To Forgive or Not to Forgive: An Analysis of U.S. Consumer Bankruptcy Choices

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Current U.S. bankruptcy law has two separate bankruptcy procedures, known as Chapter 7 and Chapter 13. When a debtor files for bankruptcy under Chapter 7, he or she must give up all assets not legally sheltered from creditor seizure in exchange for a discharge of almost all preexisting debts. Under Chapter 13, a debtor may keep all property in exchange for a promise to pay all or some specified part of his or her debts under a payment plan approved by the court.[1] Between 1980 and 1999, the total number of U.S. personal bankruptcy filings rose from 331,257 to nearly 1.4 million per year, and the rate of consumer bankruptcies per 100,000 adults increased from 201 to 650. Most bankruptcy filings during that period (about 70 percent) were under Chapter 7 as opposed to Chapter 13, which accounts for much of the increase in the total rates. As a result, net losses to creditors grew twice as fast as consumer installment credit during those years; today, those losses are counted in the tens of billions of dollars.

The continued climb in consumer bankruptcy rates and the resulting losses to creditors have generated considerable debate and led to a number of bankruptcy reform proposals. Although there is as yet no consensus concerning the driving force behind the drastic upward trend in U.S. personal bankruptcy

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[1] Section 1 provides more detailed information on the basic law.

filings,[2] researchers, practitioners, and politicians are in agreement that the current U.S. consumer bankruptcy system needs serious reform. Many proposals for reform focus on bankruptcy choices, particularly whether Chapter 13 should be encouraged over Chapter 7. The National Bankruptcy Review Commission, for example, recently recommended reforms that would eliminate reaffirmations of debt altogether. Under this recommendation, all debts would be forgiven and there would be no Chapter 13 bankruptcy. On the other hand, the Gekas bill, which has passed the House of Representatives, H.R. 3150, views Chapter 13 as an alternative to be encouraged over Chapter 7. The bill will force bankrupt debtors whose income is above the median to use all of their post-bankruptcy earnings above a predetermined level to repay debt. The credit industry supports the Gekas bill.

Changes in bankruptcy provisions will affect which chapter bankrupts choose, should they elect bankruptcy. In addition, bankruptcy provisions will affect how attractive bankruptcy is in comparison to the option of repaying debts in full as scheduled. Thus, changes in bankruptcy provisions will have an effect on the likelihood of bankruptcy. The odds of a borrower declaring bankruptcy will affect the riskiness of the loan, and thus will affect risk premia charged by competitive lenders and, in turn, borrowers' loan demand and the rate of return to savers in the economy. The likelihood that future income will be garnished to repay a loan will affect borrowers' choices regarding income—labor "effort," for example—but this can be seen as a stand-in for a broader array of incentive effects. To fully analyze the implications of a change in bankruptcy provisions, one must take into account these incentive effects as well as the general equilibrium effects. I present a simple tractable framework for capturing these effects. It may not be detailed enough to be calibrated to current statistical observations, but it does provide reliable qualitative answers to the key questions: What are the characteristics of those that are affected by proposed changes in the code? and, What are the efficiency implications of proposed changes?

The basic economic argument for having a personal bankruptcy procedure is that it helps risk-averse borrowers by providing them with insurance against the possibility that their income or wealth might fall at the time when they have to repay their loans. Thus, borrowers and creditors share the risk of a fall in borrowers' income or wealth. The implicit assumption here is that consumers cannot fully insure against their idiosyncratic income risk. This market incompleteness can arise because of informational problems. For instance, if individual incomes are private information and hence unverifiable, then it may be impossible to provide any insurance against the risks that

[2] Two competing explanations are declining bankruptcy stigma, which led to increasing abuse of the system by borrowers, and the increasingly reckless practices of major consumer creditors, especially credit card issuers.

individuals face. If there are adverse selection problems (different groups of individuals have different risk characteristics; these are private information, and therefore insurance companies protect themselves by penalizing entire groups rather than single persons), then some groups may be prevented from buying as much insurance as they would like (Aiyagari 1997).[3] Accordingly, in the economic environment studied here, individuals face fluctuating income streams and can save through a riskless saving instrument and can borrow as well. They borrow in order to smooth their consumption intertemporally.[4]

My analysis suggests that given labor income and outstanding debt, an individual will file for bankruptcy if his or her assets fall below a certain threshold. This threshold varies negatively with income. Among those who file for bankruptcy, individuals with higher assets and lower income tend to choose Chapter 13, while those with lower assets and higher income tend to choose Chapter 7. These findings, then, confirm the general view on consumers' bankruptcy choices. My discussion also indicates that ex ante, individuals may hold assets and debts simultaneously. In other words, bankruptcy provisions provide an incentive for people to borrow in order to save. Furthermore, Chapter 13 decreases a person's labor effort. To the extent that this labor effort is not directly observable, it can be measured by a person's labor productivity.

In terms of policy experiments, I focus on three policy instruments: asset exemption levels under Chapter 7, the percentage of labor income that can be garnished under Chapter 13, and a mandated income rule for Chapter 13. My analysis shows that there is an efficiency tradeoff among the policies and that their distributive effects differ greatly. In particular, an increase in the asset exemption level under Chapter 7 benefits people with medium assets and medium labor income; ex ante, they will save less and borrow more.

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[3] Brunstad (2000) discusses a list of issues, which he refers to as "problems of economic futility," that require a unique legal system of bankruptcy law.

[4] This article's modeling strategy is most closely related to those of Athreya (2000) and Lehnert and Maki (1999). Both Athreya and Lehnert and Maki, however, study only bankruptcy filings under Chapter 7. Wang and White (2000) and Adler, Polak, and Schwartz (2000) research issues similar to those I investigate. Although Wang and White make different assumptions about consumer behavior (they assume that some strategic households can hide part of their wealth so as to get maximum financial benefit under the bankruptcy system) and focus on different aspects of policy analysis (optimal personal bankruptcy procedures), my article is consistent with theirs in that both studies confirm the general view that households with relatively more wealth file for Chapter 13. Adler, Polak, and Schwartz treat loan borrowing as exogenous and investigate how private contractual arrangement affects consumers' bankruptcy choices within a principal/agent framework. Empirically, Domowitz and Sartain (1999) estimate qualitative choice models of consumers' decisions to file for bankruptcy and their choice of bankruptcy chapter. They find that medical and credit card debt are the strongest contributors to bankruptcy. Higher marriage rates, employment rates, and income all encourage the choice of Chapter 13 rehabilitation over Chapter 7. Additionally, higher levels of equity relative to debt push debtors into Chapter 13. Nelson (1999) also studies consumer bankruptcy and chapter choice using state panel data. He finds that both homestead exemption laws and garnishment laws are statistically significant for bankruptcy choices. Sullivan, Warren, and Westbrook (1989) do case studies and discuss in great detail the characteristics of a sample of personal bankruptcy filings.

