	1.2%	51.01%

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 the filings. Experiment 2 illustrates that even shutting down transitory income shocks completely does not change the number of filings. This strongly suggests that a change in transitory income uncertainty cannot be a driving force behind the increase in bankruptcy filings.

In experiment 3, we lower the variance of the persistent shocks by 60% (corresponding to a 2.5-fold increase over the two decades). This decline in the variance decreases the filings to 0.802%, 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 completely only reduces filings to 0.68%, while driving the debt-income ratio up to 27.5 percent. Thus, changes in the variance of persistent income shocks cannot quantitatively account for the rise in filings, and generate 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 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.

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 [Appendix C](#).



## 4.2 Changes in the Consumer Credit Markets Environment

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

### 4.2.1 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)).<sup>24</sup> 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,  $\chi$ . Although this most closely captures the idea of a decline in social “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

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<sup>24</sup>This explanation is also common among non academics. For example, Alan Greenspan argued that “Personal bankruptcies are soaring because Americans have lost their sense of shame.”

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. 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.

It is important to point out one caveat. 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.

#### *The 1978 Amendments to Bankruptcy Law*

One potential explanation for a decrease in the cost of bankruptcy is legal reform. Indeed, 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 also coincided with a 1977 U.S. Supreme Court decision which removed restrictions on advertising by lawyers, which may have reduced the cost of acquiring information about bankruptcy

**Table 8: Changes in Credit Market Environment**

	<b>Experiment</b>	Ch. 7 Filings	Avg. $r^b$	Charge-off Rate	Debt Earnings
1	Benchmark	0.83%	12.05 %	5.4%	9.20%
	U.S. 1995-99	0.83%	10.93 - 12.84%	4.6%	9%
	U.S. 1980-84	0.25%	10.95 - 12.05%	1.9%	5%
2a	Stigma ( $\chi$ ) $\uparrow$	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	$\bar{r} = 10\%$	0.68%	7.48 %	1.38%	9.12%
3b	$\bar{r} = 8\%$	0.66%	7.43%	1.33%	8.99%
3c	$\bar{r} = 7\%$	0.54%	6.77%	0.72%	1.12%
4a	$\tau = 3.56\%$	0.81%	14.61%	6.64%	7.65%
4b	$\tau = 4.56\%$	0.79%	16.99%	7.67%	6.33%
4c	$\tau = 5.56\%$	0.78%	19.24%	8.59%	5.26%

(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 of the rise in filings. There are also three additional reasons that cast doubt on the importance of legal changes as an explanation of the rise in filings. First, as Moss and Johnson (1999) point out, the U.S. reforms were relatively minor. 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 for the rise in consumer bankruptcies. Finally, there were no changes to the bankruptcy law in Canada in the 1980s and early 1990s, during which filings rates increased dramatically in a similar fashion to the United States.<sup>25</sup>

<sup>25</sup>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 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)).

### 4.2.2 Usury Laws

Until the late 1970's, most states imposed (tight) ceilings on nominal interest rates for consumer loans. These laws were substantially relaxed in the early 1980s as a result of the Supreme court decision involving *Marquette National Bank of Minneapolis v. First Omaha Service Corporation*, 439 US 299 (1978) which permitted banks in Nebraska to offer loans to residents of Minnesota at rates in excess of the maximum allowed under Minnesota legislation. This ruling effectively removed the ability of individual states to regulate interest rates of lenders located in other states. Subsequently, large credit card issuers relocated to states (notably Delaware and North 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 relaxation of interest rate ceilings contributed to the rise in bankruptcy by facilitating the expansion of credit to riskier borrowers.

We conduct numerical experiments to analyze the implications of this story for bankruptcies and consumer borrowing. We report the results in [Table 8](#) for three alternative ceilings, all of which lie below the average borrowing interest rate in the benchmark economy and above the risk-free lending rate of 6% (experiments 3a-3c). Even a very tight interest rate ceiling of 7% can account for only about 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). The lower level of 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 income and expense shocks. This in turn pushes some households who would not have defaulted in the absence of the low interest rate ceiling to default. This limits the effect of interest rate ceilings on defaults.

