Accounting for the Rise in Consumer Bankruptcies∗

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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, 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 account 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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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.

We consider six potential explanations of the increase in bankruptcies. One possible story is that an increase in household income risk led to more households experiencing financial trouble (Barron, Elliehausen, and Staten (2000)). The second story we consider is that idiosyncratic expense risk (due to increased medical bills, for example) has increased, thus increasing the number of households in financial trouble (Warren and Warren Tyagi (2003)). Third, compositional changes in the population (e.g. the passing of the baby-boomers through the prime bankruptcy ages and changing family structure) may have lead to an increase in the number of risky households (Sullivan, Warren, and Westbrook (2000)). The fourth story we consider, which is likely the most commonly cited explanation, 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)). Fifth, 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)), potentially leading to more defaults. The final story we consider 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)).

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 based on the competitive theory of equilibrium default introduced by Chatterjee, Corbae, Nakajima, and Ríos-Rull (2007). The model is a heterogenous 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. 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.

Our findings suggest that increased uncertainty faced by consumers plays 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.

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1 While some people have advocated behavioral reasons for consumer bankruptcy (see Laibson, Tobacman, and Repetto (2003)), 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.
The main reason is that increased uncertainty leads to an increase in precautionary savings, or conversely, a decrease in total debt. In other words, people self-insure to counter the increased risk they face and hence bankruptcy does not increase in equilibrium. 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. Thus, 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.

On the other hand, we find that changes in credit markets appear to be the primary factor driving the increase in bankruptcies. Specifically, within the context of our model, we find that a decline in the cost of filing for bankruptcy together with a decline in the transactions cost of lending matches the U.S. experience well. The intuition is straightforward. A reduction in the cost of default makes bankruptcy more attractive, which increases the expected probability of default for a given level of debt. If this were the only change, one would expect a reduction in the level of debt outstanding as lenders responded with higher interest rates for any given level of borrowing. An improvement in lending efficiency works to offset this effect by making borrowing more attractive, and also makes spreading debt repayment over longer periods less costly which works in equilibrium to make default less attractive. As a result, these two channels can generate an increase in bankruptcies, charge-off rates, and debt that matches the U.S. data. Given that we view these channels as useful reduced form proxies for credit markets changes, this suggests that a promising avenue for future research to model technological change in financial markets in more detail. One particularly interesting form of technological change are improvements in information technology which may have improved the capacity of credit card companies to assess risk.

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.

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3 A recent paper in this spirit is Drozd and Nosal (2008) who model the process by which credit card companies find customers explicitly.

4 Indeed, several recent papers explore this avenue: Narajabad (2008), Athreya, Tam, and Young (2008), Sanchez (2008), and Livshits, MacGee, and Tertilt (2008). Also, Chatterjee, Corbae, and Rios-Rull (2008) provide an explicit model of credit scoring, but do not analyze technological changes over time.
analyzed in this paper. However, neither of these papers considers changes in income or expense uncertainty. The papers also differ substantially in what is meant with changes in the credit sector. 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. 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 model and because we allow for “expense” shocks in addition to income uncertainty.

A key difference between this paper and the previous literature on equilibrium models of consumer bankruptcy is that the emphasis in this paper is on quantitatively evaluating alternative mechanisms which could account for the dramatic changes over time rather than exploring the implications of alternative bankruptcy rules. To accomplish this goal, this paper extends the model of Livshits, MacGee, and Tertilt (2007) to incorporate binding usury regimes (maximum interest rate restrictions) as well as extending the costs of default to include the possibility of fixed costs, proportional burning and utility costs.

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, 5 and 6 present our results, and Section 7 concludes.

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

2 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.\(^7\) 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.\(^8\) 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

\(^7\)See Mecham (2004) for a detailed description of consumer bankruptcy law in the United States.

\(^8\)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.)
similar to the typical bankrupt of twenty years ago (Sullivan, Warren, and Westbrook (2000), Warren (2002)). A typical bankrupt is lower middle-class (with income roughly 30-50% lower than that of the average household), in their thirties with an extremely high debt-to-income ratio. 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 report 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.