The general equilibrium price effects may dampen these results. A reduction in the percentage of labor income that can be collected by creditors under Chapter 13 benefits individuals with high assets and good labor income; ex ante, people exert less labor effort. Finally, the implementation of the labor income threshold for Chapter 13 will affect negatively those with few assets and medium labor income; ex ante, people exert less labor effort.

1. THE U.S. CONSUMER BANKRUPTCY SYSTEM

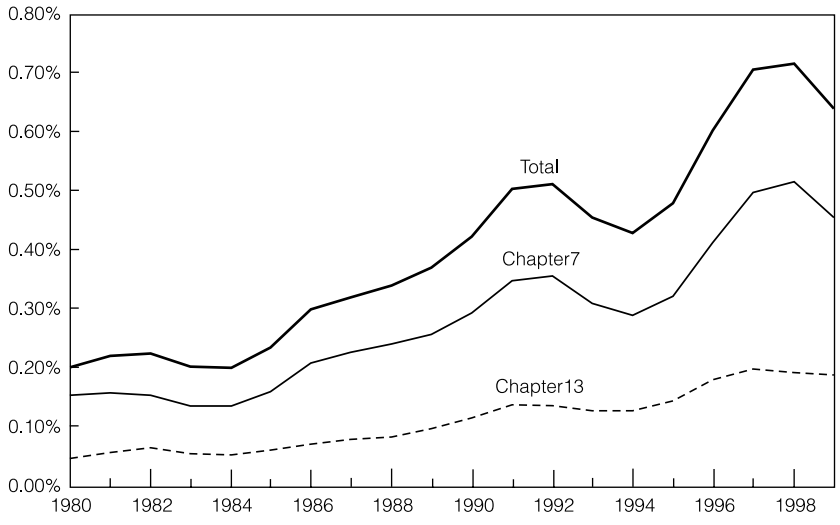
An Overview of the Basic Law

The key aspect of the current U.S. bankruptcy law is that there are two separate personal bankruptcy procedures, known as Chapter 7 and Chapter 13, and debtors are allowed to choose between them. Both procedures discharge many types of debts, causing losses for creditors.

Debtors who file under Chapter 7 of the U.S. Bankruptcy Code are not obliged to use future income to repay their debts and are only obliged to use wealth to repay debt to the extent that their wealth exceeds predetermined exemption levels. In other words, under Chapter 7 the bankruptcy court discharges all eligible debts so that the debtor enjoys a "fresh start." Chapter 7 asset exemptions fall into two categories: homestead (applied to equity in a home used as a primary residence) and non-homestead. Although bankruptcy is a matter of federal law and the rules are uniform across the United States, asset exemption levels under Chapter 7 are set by the state in which the debtor lives and vary widely. For instance, 7 states (Arizona, Florida, Kansas, Minnesota, Oklahoma, South Dakota, and Texas) have unlimited homestead exemptions, while 20 others (including Alabama, California, and Georgia) have homestead exemptions of $7,500 or less for individual debtors (see White [1998], Table 1, for Chapter 7 exemptions for all states and the District of Columbia). Non-homestead exemptions are less clear cut. State laws frequently allow households to exempt 100 percent of the value of a specific type of asset. For example, many states exempt 100 percent of the value of clothing for personal use.

Alternatively, debtors can file for bankruptcy under Chapter 13, which offers virtually the opposite option. In Chapter 13 the law allows debtors to keep all property, exempt and nonexempt, in exchange for a promise to pay all or some specified part of their debts under a three- to five-year payment plan approved by the court. The remainder of the debt will be discharged. There are several restrictions attached to the repayment plan. First, Chapter 13 sets minimum amounts that must be paid under a plan. For secured creditors, the minimum payment must at least match the value of the collateral, plus interest, but may be made over a time longer than the requirements of the statute. Certain unsecured creditors with special priorities (such as tax authorities, former spouses, and children with support orders) receive payment in full.

Figure 1 Annual Bankruptcy Filings as a Percent of Total Adult Population—United States



The minimum amount that must be paid to the rest of the unsecured creditors equals the disposable income remaining after necessary living expenses are paid and the secured and priority debt payments are made. Second, debtors must propose to pay at least as much as the creditors would have received under Chapter 7. Third, the statute requires that debtors propose plans in good faith, which is generally interpreted to mean that debtors must make some repayment even if there would have been none under Chapter 7; the amount required varies tremendously from district to district.

Debtors whose debts are discharged under either Chapter 7 or Chapter 13 are released from prebankruptcy debts, but they are ineligible for Chapter 7 for six years. Only debtors who pay in full under Chapter 13 remain eligible for a Chapter 7 bankruptcy discharge during the following six years. Creditors, especially unsecured creditors, generally favor a Chapter 13 arrangement since they may actually receive some payment under Chapter 13; under Chapter 7, they will be repaid only if debtors' assets exceed the exemption level. Nevertheless, most credit agencies identify all Chapter 13 debtors, regardless of their payment success, as having taken bankruptcy.

Recent Trends

Figure 1 depicts annual bankruptcy filings as a percent of the total adult population from 1980 to 1999 in the United States. Bankruptcy rates per 1,000

adults remained relatively stable from 1980 to 1984 but later exploded, moving from 1.2 in 1984 to 7.2 in 1998. The increase in bankruptcy rates lessened slightly in 1999. At current levels, 2 percent of American adults file for personal bankruptcy every three years. What was formerly a rarity is now almost commonplace. Also notable in Figure 1 is that about 70 percent of consumer bankruptcies are filed under Chapter 7. Moreover, Chapter 7 filings have increased at a faster rate than Chapter 13 filings. On the basis of this observation and the notion that Chapter 7 may be more harmful to the society since debtors do not need to repay any of their debts, Congress and the credit industry have formed the view that Chapter 13 should be greatly encouraged (or even mandated) so as to prevent the increasing abuse of the current system.[5]

2. A THEORETICAL MODEL

The Economic Environment

I will now consider a two-period economic model. The model has several important features. First, agents[6] face an uninsurable idiosyncratic shock to period 2 wages, and they smooth their consumption over the two periods through borrowing and saving. Specifically, agents can save through a riskless saving instrument and can borrow as well. As mentioned earlier, the introduction of this feature is to provide a potential role for bankruptcy laws. Second, agents need to exert effort in order to receive positive labor income for period 2. More importantly, an individual's choice of effort level is unobservable. It is therefore impossible to make contracts contingent on effort levels. I assume that the income an agent receives in period 2 is a product of his or her effort level and the idiosyncratic shock. This product can also be viewed as total output produced by the agent. In that sense, the labor effort of each agent affects the total output of the economy. For the remaining analysis, I will first treat a representative agent in isolation, taking borrowing and lending rates as given. I will then embed that model in a general equilibrium setting in order to endogenize the borrowing and lending rates.