The numerical experiments indicate that the interest rate deregulation story is not consistent with the other credit market facts. While a relaxation of the ceiling is consistent with a rise in the debt-income ratio, it also implies a substantial increase in the average borrowing interest rates. In the data, however, there appears to be little change in the average borrowing interest rate.

There are two additional observations which cast some doubt on the importance of usury laws. First, as pointed out by [Ellis \(1998\)](#), Canada has also experienced a rapid rise in consumer bankruptcies but did not experience a deregulation of credit markets around the same time.<sup>26</sup> Second, it is unclear whether interest rate ceilings were effectively binding in the United States. [Peterson \(1983\)](#) argues that one way around interest rate ceilings is for the seller of a good to sell at a higher price on credit. He examines data from 1979 for four states with different interest rate ceilings, and finds that the state with the lowest ceiling (Arkansas) had a higher share of installment credit offered directly by retailers than borrowers in the other states. This argument is consistent with the observed shift of credit away from store based to general purpose lending after the removal of interest rate ceilings.

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

### 4.2.3 Decline in Lending Costs

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

We report the results for three experiments in rows 4a-4c in [Table 8](#). Experiments 4a, 4b, 4c involve an increase in the transaction cost of lending of one, two, and three percentage points, respectively. Surprisingly, none of these changes have a significant effect on filings. However, variations in the transaction cost of lending have a large effect upon the average borrowing interest rate, the charge-off rate, and aggregate borrowing. For all three experiments, the increase in average borrowing interest rates exceeds the increase in the risk-free borrowing interest rate. This is

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<sup>26</sup>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 \(2000\)](#)).

due to the fact that lower risk households reduce their borrowing, which leads to an increase in the average risk premium on lending. It is also worth noting that a decrease of roughly three percentage points in the transactions cost is consistent with the observed increase in borrowing.

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

## 5 Can a Combination of Stories Match the Data?

Our conclusion from Section 4 is that none of the stories *individually* can generate a substantial rise in bankruptcy while matching the observed changes in borrowing, the interest rate, and charge-offs. We now analyze whether a combination of stories can match the data.

The combination we choose is guided by our earlier results, and is a combination of both uncertainty and credit market stories. We incorporate two uncertainty stories: an increase in expense uncertainty and an increase in transitory income uncertainty. A reasonable upper bound on the change in expense uncertainty is that the probabilities in the early 1980s were roughly 85% of the late 1990s. In our experiment, we thus scale down the benchmark probabilities of expense shocks by 0.85. To capture changes in income volatility, we scale down the variance of the transitory shock by 25% (which is at the upper limit of the values suggested by [Heathcoate, Storesletten, and Violante \(2004\)](#)). Given these changes, we 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.

The results of increasing the stigma cost are reported in the experiment 2 of Table 9. In this experiment, the transaction cost is increased by 4.15% (to 6.71% from 2.56%), while the stigma parameter is set equal to slightly less than half of its value in the stigma only experiment reported in Table 8. This combination experiment 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 1.3% to 5.4% in the model, compared to a slightly lower increase in the data, from 1.9% to 4.6%.

The success of this experiment is driven primarily by two credit market variables: the decline in the cost of bankruptcy and the transaction cost of lending. This can be seen from experiments 3 - 6 of Table 9, where the results of dropping each of the four changes from the stigma combination experiment are reported. These experiments show that the increase in expense and transitory income uncertainty play a small role along all dimensions. The main factor in the rise in filings is the decline in the costs of filing (modelled as stigma in this experiment), which accounts for roughly 75% of the rise in filings. In contrast, the decline in the transaction cost has a very small effect on filings, but counteracts the increase in interest rates and the decline in borrowing predicted by the decline in stigma.