The first four rows in Table 1 summarize data from two surveys of Chapter 7 and Chapter 13 filers conducted by Sullivan, Warren, and Westbrook (2000). 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. These studies also suggest that the debt-to-income ratios of bankrupts have increased while the average real income of the typical bankrupt has not changed 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 in the Ohio and Utah studies were lower.

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.

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 use these facts to evaluate the stories.

Since our model will abstract from durable goods, the relevant bankruptcies in
Table 1: Liabilities and Assets of Bankrupts in the U.S. (1997$)

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

* 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 (2003). A description of the samples used in these studies can be found in the web appendix.

Table 2: Key Observations

<table>
<thead>
<tr>
<th>Fact</th>
<th>1980-84</th>
<th>1995-99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 7 filings</td>
<td>0.25%</td>
<td>0.83%</td>
</tr>
<tr>
<td>Average borrowing interest rate</td>
<td>10.95 – 12.05%</td>
<td>10.93 – 12.84%</td>
</tr>
<tr>
<td>Debt/Income</td>
<td>5%</td>
<td>9%</td>
</tr>
<tr>
<td>Charge-off rate</td>
<td>1.9%</td>
<td>4.8%</td>
</tr>
</tbody>
</table>

the data are non-business Chapter 7 filings. 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

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9The 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.
focus on Chapter 7 filings, the relevant target for our model is unsecured debt.\textsuperscript{10} 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 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 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. Thus total debt as a fraction of personal disposable income has increased from roughly 5\% in the early 1980s to about 9\% for the late 1990s.

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\% (personal loans) and 13\% (credit cards). Somewhat surprisingly, there is little change in these interest rates over time.\textsuperscript{11}

The small change in real borrowing interest rates is even more surprising given

\textsuperscript{10}We focus our attention on the stock of unsecured credit rather than household net worth for three reasons. First, many household assets are (partially) exempt and hence net worth underestimates the value of consumer debt that could be discharged in Chapter 7. Secondly, it is costly to seize assets, so that even when assets are not technically exempt, from a creditors’s perspective the value of debt that is unsecured is larger than a net worth measure would indicate. Finally, many people have argued that credit card debt is underreported in the SCF (which is the most common source of household net worth data) by as much as 50\%. We thus use actual data on unsecured credit instead. We discuss this in more detail in a separate online appendix.

\textsuperscript{11}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.
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.\footnote{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.} 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).\footnote{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.} 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 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 (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.\footnote{As this paper focuses on the market for unsecured debt (which comprises a small fraction of total borrowing in the United States), significant feedback effects on the aggregate risk-free interest rate seem unlikely. Given the significant computational burden associated with closing the model, we assume that the aggregate capital market takes the form of a small open economy.} Households have the option to declare bankruptcy.
Households
Household maximize expected discounted life-time utility from consumption:

\[
E \sum_{j=1}^{J} \beta^{j-1} u \left( \frac{c_j}{n_j} \right)
\]  
(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:

\[
y^i_j = \bar{\tau}_j z^i_j \eta^i_j,
\]  
(3.2)

where \( \bar{\tau}_j \) is the deterministic endowment of efficiency units of labor, \( z^i_j \) is a persistent shock to the household’s earnings, and \( \eta^i_j \) 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. 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, bankruptcy cannot be declared two periods in a row. 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. Second, to capture the requirement that borrowers make a good faith effort to repay their debt, we force bankrupt households to repay a fraction \( \gamma \) of their earnings during the period in which they file. Since we lack a direct measure of

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15 This means that bankrupts cannot save or borrow during the default period because all assets are seized during a Chapter 7 bankruptcy. Given our period length of three years, one might wonder if the restriction to not allow savings constitutes a significant punishment. It turns out that the no-savings constraint is binding only for a very small fraction of households and that results do not change significantly when this assumption is relaxed.

16 The U.S. bankruptcy code specifies that borrowers must act in “good faith”, so that someone who borrows and immediately files for bankruptcy risks having their petition denied. Prior to 1984, courts had the implicit right to dismiss a case based on “bad faith” behavior 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
these implicit constraints on bankruptcy, we calibrate this bankruptcy cost parameter so as to match the debt facts.