In period 1, an agent enters the economy endowed with some assets a_1 and a signal θ_1, which indicates the quality of the agent's period 2 labor income. An agent draws utility from consumption in both periods, disutility from working in period 2, and a utility penalty from filing for bankruptcy in

[5] Some researchers, however, dispute this view. White (1998), for example, argues that a much higher fraction of U.S. households would benefit financially from bankruptcy than actually file under current bankruptcy provisions.

[6] I use the words "agent," "person," and "individual" interchangeably throughout this article. I assume that there is a continuum of agents in the economy.

period 2.[7] There exists a single creditor in the economy, and agents borrow and deposit with the creditor. Let r^b denote the rate at which the agent borrows, and let r^d denote the deposit rate.

In period 1, an agent chooses consumption debt and/or asset holdings for period 1 and effort for period 2. I denote these decision rules by c_1, d_2/a_2, and l_2 respectively.[8] The agent's labor income shock described by θ_2 is revealed at the beginning of period 2. The probability distribution of θ_2 conditional on the signal θ_1 increases in θ_1 in the sense of first order stochastic dominance, i.e.,

$$F(\theta_2|\theta_1') \leq F(\theta_2|\theta_1) \text{ for } \theta_1' > \theta_1,$$

$F(\theta_2|\theta_1)$ is the cumulative distribution function for period 2's labor income shock θ_2 given period 1's signal θ_1.

After observing his or her labor income shock for period 2, θ_2, the agent works at the effort level decided in period 1. The agent's period 2 income, therefore, consists of labor income and any interest earned on deposits. The agent then decides whether to repay the debt, d_2. If he or she does not repay the debt, the agent will file for either Chapter 7 or Chapter 13 bankruptcy. Under Chapter 7 bankruptcy, the agent will keep his or her assets up to the maximum amount that is exempted under the bankruptcy law, which I denote by E. The agent surrenders remaining assets to the creditor, but keeps all labor income. If Chapter 13 bankruptcy is chosen, the agent may keep all assets; however, a portion ρ ($0 \leq \rho \leq 1$) of period 2 labor income will be used to pay off debts.[9] In the theoretical discussion of this paper, I treat ρ as fixed, independent of an agent's debt and earnings. I use x to denote an agent's decision; x equals 1 if the agent pays off his or her debt, x equals 7 if Chapter 7 bankruptcy is filed, and x equals 13 if Chapter 13 bankruptcy is filed.

An agent suffers a utility loss, S, from a bankruptcy filing of either type. This utility loss represents either the cost of having to borrow at a much higher rate in the future had the model been of infinite horizon (a more realistic case), or the stigma, the level of social disapproval of bankruptcy, or both. In the first case, S would be a function of the interest rate that an agent is charged if he or she has to borrow again after filing for bankruptcy and the agent's average income, income volatility, and desire to smooth consumption. The higher the desire to borrow after bankruptcy, and the higher the postbankruptcy borrowing rate, the higher the cost of filing for bankruptcy will be. Consumption for

[7] To simplify my analysis, without loss of generality, I assume away any labor decision in period 1.

[8] The labor effort here measures how hard a person works in terms of whether he or she tries hard enough to get a well-paying job. Therefore, it is not something a court can mandate.

[9] The implicit assumption is that while private agents cannot enforce a contract contingent on an agent's income, the government can, due to its special enforcement technology (by putting an individual in prison, for example).

period 2 is simply the agent's remaining income after the payment/bankruptcy decision.

To summarize, the time line of the economy is as follows:

time	period 1	period 2
information	asset a_1, period 2 labor income signal θ_1	labor income shock θ_2
decision rules	consumption c_1, asset a_2, borrowing d_2, and effort l_2	payment decision x, and consumption c_2

For the analysis that follows, I assume that an agent's utility function takes the form $Q(c_1) + E[U(c_2) - S \cdot 1(x = 7 \text{ or } 13)] - V(l_2)$, where $Q' > 0$, $Q'' < 0$, $Q''' > 0$, $U' > 0$, $U'' < 0$, $U''' > 0$, $V' > 0$, $V'' > 0$, and $1(.)$ is an indicator function that takes the value 1 if the statements inside the parentheses are true and takes the value 0 otherwise.

An Agent's Problem

To correctly present the choice problem of an agent in our economy, it is helpful to think about it in reverse chronological order.

An Agent's Period 2 Problem: The Bankruptcy Decision

In period 2, agents are described by their assets, debt positions, labor ability, and labor effort decision, namely $(a_2, d_2, \theta_2, l_2)$. They make payment and consumption decisions to maximize period 2 utility as follows,

$$\max_{x, c_2 > 0} U(c_2) - S \cdot 1(x = 7 \text{ or } 13) - V(l_2).$$

An agent faces three choices here: file for bankruptcy under Chapter 7, file for bankruptcy under Chapter 13, or repay the debt. Let W^7, W^{13}, and W^R denote an agent's period 2 utility under the three choices respectively. The last option, of course, requires that the agent's income exceeds the debt payment, i.e., $r^d a_2 + \theta_2 l_2 \geq r^b d_2$. We then have the following expressions,

$$W^7 = U(\min\{E, r^d a_2\} + \theta_2 l_2) - S, \quad (1)$$

$$W^{13} = U(r^d a_2 + (1 - \rho)\theta_2 l_2) - S, \quad (2)$$

$$W^R = U(r^d a_2 + \theta_2 l_2 - r^b d_2), \text{ and } r^d a_2 + \theta_2 l_2 \geq r^b d_2. \quad (3)$$

When the agent's income is not enough to repay the debt, i.e., $r^d a_2 + \theta_2 l_2 \leq r^b d_2$, he or she has no choice but to file for bankruptcy. I call this type of

Table 1 Parameter Values for Example 1

Parameter	Values
bankruptcy cost (S)	1.50
Chapter 7 asset exemption level (E)	4.00
deposit rate (r^d)	1.00
borrowing rate (r^b)	1.20
debt holding (d_2)	7.00
period 2 labor decision (l_2)	1.00
portion of income garnished under Chapter 13 (ρ)	0.45

bankruptcy filing "involuntary bankruptcy." The bankruptcy choice between the two chapters will depend only on the agent's period 2 consumption since the penalty S applies in either case. When $\min\{E, r^d a_2\} + \theta_2 l_2 \geq r^d a_2 + (1-\rho)\theta_2 l_2$, the agent will file for bankruptcy under Chapter 7, but otherwise will file under Chapter 13. More specifically, when the agent's assets are below the exemption level, $r^d a_2 \leq E$, he or she will always file for bankruptcy under Chapter 7; when the agent's assets are above the exemption level, $r^d a_2 \geq E$, he or she will file for bankruptcy under Chapter 7 only if $a_2 \leq \frac{1}{r^d}(E + \rho\theta_2 l_2)$.