The intuition for this result 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 (compare experiments 2 and 4 in Table 9). 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  $\tau$  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. Together, these forces 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 compared to the experiment without the transactions cost increase.

These experiments reinforce our interpretation of the earlier results that none of the stories can individually account for the rise in bankruptcies. Instead, it leads us to conclude that a combination of these types of credit market changes is largely responsible for the rise in filings: Credit market innovations have both made bankruptcy more attractive and reduced the cost of lending.

Experiments 7 and 8 of Table 9 report the results for the two alternative bankruptcy costs: burning and the fixed costs of filing. As in section 4.2.1, 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

**Table 9: Combination of Stories**

	<b>Experiment</b>	Ch. 7 Filings	Avg. $r^b$	Charge-off Rate	Debt <u>Earnings</u>
1	Benchmark	0.83%	12.05 %	5.4%	9.20%
	U.S. 1995-99	0.83%	10.93 - 12.84%	4.6%	9%
	U.S. 1980-84	0.25%	10.95 - 12.05%	1.9%	5.0%
2	Stigma, all, see text	0.25%	11.66%	1.3%	5.05%
3	No $\Delta$ Expense	0.30%	11.856%	1.4%	4.99%
4	No $\Delta$ Stigma	0.64%	19.37%	7.6%	4.22%
5	No $\Delta$ $\tau$	0.31%	7.06%	1.0%	13.64%
6	No $\Delta$ Trans. Income	0.26%	11.71 %	1.2%	4.89%
7	Burn, all, see text	0.25%	11.38%	1.1%	5.20%
8	Fixed Cost, all, see text	0.25%	11.42%	1.05%	5.02%

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.

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  $\tau$ ) 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.<sup>27</sup> This suggests that the credit market changes explored

<sup>27</sup>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



in our paper could have played a significant role in the reduction of savings observed in the U.S.

## 6 Conclusion

In this paper, we quantitatively evaluate the extent to which the six most commonly offered explanations of the rise in bankruptcies can account for the rise in filings, the observed increase in unsecured consumer debt relative to disposable income, the lack of change in average borrowing interest rates, and the rise in charge-off rates. Our first finding is a negative one. Our results suggest that none of the stories we consider can *individually* account for the rise in consumer bankruptcies and changes in credit markets. Our second finding is a positive one. A combination of four of these stories does a very good job of accounting for the key facts. Our experiments suggest that the most important of these factors are related to changes in credit markets. Indeed, our paper suggests that a reduction in the cost (the “stigma”?) of bankruptcy and a reduction in the transactions cost of lending play 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 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 debtors “type,” bankruptcy is an important signal to the creditor 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

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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](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](http://www.gpoaccess.gov/usbudget/fy01/sheets/b_31.xls).

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.