In our quantitative experiments we evaluate explanations which feature a decline in the cost of bankruptcy. To do this we consider three costs: a utility cost of filing, $\chi$, the “burning” of a fraction $\lambda$ of filers’ consumption during the bankruptcy period, and a fixed cost of filing, $\phi$.\(^{17}\)

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 $\gamma$ (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 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, $\tau$.

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 $j$. 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 intermed-

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\(^{17}\)As we will see later, the quantitative effects of changes in each of these three costs are almost identical. We include all three to show that our results are robust to the details of the specification.
aries 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 \( q^b(d', z, j) = (1 - \theta(d', z, j))\bar{q}^b \), where \( \bar{q}^b = \frac{1}{1 + r^t + \bar{r}} \) 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

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

(3.3)

where \( E\left(\frac{\gamma y'}{d' + \kappa'}\right) \) 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

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

(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, households have the option to default when they are ineligible for bankruptcy.\(^{18} \)

If a household chooses this option, they face the same proportional costs as if they were able to file for bankruptcy. However, unlike in bankruptcy, no debt is discharged. Given that households in default no longer are borrowing from the market, we assume their debt is rolled over at a fixed interest rate \( r^\kappa \). Note that the only debt such a household holds is debt arising from an expense shock. After the forced repayments and applying interest rate \( r^\kappa \), next period’s debt for this case is equal to \((\kappa - \gamma \bar{e}_j z \eta)(1 + r^\kappa)\). The value function for a household defaulting in the period following bankruptcy is denoted by \( W \). The value functions are given by:

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

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

(3.5)

\(^{18}\)We need to introduce this option to deal with the possibility that a household may not be able to repay the realized value of an expense shock in the period immediately following bankruptcy. In practice, this is not of much importance in the model since this situation rarely arises.
\[ V_j(z, \eta) = u \left( \frac{c}{n_j} \right) - \chi + \beta E \max \{ V_{j+1}(0, z', \eta', \kappa'), W_{j+1}(z', \eta', \kappa') \} \]
\[ \text{s.t. } c = (1 - \lambda)(1 - \gamma)(\bar{e}_j z \eta - \phi) \quad (3.6) \]

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

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 \( u(c) = c^{1-\sigma} - \frac{1}{1-\sigma} \). We set the annual discount factor equal to 0.94 and the degree of risk aversion \( \sigma \) equal to 2.\(^{19}\) Household size measured in equivalence units is taken from Livshits, MacGee, and Tertilt (2007).

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...

\(^{19}\)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.
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 out of pocket medical expenses in 1996 and 1997 for a random sample of 19,859 persons (7,435 households).\(^{20}\) We combine our estimate of these medical expense shocks with estimates of the cost of divorces and 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.\(^{21}\) 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: \( \log y^i = z^i + \eta^i + g(X^i) \), where \( g(X) \) captures the deterministic component of earnings, and \( z, \eta \sim N(0, \sigma^2) \) are respectively persistent and transitory random components. The log of the persistent idiosyncratic shock follows an AR(1) process, \( z^i_j = \rho z^i_{j-1} + \epsilon^i_j, \) where \( \epsilon^i_j \sim N(0, \sigma^2) \). We set the benchmark annual value of \( \rho = 0.95, \sigma^2 = 0.025 \) and \( \sigma^2 = 0.05 \). 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 average replacement rate of 55%, which is within the range of numbers reported in

\(^{20}\)Medical bills paid for by Medicare, Medicaid and private health insurance plans are not part of our measure of shocks. Expense shocks are constructed exclusively based on out-of-pocket medical expenditures.

\(^{21}\)Newly-born and retired households are not subject to expense shocks.
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 $r^*$ 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 debt recovery 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 transactions cost of making loans of 2.56% annually. Together with the risk-free savings rate of 3.44%, the annual risk-free lending rate is 6%. 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 official legal ceilings. 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.