The case where the agent has enough income to repay the debt is more involved. An agent will file for Chapter 7 if his or her assets are below the threshold discussed above and the consumption benefit of filing for bankruptcy is at least S, i.e., $U(\min\{E, r^d a_2\} + \theta_2 l_2) - U(r^d a_2 + \theta_2 l_2 - r^b d_2) \geq S$. Let Δ denote the utility difference $U(\min\{E, r^d a_2\} + \theta_2 l_2) - U(r^d a_2 + \theta_2 l_2 - r^b d_2) - S$. That is, Δ is the net benefit of filing under Chapter 7 compared to paying off one's debt.

$$\frac{\partial \Delta}{\partial a_2} = \begin{array}{ll} r^d U'(r^d a_2 + \theta_2 l_2) - r^d U'(r^d a_2 + \theta_2 l_2 - r^b d_2), & \text{if } r^d a_2 \leq E; \\ -r^d U'(r^d a_2 + \theta_2 l_2 - r^b d_2), & \text{otherwise.} \end{array} \tag{4}$$

Given our assumption that U is concave, it is obvious that $\frac{\partial \Delta}{\partial a_2} \leq 0$. Similarly, we can show that the utility difference Δ decreases in the labor income shock θ_2 and increases in the agent's debt holding d_2. It follows that the higher an agent's assets or labor income, and the lower the agent's debt holding, the likelier he or she is to repay the debt.

When the agent's assets are above the threshold described earlier and the cost of filing for Chapter 13 is smaller than the bankruptcy cost S, $U(r^d a_2 + (1-\rho)\theta_2 l_2) - U(r^d a_2 + \theta_2 l_2 - r^b d_2) \geq S$, he or she will file for Chapter 13. If we let $\tilde{\Delta}$ denote the utility difference $U(r^d a_2 + (1-\rho)\theta_2 l_2) - U(r^d a_2 + \theta_2 l_2 - r^b d_2) - S$, analysis similar to that above shows that this utility difference exhibits the same properties as the utility difference between filing for Chapter 7 and repaying the debt. The agent is more likely to repay the debt when assets and labor income shock are higher and the debt holding is lower. When the

agent has the income to repay the debt, filing is often referred to as "voluntary bankruptcy."

Result 1 *Given the period 2 labor income shock and debt holdings, as assets increase an agent will file for bankruptcy first under Chapter 7, then under Chapter 13, and will repay the debt only if assets exceed some threshold. For a given level of assets and as labor income increases, an agent will file for bankruptcy first under Chapter 13, then under Chapter 7, and will repay the debt only if the labor shock exceeds some threshold.*

The intuition behind Result 1 is straightforward. An agent will lose either wealth or income after filing for bankruptcy. Agents who have sufficient wealth or income or both will, therefore, have no incentive to file for bankruptcy. Chapter 7 exempts all labor income but only part of assets. As a result, agents with good income but few assets will benefit from Chapter 7. Chapter 13 protects agents' assets at the cost of their labor income. Consequently, Chapter 13 benefits agents with large assets but low labor income. The following numerical example illustrates Result 1.[10]

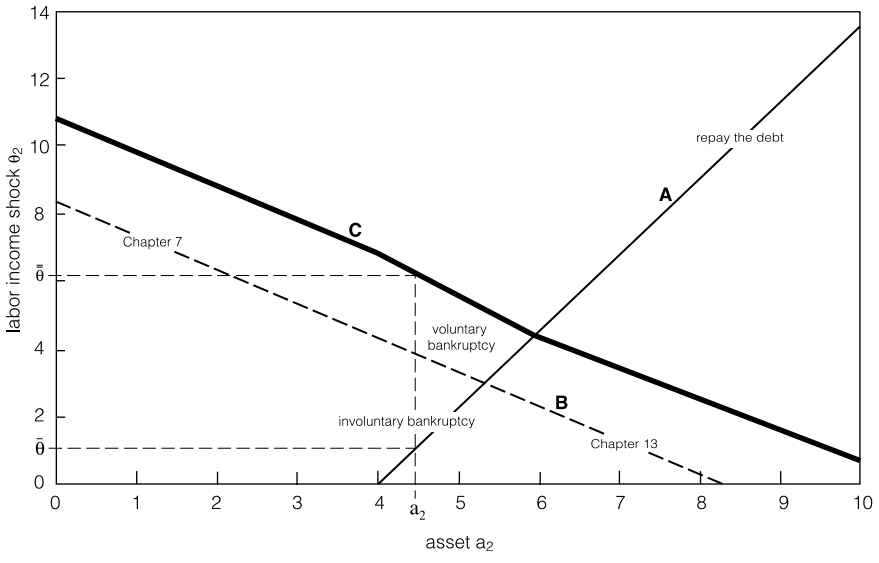
Example 1 *Utility is logarithmic, i.e.,* $U(c_2) = \log(c_2)$. *Parameters are chosen as in Table 1.*

Figure 2 depicts an agent's bankruptcy decision in relation to his or her period 2 assets and labor income shock. Line A describes asset-labor income shock pairs for which the agent is indifferent between filing for Chapter 7 or Chapter 13, $r^d a_2 - \rho\theta_2 l_2 - E = 0$. The agent will file for Chapter 7 if this expression is negative and will file for Chapter 13 otherwise. Line B consists of assets and labor income shocks that are just enough to repay the debt, $r^d a_2 + \theta_2 l_2 - r^b d_2 = 0$. Agents with more income than debt lie above line B. Line C is the indifference curve of the agent between filing for bankruptcy and repaying the debt, i.e., $\max(U(\min[E, r^d a_2] + \theta_2 l_2), U(r^d a_2 + (1-\rho)\theta_2 l_2)) - U(r^d a_2 + \theta_2 l_2 - r^b d_2) - S = 0$. Agents preferring to repay the debt lie above this indifference curve.

As seen in Figure 2, an agent will repay the debt if both assets and the labor income shock exceed the threshold set by line C. Underneath the repayment line, the fewer assets agents have, the higher the labor income shock they receive, and the more likely they are to file for Chapter 7. Conversely, the more assets they have, and the lower their period 2 labor income, the more likely they are to file for Chapter 13. More specifically, as illustrated in Figure 2, for the given value of a_2, if $\theta_2 < \overline{\theta}$, the agent files for bankruptcy under Chapter 13, if $\overline{\theta} \leq \theta_2 < \overline{\overline{\theta}}$, the agent files for bankruptcy under Chapter 7,

[10] Note that the examples presented in this article consist of magnitudes that are by no means calibrated. They are included to illustrate the discussion.