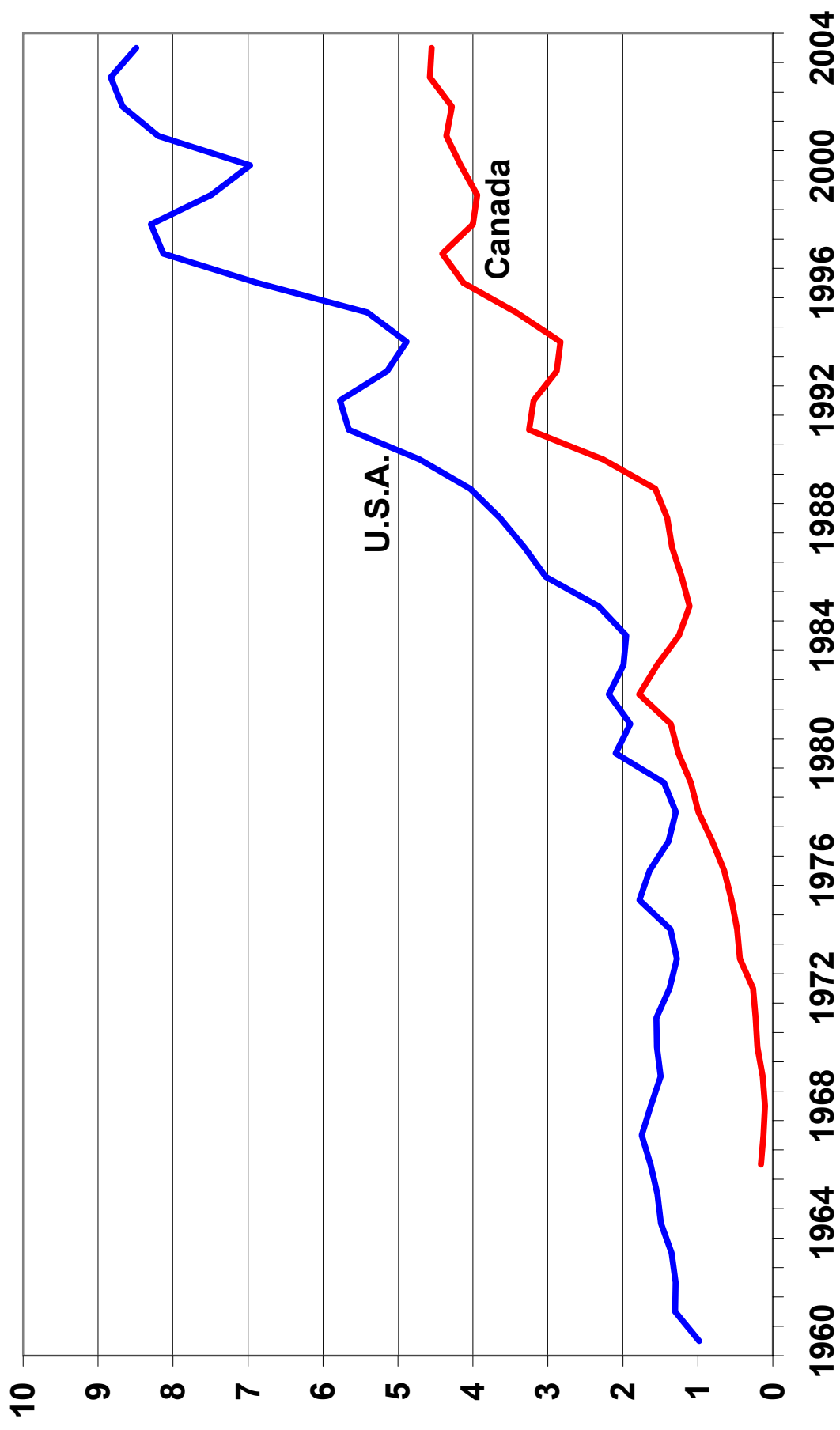
## C More on Income Uncertainty

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 a 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 the variance of the transitory shocks by a factor of 30 does deliver the desired increase in bankruptcy rates, but implies an interest rate as high as 60%. The variance of the persistent shock has to be increased 7.5-fold to get the bankruptcy rate to increase to the late 90’s level. This “success” has the debt level collapsing to 0.55% and the average interest rate exceeding 37%.