The $\gamma$ implied by this calibration is 0.319. It is worth emphasizing that this parameter captures many features of the default option introduced by bankruptcy, and that we do not interpret $\gamma$ as mapping directly into what is recovered by lenders after a borrower has defaulted. Instead, this is intended to capture the fact that borrowers typically make a sequence of payments on unsecured debt before defaulting (in part to satisfy good faith requirements as discussed in footnote 16). This feature is especially important in our model where, due to computational limitations, each model period corresponds to three years. While the lack of a direct empirical counterpart makes it difficult to directly determine whether the number implied by our calibration is high (or low), it is worth noting that this value allows us to match key features of the data. A substantially lower $\gamma$ would lead to a much lower level of debt, higher average borrowing interest rates, higher charge-off rate (since less debt would be recovered), and higher defaults. For example, if one decreases $\gamma$ by half (holding all of the other parameters fixed), defaults roughly double, debt decreases by roughly two-thirds and interest rates nearly triple.

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22Ceilings vary by state from 8 to 30 percent: See http://www.lectlaw.com/files/ban02.htm.
3.3 Quantitative Evaluation of Proposed Explanations

We use the quantitative model to evaluate the various stories for the increase in bankruptcies proposed in the literature. In addition to matching the aggregate facts, this model also does a good job of matching the life cycle profile of bankruptcies and consumption (see Livshits, MacGee, and Tertilt (2007)). 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 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”. 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. 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)

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23 In principle, one could also use changes in life cycle profiles (of consumption, debt, defaults, etc.) to evaluate the stories. Unfortunately, only limited data on such changes exists. As data provided by Sullivan, Thorne, and Warren (2001) show, the shape of the life cycle profile of defaults has changed very little between 1991 and 2001. Instead, the entire profile has shifted upward. This is consistent with the results of our numerical experiments.

24 See for example Sullivan, Warren, and Westbrook (2000), Figure 1.2.

25 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.
conclusion is that changes in uncertainty cannot account for the rise in consumer bankruptcies.

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).

Experiments 2 and 3 suggest that an increase in expense shocks alone cannot explain the U.S. experience from 1980 to 2000, as it counterfactually 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. To assess the contribution of increased expense uncertainty we need to estimate the change in expense uncertainty over the last two decades.

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

The data actually suggest that the rate of unwanted pregnancies and divorces has stabilized, if not decreased, since the 1980s (see the appendix on the web). Hence, we focus attention exclusively on changes in medical spending. In the U.S., total
health expenditures have increased from $247 billion in 1980 to $1,149 billion in 1998. Of relevance for this paper are medical costs born directly by households, net of insurance premia. Real out-of-pocket (OOP) payments per households have increased from $1,477 in 1980 to $1,946 in 1998, a 32% increase. However, OOP payments as a fraction of median household income 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. 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 the filing rate could come through this channel. 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 (which has universal health care coverage) casts further doubt on changes in medical uncertainty being the main driving force behind the rise in filings. 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.

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26 Insurance premia are regular payments and are hardly unexpected.
27 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 our numbers are an upper bound.
28 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.
29 This is likely an overestimate, as part of the expense shock is due to family shocks which have changed little over this period.
4.2 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 (2008)). 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 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, 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 (2008) 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.\footnote{Although these estimates are for hourly wages rather than earnings, they still provide a useful estimate for our purposes since Heathcoate, Storesletten, and Violante (2004) decompose the income process into the transitory and persistent components (as well as returns to permanent characteristics). Given that hours and wages are positively correlated, the numbers we use are likely an underestimate of the change in earnings volatility. However, as our experiments show, this bias is likely to be quantitatively unimportant for our findings (see Table 4).}

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 4.

Table 4: Changes in Income Uncertainty (1995-99 Benchmark)