Figure 2 Agent's Period 2 Bankruptcy Decision—An Example



and if $\theta_2 \geq \overline{\overline{\theta}}$, the agent repays the debt. An increase in debt d_2 will move line B and line C upward, reducing the region of debt repayment.

An Agent's Period 1 Problem: Portfolio and Labor Effort Decisions

Agents in period 1 make portfolio, consumption, and labor decisions to maximize their lifetime utility as follows,

$$\max_{a_2,d_2,c_1,l_2} Q(c_1) + E_{\theta_2|\theta_1} \max(W^7, W^{13}, W^R) - V(l_2)$$

s.t.

$$c_1 + a_2 = a_1 + d_2, \tag{5}$$

$$c_1, a_2, d_2, l_2 \geq 0. \tag{6}$$

I assume that the labor income shock θ takes value in $[\theta_{\min}, \theta_{\max}]$. Let $\overline{\theta}$ and $\overline{\overline{\theta}}$ denote the two thresholds so that given a_2, d_2, and l_2, when $\theta_2 \leq \overline{\theta}$, an agent will file for bankruptcy under Chapter 13; when $\overline{\theta} \leq \theta_2 \leq \overline{\overline{\theta}}$, an agent will file for bankruptcy under Chapter 7; when $\theta_2 \geq \overline{\overline{\theta}}$, an agent will repay the debt (Result 1). The agent's period 1 utility can then be rewritten as $Q(a_1 + d_2 - a_2) + (\int_{\theta_{\min}}^{\overline{\theta}} W^{13} + \int_{\overline{\theta}}^{\overline{\overline{\theta}}} W^7 + \int_{\overline{\overline{\theta}}}^{\theta_{\max}} W^R) dF(\theta_2|\theta_1) - V(l_2)$.

This utility function is no longer concave; it consists of kinks where agents are indifferent between two of the three choices. In the analysis that follows, I focus on cases in which the equilibrium solution does not fall on any of these kinks, in which case Euler equations are both necessary and sufficient. The qualitative results thus obtained can be generalized to other cases where equilibrium occurs at a kink. I omit those analyses in order to save space.

Assuming interior solutions (all the choice variables take positive values), Euler equations for this maximization problem are

$$\begin{aligned} &Q'(a_1 + d_2 - a_2) \\ &\quad = r^d \int_{\theta_{\min}}^{\overline{\theta}} U'(r^d a_2 + (1-\rho)\theta_2 l_2) dF(\theta_2|\theta_1) + r^d \int_{\overline{\theta}}^{\overline{\overline{\theta}}} \\ &\qquad U'(r^d a_2 + \theta_2 l_2) dF(\theta_2|\theta_1) 1(r^d a_2 \leq E) \\ &\qquad\quad + r^d \int_{\overline{\overline{\theta}}}^{\theta_{\max}} U'(r^d a_2 + \theta_2 l_2 - r^b d_2) dF(\theta_2|\theta_1), \quad (7) \end{aligned}$$

$$Q'(a_1 + d_2 - a_2) = r^b \int_{\overline{\overline{\theta}}}^{\theta_{\max}} U'(r^d a_2 + \theta_2 l_2 - r^b d_2) dF(\theta_2|\theta_1), \quad (8)$$

$$\begin{aligned} V'(l_2) \quad = \quad & \int_{\theta_{\min}}^{\overline{\theta}} (1-\rho)\theta_2 U'(r^d a_2 + (1-\rho)\theta_2 l_2) dF(\theta_2|\theta_1) \\ & + \int_{\overline{\theta}}^{\overline{\overline{\theta}}} \theta_2 U'(\min\{E, r^d a_2\} + \theta_2 l_2) dF(\theta_2|\theta_1) \\ & + \int_{\overline{\overline{\theta}}}^{\theta_{\max}} \theta_2 U'(r^d a_2 + \theta_2 l_2 - r^b d_2) dF(\theta_2|\theta_1). \quad (9) \end{aligned}$$

When there are no bankruptcy provisions, Euler equations (7) and (8) for a_2 and d_2 respectively become

$$Q'(a_1 + d_2 - a_2) = r^d \int_{\theta_{\min}}^{\theta_{\max}} U'(r^d a_2 + \theta_2 l_2 - r^b d_2) dF(\theta_2|\theta_1), \quad (10)$$

$$Q'(a_1 + d_2 - a_2) = r^b \int_{\theta_{\min}}^{\theta_{\max}} U'(r^d a_2 + \theta_2 l_2 - r^b d_2) dF(\theta_2|\theta_1). \quad (11)$$

Obviously, these two equations cannot hold simultaneously when the deposit rate differs from the borrowing rate.[11] This implies that an agent will not hold both assets and debt in period 2 in the absence of bankruptcy provisions. When there are either Chapter 7 or 13 bankruptcy provisions, however, the agent may hold both assets and debt simultaneously. The intuition is that although debt

[11] When the borrowing rate is the same as the deposit rate, the equilibrium condition pins down the agent's net asset position, $d_2 - a_2$.

requires paying an interest rate premium, the prospect of not having to pay the debt completely or part of it in the event of bankruptcy lowers the effective rate an agent pays on his or her debts. In other words, bankruptcy provisions encourage agents to borrow to save. Lehnert and Maki (1999) also obtain such a result in their paper through numerical simulation. They further argue that this theoretical result is corroborated by household behavior as documented in the Consumer Expenditure Survey.[12]

Result 2 *With either Chapter 7 or Chapter 13 bankruptcy provisions, an agent may simultaneously hold low-return assets and high-interest debt; with no bankruptcy provisions, however, an agent will hold only one of the two instruments.*

With regard to labor effort, equation (9) suggests that an agent's period 2 work effort is a decreasing function of the probability of filing for Chapter 13. This is a direct result of a Chapter 13 provision: Those who file under 13 lose part of their income to their creditors.

Result 3 *The work effort that an agent exerts in period 2 decreases as the probability of bankruptcy filing under Chapter 13 increases.*

The effects of changes of a_1 and θ_1 on agents' portfolio and bankruptcy decisions are more complicated. When a_1 increases, the agent does not need to borrow as much from period 2 to increase consumption in period 1 since now he or she can consume more period 1 assets. The reduced debt relative to asset holdings will in turn increase the debt repayment region. Hence, agents will take advantage of bankruptcy provisions less often.