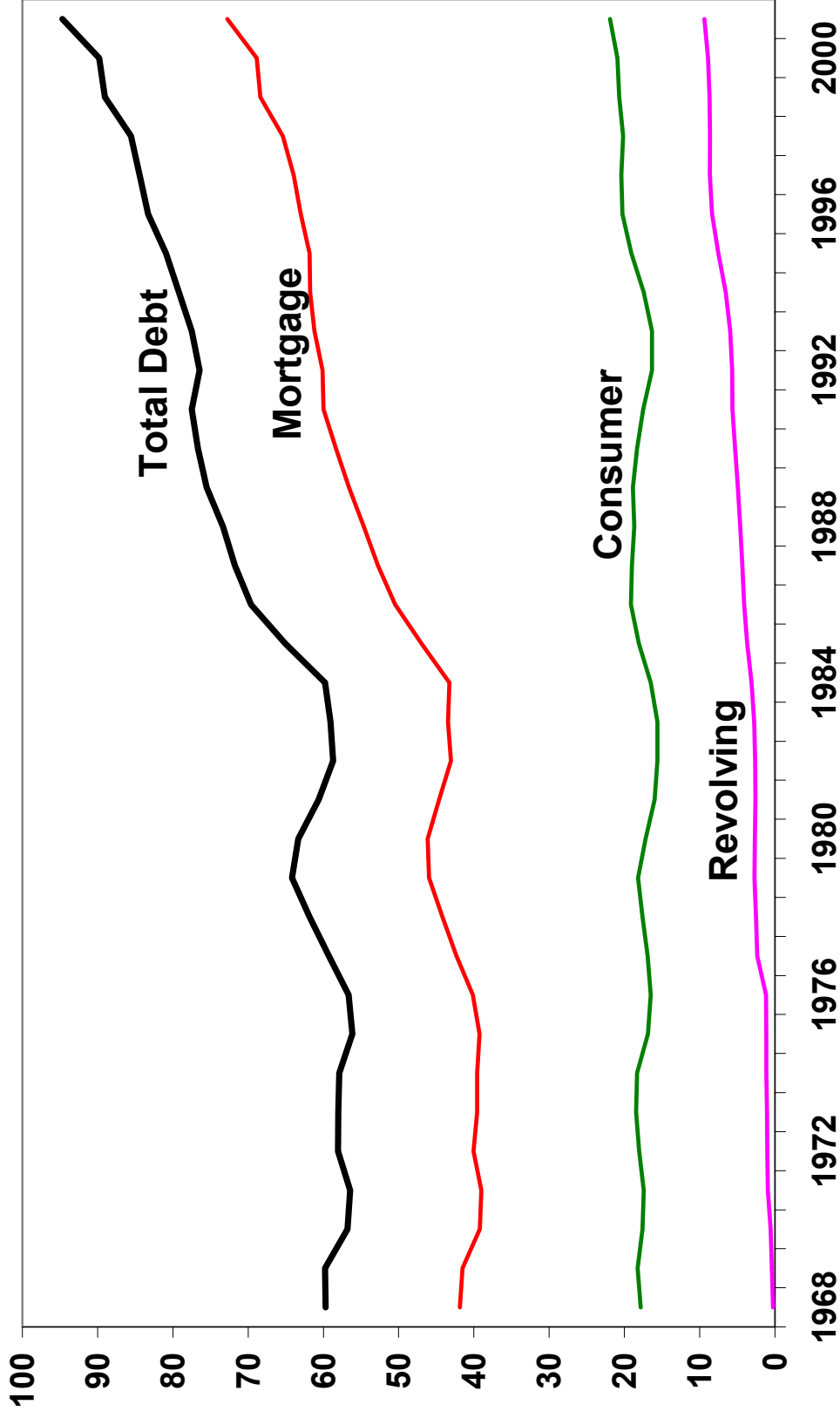
**Table 10: Changes in Income Uncertainty (1980 Benchmark)**

	Experiment	$\sigma_{\eta}^2$	$\sigma_{\epsilon}^2$	Ch. 7 Filings	Avg. $r^b$	Charge-off Rate	Debt $\overline{\text{Earnings}}$
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%	4.6%	9%
2	Transitory 1	<b>0.05</b>	0.025	0.259%	11.46%	1.17%	4.86%
3	Transitory 2	<b>1.13</b>	0.025	0.83%	59.68%	31.0%	2.61%
4	Persistent 1	0.0375	<b>0.05</b>	0.37%	11.94%	1.6%	3.01%
5	Persistent 2	0.0375	<b>0.183</b>	0.83%	37.5%	19.8%	0.55%