<table>
<thead>
<tr>
<th>Experiment</th>
<th>$\sigma^2_\eta$</th>
<th>$\sigma^2_\epsilon$</th>
<th>Ch. 7 Filings</th>
<th>Avg. $r^b$</th>
<th>Charge-off Rate</th>
<th>Debt Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark</td>
<td>0.05</td>
<td>0.025</td>
<td>0.83%</td>
<td>11.35%</td>
<td>4.9%</td>
<td>9.20%</td>
</tr>
<tr>
<td>U.S. 1995-99</td>
<td></td>
<td></td>
<td>0.83%</td>
<td>10.93-12.84%</td>
<td>4.8%</td>
<td>9%</td>
</tr>
<tr>
<td>U.S. 1980-84</td>
<td></td>
<td></td>
<td>0.25%</td>
<td>10.95-12.05%</td>
<td>1.9%</td>
<td>5%</td>
</tr>
<tr>
<td>1 Transitory 1</td>
<td>0.0375</td>
<td>0.025</td>
<td>0.834%</td>
<td>10.29%</td>
<td>3.9%</td>
<td>9.79%</td>
</tr>
<tr>
<td>2 Transitory 2</td>
<td>0</td>
<td>0.025</td>
<td>0.830%</td>
<td>8.83%</td>
<td>2.7%</td>
<td>12.25%</td>
</tr>
<tr>
<td>3 Persistent 1</td>
<td>0.05</td>
<td>0.01</td>
<td>0.800%</td>
<td>8.26%</td>
<td>2.1%</td>
<td>14.87%</td>
</tr>
<tr>
<td>4 Persistent 2</td>
<td>0.05</td>
<td>0.004</td>
<td>0.781%</td>
<td>7.39%</td>
<td>1.4%</td>
<td>20.88%</td>
</tr>
<tr>
<td>5 Persistent 3</td>
<td>0.05</td>
<td>0</td>
<td>0.676%</td>
<td>6.99%</td>
<td>1.0%</td>
<td>27.48%</td>
</tr>
<tr>
<td>6 $\rho = 0.98$</td>
<td>0.05</td>
<td>0.025</td>
<td>0.934%</td>
<td>15.48%</td>
<td>8.3%</td>
<td>4.82%</td>
</tr>
<tr>
<td>7 $\rho = 0.98$</td>
<td>0.05</td>
<td>0.01</td>
<td>0.847%</td>
<td>8.42%</td>
<td>2.3%</td>
<td>10.58%</td>
</tr>
<tr>
<td>8 No inc. risk</td>
<td>0</td>
<td>0</td>
<td>1.182%</td>
<td>7.26%</td>
<td>1.2%</td>
<td>51.01%</td>
</tr>
</tbody>
</table>

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 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. The main reason here is that consumers offset much of the additional uncertainty they face through increased precautionary savings (i.e. a decrease in debt as seen in the table). Thus, when the variance of shocks increases, consumers do not increase their filings by much, since they can deal with those shocks due to their improved asset position. In the extreme case (Experiment 8), where we shut down all income uncertainty, the large increase in filings is driven by the dramatic rise in household debt resulting from the reduced precautionary saving motive. As a result, expense shocks easily “push people over the edge.”

The recent literature on turbulence (e.g., Kambourov and Manovskii (forthcoming)) suggests that, perhaps, the persistence of income has gone down over the last few decades. Experiments 6 and 7 in Table 4 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 filings and a 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

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31 The precautionary savings effect is significant: Whereas average savings in the benchmark economy are 1.44 times average income, this ratio falls to 1.38 in experiment 1, to 1.21 in experiment 2, to 0.81 in experiment 3, and to 0.38 in experiment 5 in Table 4.
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 the Web Appendix.

4.3 Demographic Changes

Demographic changes, such as the ageing of the baby-boomers or an increase in the number of single households, could change the fraction of households facing high levels of idiosyncratic uncertainty. Our analysis of the data, however, suggests that neither the aging of the baby-boomers nor a decline in the fraction of married households are quantitatively important for explaining the rise in bankruptcy filing rates. The aging baby-boomer story turns out to be relatively unimportant since the changes in the age composition of the population are actually relatively small between 1980 and 2000. While the stock of single households more than tripled, their share of the overall population is still relatively small and their bankruptcy rate is only somewhat higher than the average. As a result, this compositional change in the population only leads to a modest increase in filings (see the web appendix for a more detailed discussion).

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)). 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

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32Berger (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.
have had important implications for consumer credit markets. Bankruptcy reform during the late 1970s may have made bankruptcy more attractive (Shepard (1984)), 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 examine two “reduced-form” channels via which changes in credit markets may have made bankruptcy more attractive and expanded households’ access to credit. 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. 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 driving the rise in bankruptcies.33

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)). 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)).34 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


34This explanation is 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 5. 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. These results also imply that it is very difficult to distinguish between alternative hypothesis based on declines in different types of bankruptcy costs.\textsuperscript{35}

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 the average borrowing interest rate should have significantly increased.\textsuperscript{36} 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

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\textsuperscript{35}One channel along which the form of the decline in the cost of bankruptcy could potentially be distinguished is via their impact on the debt-income ratio of bankrupts. However, the available data on debt-income ratios is very limited and noisy and currently precludes us from further disentangling these channels.