An improved period 2 labor income prospect (larger θ_1)implies that the agent would like to borrow more to increase consumption in period 1. A better labor income prospect in the sense of first-order stochastic dominance also means that the agent repays loans more often given the amount borrowed. In other words, the agent now enjoys the bankruptcy provision less often, which will reduce borrowing in period 1. In this case, whether the agent will borrow more when θ_1 is higher depends on the net effect of the two forces. Similarly, bankruptcy and labor effort decisions will be affected by opposing forces.

Example 2 *The agent's utility takes the following functional form:* $log(c_1) + E_{\theta_2|\theta_1}[c_2 - S \cdot 1(x = 7 \text{ or } 13)] - 1.25 * l_2^2$. $F(\theta_2) = (\theta_2)^{\theta_1}$, *where* $\theta_1, \theta_2 \in [0, 1]$. *Other parameter values are summarized in Table 2.*

[12] The Consumer Expenditure Survey (CE) is an annual survey of about 5,500 households conducted by the Bureau of Labor Statistics. Participants are surveyed four times over the course of the year and are asked about their expenditures, assets, liabilities, and incomes.

Table 2 Parameter Values for Example 2

Parameter	Values
bankruptcy cost (S)	2.06
Chapter 7 asset exemption level (E)	0.43
deposit rate (r^d)	1.00
borrowing rate (r^b)	1.06
portion of income garnished under Chapter 13 (ρ)	0.65

Table 3 Simulation Results of Example 2

Parameters		Simulation Results					
a_1	θ_1	a_2	l_2	d_2	Chapter 13 (percent)	Chapter 7 (percent)	Repayment (percent)
0.114	1.00	0.4985	0.5963	0.3937	0.2677	0.0715	0.6608
0.120	1.00	0.4993	0.5779	0.3734	0.2855	0.0177	0.6968
0.114	0.99	0.4976	0.5948	0.3926	0.2684	0.0737	0.6579

Table 3 summarizes results of the three experiments. According to these experiments, agents with higher period 1 assets save more, borrow less, and repay debt in period 2 more often. In the event of bankruptcy, they file for Chapter 13 more often in order to protect their assets. As a result, they put in less labor effort. Agents with inferior period 2 labor income prospects save less and borrow even less, and repay debt in period 2 less often. In the event that they become bankrupt, they file for Chapter 7 more often because they hold fewer assets in period 2. Consequently, they exert more labor effort.

Financial Intermediation and Credit Market Equilibrium

Thus far analysis has focused on a single agent, taking borrowing and lending rates as given. I now introduce financial intermediation and define a credit market equilibrium. There is a single creditor in this economy. Without loss of generality, I call this creditor a bank. Agents deposit with the bank at rate r^d and borrow from the bank at rate r^b. Note that borrowers are charged the same rate irrespective of their assets and debt position. The implicit assumption is that the lender does not observe borrowers' assets and cannot set prices according to loan size. This is a simplifying assumption. Alternatively, one could make the lending rate a function of the borrower's assets or loan size, or even a signal regarding his or her period two labor income shock.

The bank makes zero profit under the assumption of competitive financial intermediation. Let $G(a_1, \theta_1)$ denote the ex ante distribution of agents over period 1 wealth and period 2 labor income shock signals, and let there be a measure 1 of agents in the economy. The zero profit restriction translates into

$$\int_{a_1,\theta_1} [\int_{\theta_{\min}}^{\bar{\theta}} \rho\theta_2 l_2 F(\theta_2|\theta_1) + \int_{\bar{\theta}}^{\bar{\bar{\theta}}} \max[0, r^d a_2 - E] dF(\theta_2|\theta_1) + \int_{\bar{\bar{\theta}}}^{\theta_{\max}} r^b d_2 dF(\theta_2|\theta_1)] dG(a_1, \theta_1) = r^d \int_{a_1,\theta_1} \int_{\theta_2} a_2 dF(\theta_2|\theta_1), \quad (12)$$

where the first term on the left-hand side of equation (12) is the wage garnished from agents who file for bankruptcy under Chapter 13, the second term is the assets obtained from agents who file for bankruptcy under Chapter 7, and the third term is the loan repayment from those who do not default. The right-hand side of the equation is the cost of deposits. Obviously, the greater the number of agents filing for bankruptcy, the higher the borrowing rate the bank will charge.

A general equilibrium of our economy consists of a pair of interest rates (r^d, r^b) and a set of decisions (a_2, d_2, l_2, x) such that given the interest rates, (1) agents make decisions that maximize their expected utility, (2) the bank breaks even, and (3) capital markets clear as follows,

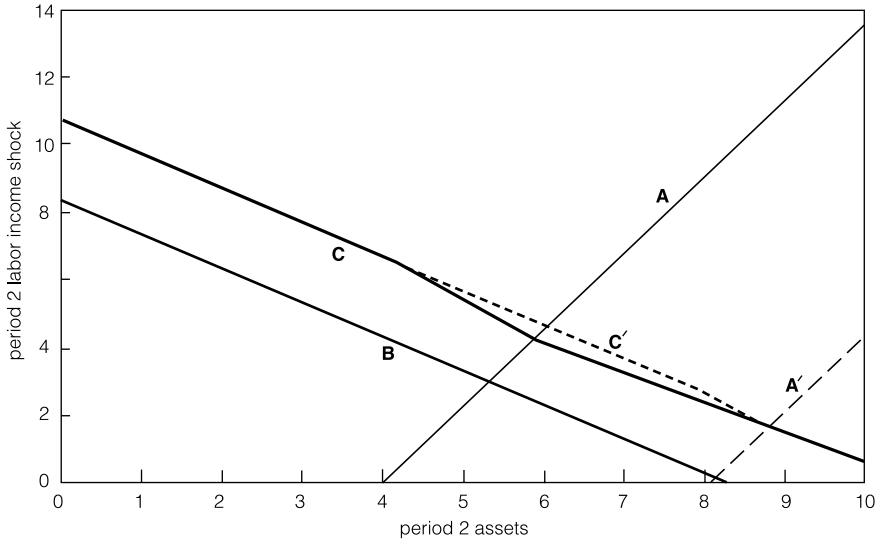
$$\int_{a_1,\theta_1} a_2(a_1, \theta_1) dG(a_1, \theta_1) = \int_{a_1,\theta_1} d_2(a_1, \theta_1) dG(a_1, \theta_1). \quad (13)$$

The left-hand side of equation (13) is the deposits the bank collects from the agents, and the right-hand side is the loans that the bank makes.

3. POLICY EXPERIMENTS

Most of the current proposals on bankruptcy reform center on three policy instruments: the bankruptcy exemption, the percentage of wage income that can be garnished by creditors in the event of bankruptcy, and the financial profiles of agents who must file for bankruptcy under Chapter 13. The National Bankruptcy Review Commission, for example, recommends large increases in bankruptcy exemptions. The Gekas bill goes in the opposite direction by forcing debtors in bankruptcy whose income is above the median to use 100 percent of their postbankruptcy earnings above a predetermined level to repay debt. In this section, I analyze the implications of each of the proposed bankruptcy law changes. In particular, I ask how these changes affect agents' repayment and bankruptcy chapter choices, their ex ante portfolio decisions, and their labor decisions and welfare.