**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**

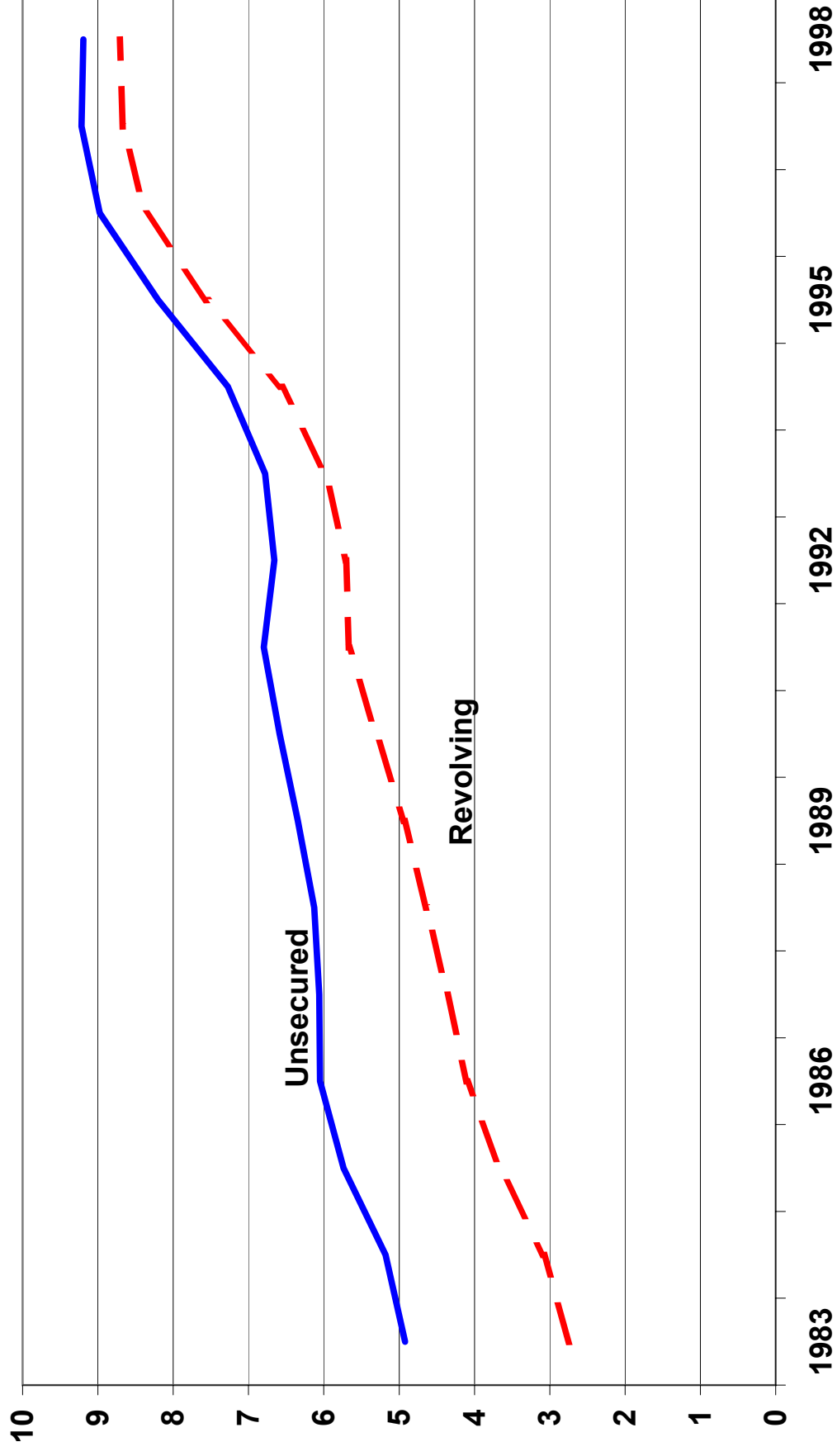