\textsuperscript{36}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.
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 modeling 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 (whether it be a reduction in the social stigma of bankruptcy, filing fees or other costs) by itself is not the whole story.

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Ch. 7 Filings</th>
<th>Avg. ( r^b )</th>
<th>Charge-off Rate</th>
<th>Debt Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Benchmark</td>
<td>0.83%</td>
<td>11.36%</td>
<td>4.8%</td>
<td>9.20%</td>
</tr>
<tr>
<td>U.S. 1995-99</td>
<td>0.83%</td>
<td>10.93 - 12.84%</td>
<td>4.8%</td>
<td>9%</td>
</tr>
<tr>
<td>U.S. 1980-84</td>
<td>0.25%</td>
<td>10.95 - 12.05%</td>
<td>1.9%</td>
<td>5%</td>
</tr>
<tr>
<td>2a Stigma (( \chi )) ↑</td>
<td>0.25%</td>
<td>7.04%</td>
<td>0.97%</td>
<td>14.00%</td>
</tr>
<tr>
<td>2b Burning ↑</td>
<td>0.25%</td>
<td>7.04%</td>
<td>0.98%</td>
<td>14.69%</td>
</tr>
<tr>
<td>2c Fixed cost ↑</td>
<td>0.25%</td>
<td>7.02%</td>
<td>0.95%</td>
<td>12.54%</td>
</tr>
<tr>
<td>3a ( \tau )↑ (( \tau = 4.81% ))</td>
<td>0.79%</td>
<td>15.89%</td>
<td>6.59%</td>
<td>6.00%</td>
</tr>
<tr>
<td>3b ( \tau )↑ (( \tau = 5.81% ))</td>
<td>0.78%</td>
<td>17.97%</td>
<td>7.39%</td>
<td>5.00%</td>
</tr>
<tr>
<td>3c ( \tau )↑ (( \tau = 6.81% ))</td>
<td>0.77%</td>
<td>20.08%</td>
<td>8.19%</td>
<td>4.22%</td>
</tr>
<tr>
<td>4 Stigma (( \chi )) ↑ and (( \tau ))↑</td>
<td>0.25%</td>
<td>11.83%</td>
<td>1.19%</td>
<td>5.02%</td>
</tr>
</tbody>
</table>

### 5.2 Legal Changes

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.\footnote{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)).}

Another potentially relevant legal change was the Supreme Court Marquette decision in 1978 that effectively removed state usury laws. However, we are skeptical that this had a significant direct effect on bankruptcy filings. First, using the model we find that even a very low ceiling of 7\% can only account for roughly half of the rise in filings. However, the removal of interest rate ceilings imply a counterfactual high increase in interest rates (see the web appendix for details). Secondly, Canada 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)). Finally, it is unclear whether interest rate ceilings were effectively binding in the United States (see Peterson (1983)). 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.

5.3 Decline in Lending Costs

Technological progress has had a significant effect on the working of consumer credit markets. One way of capturing important elements of these changes is via a decline in the transactions cost of making loans (the wedge between the safe borrowing rate and the saving rate). We interpret the transactions cost as a reduced form way of capturing many types of technological process in the lending sector, not all of which would show up as a spread between the borrowing and savings interest rates in the data (e.g. fees and other fixed costs of obtaining a loan). There are however, at least three channels which could directly lead to a decline in the wedge. First, the increased use of credit scoring to evaluate loan applicants may have reduced the
costs of processing consumer loans (Mester (1997)). Financial innovations such as securitization lowered the cost of funds (Furletti (2002)), which in our framework translates into a reduced transactions cost. Finally, increased competition in the banking sector may have reduced the lending margins of credit card providers and thus reduced the wedge between the borrowing and lending rate.\textsuperscript{38}

Since we lack a direct measure of the transactions cost of lending, we begin by asking how large a change in $\tau$ is required to match the change in bankruptcy filings. We find that, in our model, variations in $\tau$ (holding all other parameters fixed) have relatively small impacts on defaults rates. As a result, even for large variations in $\tau$ we are unable to come close to matching the change in default rates observed in the data. This result is 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.