Figure 3 Changes of Bankruptcy Regions due to an Increase in Exemption



Bankruptcy Exemption

I start with the period 2 decision problem. Holding interest rates fixed, suppose the bankruptcy exemption in the model economy is increased from E_1 to E_2. There are two immediate effects. First, Chapter 7 bankruptcy is now more attractive than Chapter 13, though only for agents with medium assets. Agents whose assets are below $\rho\theta_2 l_2 + E_1$ will file for Chapter 7 under the old exemption level, and agents whose assets are above $\rho\theta_2 l_2 + E_2$ will not find the increase sufficient for them to change their bankruptcy chapters. Only those with assets between these two cutoff levels and whose labor income shocks are not high enough to make debt repayment more attractive will switch from Chapter 13 to Chapter 7.

Second, agents with assets between E_1 and $\rho\theta_2 l_2 + E_2$ may also benefit from the increase in exemption by filing for Chapter 7 rather than paying off their debt. To demonstrate, recall that agents are indifferent between filing for Chapter 7 and repaying debt when $U(\min\{r^d a_2, E\} + \theta_2 l_2\}) - S = U(r^d a_2 + \theta_2 l_2 - r^b d_2)$. The exemption level affects this equality only if agents' assets are above this level. Moreover, if agents' assets are too high, either Chapter 13 or repayment will be more attractive. Figure 3 depicts changes in bankruptcy regions when E is increased from 4 to 8 using Example 1. All the

lines carry the same interpretation as those in Example 1. The dotted lines correspond to those under the new exemption level.

In period 1, because of the increased benefits of filing for bankruptcy under Chapter 7, agents will save less and/or borrow more so that in period 2 they have a higher chance of filing for bankruptcy under Chapter 7. This can be seen in equation (8). The threshold $\overline{\overline{\theta}}$ increases with the increase in E; for the equation to continue to hold, the agent needs to hold more debt relative to assets. The general equilibrium effect of the increase in debt and decrease in saving is that the deposit rate increases. In addition, the increase in default (particularly Chapter 7 default) increases the borrowing rate. This increase in borrowing rate will dampen the decrease in saving since agents will have to rely more on saving to smooth their consumption. An increase in the deposit rate clearly benefits those who save, and an increase in the borrowing rate hurts those who borrow. The implication is that increasing the exemption will benefit the rich and hurt the poor, especially those with good labor prospects.

Result 4 *Given assets and debt, agents with medium assets and low labor income shocks will benefit from an increase in the exemption by switching from Chapter 13 to Chapter 7. Agents with medium assets and medium income shocks will benefit from the increase in the exemption if they switch from repaying their debt to filing for Chapter 7. Ex ante, agents will exert more labor effort. General equilibrium price changes may dampen these results.*

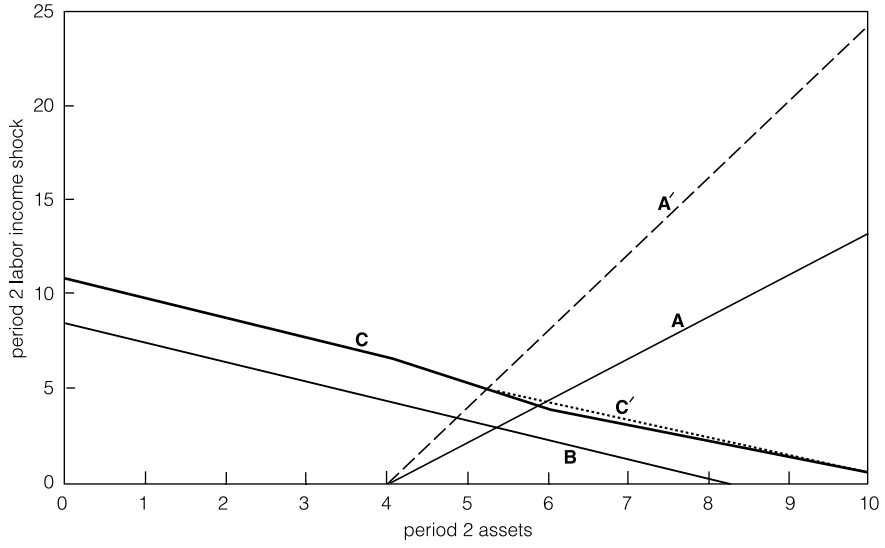
Wage Garnishment

I next discuss the effects of changes in the percentage of wage income that can be garnished by creditors in the event of Chapter 13 bankruptcy. This wage garnishment is captured by the parameter ρ in the model.

Changes in ρ affect two types of marginal borrowers: those who are at the margin of filing for Chapter 7 bankruptcy as opposed to Chapter 13 and those who are at the margin of paying off their debts as opposed to filing for Chapter 13. A reduction in ρ will induce more agents in the first group to file for Chapter 13. The second group of borrowers repays debts because the utility from doing so is higher than filing for Chapter 13, i.e., $U(r^d a_2 + \theta_2 l_2 - r^b d_2) \geq U(r^d a_2 + (1-\rho)\theta_2 l_2) - S$. A smaller ρ will increase the value of filing for Chapter 13 and, hence, will make agents less likely to pay off debts. Again, the benefits of a smaller ρ accrue more to agents with better labor income shocks. Furthermore, since only agents with relatively greater assets will consider filing for Chapter 13, a reduction in wage garnishing will most benefit rich people with relatively high labor income shock. Figure 4 plots changes in bankruptcy regions when I reduce ρ from 0.45 to 0.25 in Example 1.