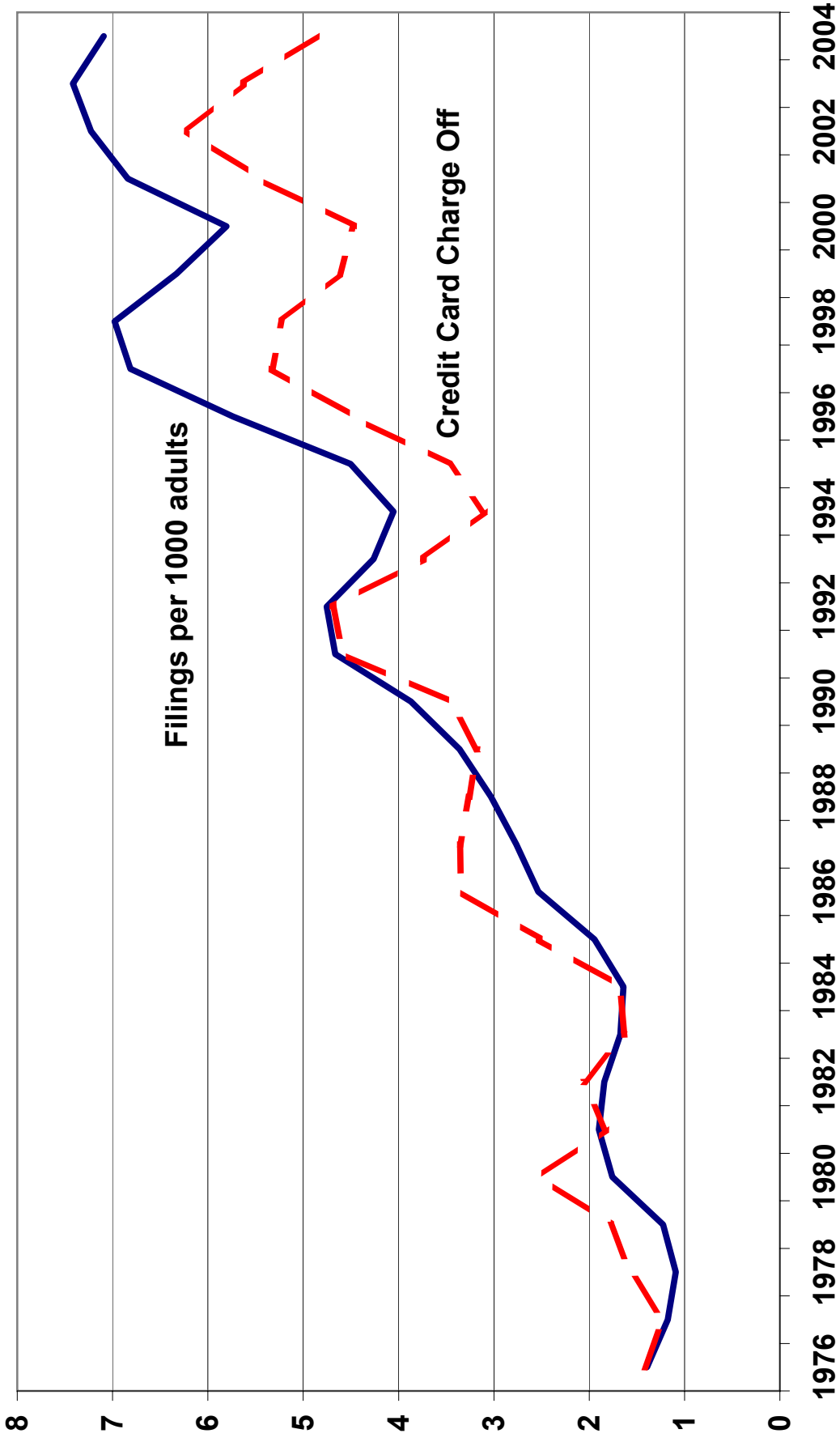
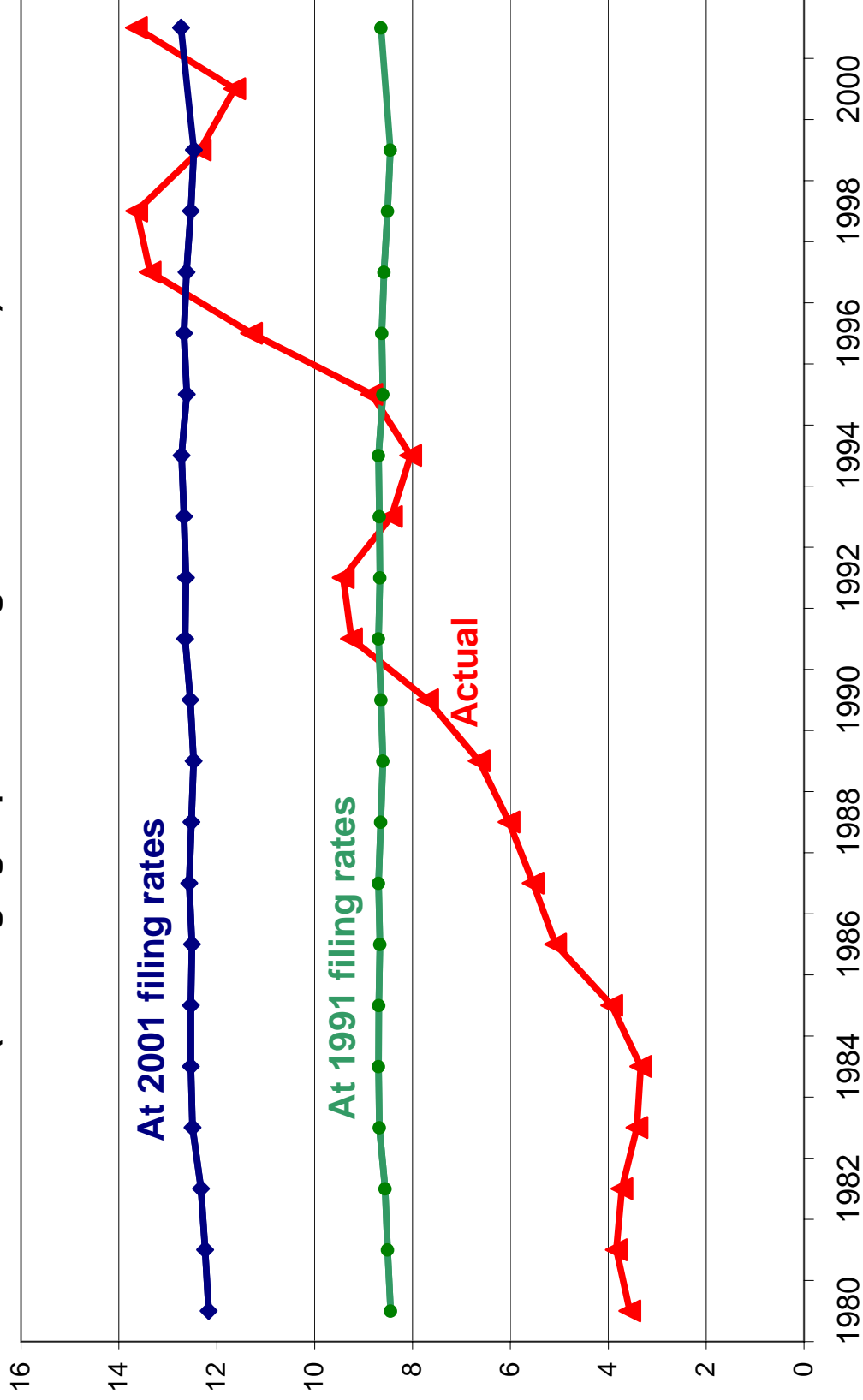


Figure 4: Chapter 7 Filings & Credit Card Charge Off Rates, %



**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)**