Given the small impact on defaults, an alternative approach to accessing the potential impact of changes in the borrowing wedge is to use the model to back out how large a change in $\tau$ is required to reduce total borrowing to the early 80s level (holding all other parameters fixed). The required change in the transactions cost is 3.25\% (i.e. $\tau = 3.25 + 2.56 = 5.81\%$). As can be seen from row 3b in Table 5, while increasing $\tau$ has a very minor effect on filings, it has a large effect upon the average borrowing interest rate, and the charge-off rate. 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. As a robustness check, we also report the results for two other values of the transaction cost of lending centered about 3.25\% (of minus and plus one percentage points) in rows 3a and 3c in Table 5. These two experiments show a similar pattern, with a decrease (increase) in the transaction

\textsuperscript{38}Dick and Lehnert (2007) argue that the removal of barriers to interstate branch banking increased competition between banks.
costs leading to a lower (higher) discharge rate. 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 may have been an important factor in the rise in unsecured borrowing.

Although there are no direct measurements of the transaction costs, the spread between the borrowing and lending rate not accounted for by charge-offs can be used as a proxy to help assess whether or not a large change in the wedge is reasonable. Abstracting from aggregation issues due to borrower heterogeneity, charge-offs in the model are equal to $r - \frac{(r^s + \tau)}{1 + r}$, where $r$ denotes the average borrowing interest rate, $r^s$ is the saving interest rate and $\tau$ is the wedge between the saving rate and the safe borrowing rate. Using this relationship and the data in Table 2, the implied borrowing wedge for the late 1990s is between 2.2 and 4 percent.\footnote{Note that our calibrated $\tau = 2.56\%$ falls into this range.} Using the early 1980s data gives a $\tau$ of between 5.4 and 6.8 percent. The implied decline in the transactions cost is roughly 3 percentage points, which is close to the 3.25% required to match the early 1980s debt level.

One issue worth noting is that this back-of-the-envelope calculation abstracts from the potential impact of changes in interest deductibility following the 1986 tax reform. Prior to 1986, interest rates on unsecured consumer loans were tax deductible. Altig and Davis\footnote{Altig and Davis (1992) calculate that the implied marginal subsidy rate to borrowing was 24.7% in 1980. If one were to take this into account, one would conclude that there was relatively little change in the after-tax cost interest rate faced by borrowers. Incorporating the elimination of the tax subsidy into our back of the envelope calculation, the implied decrease in the effective wedge faced by households is much smaller (roughly 1%).} calculate that the implied marginal subsidy rate to borrowing was 24.7% in 1980. If one were to take this into account, one would conclude that there was relatively little change in the after-tax cost interest rate faced by borrowers. Incorporating the elimination of the tax subsidy into our back of the envelope calculation, the implied decrease in the effective wedge faced by households is much smaller (roughly 1%). While our model does not distinguish between the interest rate paid by borrowers versus that received by lenders, one rough way of determining the impact of this tax tax is to feed in a 1 percent decline in the wedge. The change in borrowing implied by this change in transactions costs is significantly lower, and would lower the debt-income ratio only to roughly 7.7% instead of 5% (roughly one-third of the observed change in borrowing). However, there are two caveats to this adjustment. First, the interest tax deduction only applied to borrowers who itemized their taxes. Over 60% of tax filers did not itemize prior to 1986 (see Stango 29).
For these households, the change in the tax code should have no impact on their marginal cost of borrowing. Second, to the extent that a large share of unsecured debt is held by lower income households, the tax benefit would be smaller since their marginal tax rate is lower than the average marginal tax rate. Given that most bankrupts are drawn from the middle and lower middle portions of the earnings distribution, abstracting from tax considerations may be a reasonable approach here.

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 $\tau$. To check the robustness of this approach, we also undertook experiments where we increased the risk-free rate ($r^*$) while holding the transaction cost of lending ($\tau$) fixed. As one would expect, although a slightly smaller increase in $r^*$ is needed to generate the same decrease in borrowing as a given change in $\tau$, these experiments yielded similar results to those reported in Table 5. 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.