In period 1, holding interest rates constant, marginal agents in the first group will increase their savings, while those in the second group will increase

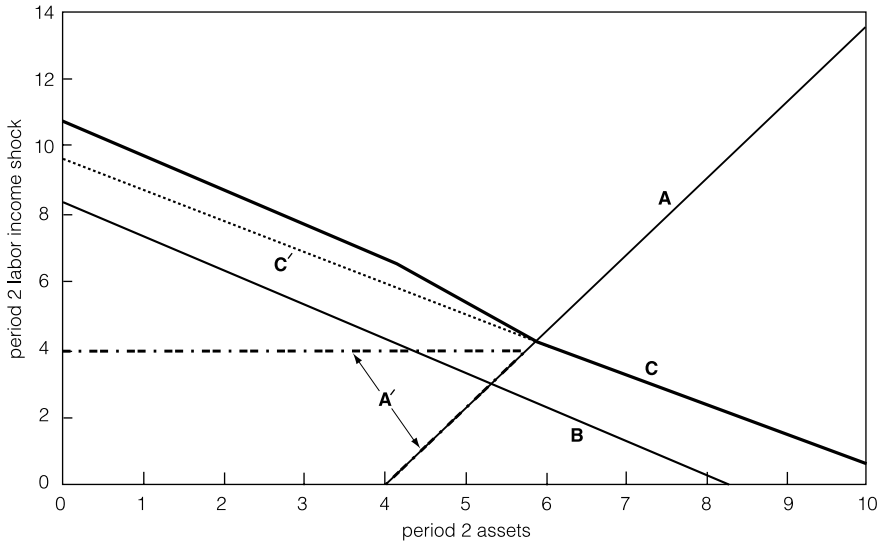
Figure 4 Changes of Bankruptcy Regions due to a Reduction in Wage Garnishment



their borrowing to take advantage of the now more beneficial Chapter 13 bankruptcy provision. Agents will also increase their labor effort since now a smaller fraction of their labor income will be lost to creditors. If there is excess aggregate saving in the economy, the deposit rate will drop so that the aggregate saving equals aggregate borrowing in the new equilibrium. If there is excess aggregate borrowing, the deposit will rise to reach a new equilibrium. The general equilibrium effect of a reduction of ρ on the borrowing rate is twofold. On one hand, more agents will default, and the increased default risk will cause the borrowing rate to increase. On the other hand, with more Chapter 13 and fewer Chapter 7 filings the lender will be able to collect more, which will tend to reduce the borrowing rate.

Result 5 *Given their assets and debt positions, agents with good labor income shocks and high assets will benefit from a reduction in wage garnishment under Chapter 13. The benefits come from either switching from Chapter 7 to Chapter 13, or switching from repaying debts to filing for Chapter 13. Ex ante, agents respond to the changed incentives by either saving more or borrowing more and by exerting higher labor effort.*

Figure 5 Changes in Bankruptcy Regions due to an Income Mandate



Income Mandate

Under an income mandate provision, if your income is above a certain cutoff level, then you cannot file for bankruptcy under Chapter 7. The cutoff is often determined according to the population income distribution. Let us suppose that all the other provisions remain unchanged, including the exemption level and the percentage of labor income that will be collected by creditors under Chapter 13.

The implementation of such an income mandate corresponds to setting a labor income shock threshold in our economy. Agents with a period 2 income shock above this level can file for bankruptcy only under Chapter 13. The effects of the income mandate are straightforward. It affects only those with the lowest amount of assets and medium labor income shocks. Those with more assets will file under Chapter 13 even without the mandate, and those with good labor income shocks will always repay their debts. Figure 5 depicts the imposition of a labor income shock cutoff equal to 4 in Example 1. The repayment line for low assets agent shifts down because of the income mandate. The reason for the downward shift is that the benefits from filing from bankruptcy (Chapter 13 under the new rule) are fewer than before (Chapter 7). As a result, agents are more likely to pay off their debt.

In period 1, agents realize they will have to file for Chapter 13 more often than in period 2; they will therefore put in less labor effort and will borrow

less as a result. The reduced demand will drive down the deposit rate. The borrowing rate will also come down since the borrowing premium will be lower. More agents will file for Chapter 13, and more agents will pay off their debts.

Result 6 *Given assets and debt positions, an income mandate for Chapter 13 filing hurts agents with few assets and medium labor income shocks. Ex ante in period 1, agents will not work as hard and will also reduce their borrowing. In general equilibrium, both deposit rates and borrowing rates will come down.*

To summarize my policy discussion, a reduction in assets exemption level under Chapter 7 benefits agents with medium assets and medium labor income shock. Ex ante, these agents save less and borrow more; however, they also work harder. The general equilibrium price effects are likely to dampen these results. A reduction in the percentage of wages that can be garnished under Chapter 13 benefits agents with high assets and medium labor income shock. These agents switch to Chapter 13 bankruptcy from either Chapter 7 bankruptcy or repayment. Ex ante, these agents work less hard. Whether the interest rate increases or not depends on the net changes of the total increase in saving and the total increase in borrowing. Finally, an income mandate hurts agents with medium labor income shocks and few assets. Ex ante, these agents will not work as hard and will also reduce their borrowing.

Two points need to be made before I conclude. First, a two-period model has been chosen to keep the analysis relatively simple and tractable. A proper analysis of efficiency losses and distributional concerns would obviously require a fully dynamic model of bankruptcy choice. The extension of the current model to an infinite horizon makes the bankruptcy cost at least partly endogenous (see "The Economic Environment," above, for a discussion of the bankruptcy cost); the bankruptcy decisions, therefore, become truly dynamic. I speculate that most of the qualitative results of this article will survive this extension.

A second point to bear in mind is that I assume that the portion of income garnished under Chapter 13 is constant, while in practice it often depends on the debtor's income as well as his or her debts. Relaxation of this assumption clearly would make Chapter 13 more attractive to those with fewer debts and higher labor income shocks.

4. CONCLUSION

The recent surge in U.S. consumer bankruptcy filings has prompted many reform proposals. At the center of these proposals is the issue of consumer bankruptcy choices, specifically whether agents should be encouraged to choose Chapter 13 over Chapter 7.

I have used a simple theoretical model with uninsurable labor income to investigate two sets of issues: What are the financial profiles of those who repay their debts and those who file for bankruptcy under one chapter or the other? and, What are the policy implications of the current reform proposals, including efficiency and distributional concerns? With respect to the first question, I confirm the general view that agents with relatively greater assets prefer Chapter 13, while those with relatively high labor income prefer Chapter 7. I also find that bankruptcy provisions tend to encourage "borrow to save" behavior; that is, some agents will hold low return assets and high risk-premium debt simultaneously. Furthermore, agents with a higher probability of filing for Chapter 13 will exert less labor effort.

I conducted three policy experiments: changes in the bankruptcy exemption under Chapter 7, changes in the percentage of labor income that can be garnished under Chapter 13, and the implementation of a labor income mandate for Chapter 13 filings. The experiments show that a reduction in the asset exemption level, an increase in the percentage of labor income that can be obtained by creditors, and the implementation of a labor income mandate will all encourage Chapter 13 bankruptcy filings over Chapter 7 and the repayment of debt. The efficiency cost of these changes is that agents will exert less effort, causing total output (labor income in my model) to drop. In terms of income and wealth distribution effects, three conclusions emerge. Changes in the asset exemption level affect those with medium assets and medium labor income. Changes in wage garnishment affect those with high assets and medium labor income shock. The implementation of an income mandate affects those with few assets and medium labor income.

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