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

Thus far we have considered the impact of changes in each of the credit market channels separately. Could credit market innovations which led to reduction in both the transaction cost $\tau$ and the cost of bankruptcy $\chi$ account for the observed experience?

The answer is yes. Experiment 4 in Table 5 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 5). 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 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% to 4.8%.

The intuition for this result is straightforward. 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 5). 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. 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 likely 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 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 6. The required increase in the transaction cost is 4.5 percentage points (from 2.56% to 7.06%), while the stigma parameter is slightly less than half of its value in the “stigma only” experiment (line 2a in Table 5). This 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 1.4% 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 channel individually and look at the impact this has on aggregate variables (experiments 3 – 6 in Table 6). 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 6 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 up to 90% of the rise on filings and for virtually all of the increase in unsecured borrowing.
Table 6: Decomposing Uncertainty and Credit Market Stories

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

6.1 Welfare Costs and Savings

We can use the experiments to evaluate the welfare effects of the rise of bankruptcies. Our welfare measure is the percentage increase in the lifetime consumption stream required to equalize expected life-time utility across two experiments: the equivalent consumption variation (ECV). Overall, the changes from the early 1980s to the late 1990s (i.e. comparing experiment 2 with row 1 in Table 6) generate a welfare improvement of more than half a percent of consumption (ECV = 0.57%). It is worth noting that while this welfare gain is significant, it is roughly 1 tenth of the cost of business cycles estimated by Storesletten, Telmer, and Yaron (2000).

This net welfare gain reflects the key role financial market innovations play in accounting for the rise in bankruptcies in these experiments. The driving force here is the decrease in the transactions cost of lending. If this were the only change from the early 1980s to the late 1990s (experiment 5 versus experiment 2), households welfare would have increased even more (ECV = 1.19%). The impact of lowering the cost of defaulting is more complicated. On the one hand, starting from the 1980s benchmark (experiment 2), reducing stigma to the 1990s level increases welfare (ECV = 0.27%). However, lowering both the transaction cost of lending and the stigma generates a
smaller increase in total welfare (ECV = 1.17%) than the decline in transaction costs alone. Intuitively, as the lending technology become more efficient, households prefer to live in a world where defaulting is slightly more costly, as this allows them to borrow more than they could otherwise. The negative impact of higher levels of income and expense uncertainty are as expected. Had only expense risk increased, welfare would have declined by -0.29%. Similarly, had only transitory earnings risk increased from the early 80s to the late 90s, welfare would have decreased by -0.33%. While the costs of increased uncertainty were significant, they were much less than the benefits to consumers of being able to borrow at lower costs both for lifecycle borrowing purposes and to smooth idiosyncratic shocks. This simple decomposition highlights that welfare consequences of a rise in bankruptcy depend upon the underlying driving force.

An additional question is how the the implications of our experiments for the change in household wealth compare to the data. In the data, the ratio of median net worth to median income fell from 1.24 in 1984 to 0.89 in 1998, a 28% decline.\footnote{These values for median net worth are 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.} We find a similar decline in our experiments. Specifically, in our experiments the ratio of median net worth to median income declines from 0.60 in the early 1980s (experiment 2 in Table 6) to 0.40 in the late 1990s (the benchmark experiment) – a decline of 34% which is close to that observed in the data.\footnote{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 correspond to the top few percent of income distribution in the data.} The one caveat is that the model understates median net worth by roughly half. However, it is worth noting that the model abstracts from two important factors in wealth accumulation: bequests as well as durable goods (especially housing). Without these two key savings motives, it is not surprising that the model implied savings of households is significantly lower than the one observed in the data.\footnote{A brief discussion of savings rates by ages in the model and their comparison with the data are discussed in the web appendix.}

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 Ríos-Rull (2008) is important to improve our understanding of the working of consumer credit markets.

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35
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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 understimate 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.
Figure 1: Consumer Bankruptcies per 1000 of 18-64 yr-old

- U.S.A.
- Canada
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, %

Filings per 1000 adults

Credit Card Charge Off