An Equilibrium Model of the Timing of Bankruptcy Filings [1]

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Abstract

Existing quantitative-theoretic models of bankruptcy do not make a distinction between bankruptcy and default. In reality, default occurs first and is generally – but not always (and perhaps not even typically) – followed by a bankruptcy filing months later. While we possess reasonably sophisticated models of household default, we do not possess a comparably sophisticated model about the timing of a delinquent debtor's filing decision. The aim of this project is to take a step toward developing such a model. The utimate goal is to use the model to quantitatively account for phenomena such as "financial distress" (the period or state during which a delinquent debtor is being pursued by creditors), "informal bankruptcy" (where a delinquent debtor does not file for bankruptcy but neither does she repay or be pursued by creditors) and to understand some of the causal forces affecting the path of bankruptcy filings around the time of the most recent bankrupcty reform as well as secular trends in bankruptcy filings.

Key Words: Bankruptcy Filings, Informal Bankruptcy, Delinquency, Collections Industry

"Poor people and investment bankers have one thing in common: They both spend considerable energy thinking about money." David Shipler, *The Working Poor*

1 Introduction

Existing quantitative-theoretic models of bankruptcy do not make a distinction between bankruptcy and default and proceed as if bankruptcy occurs at the same time as default. In reality, default always occurs first and is typically – but not always – followed by a bankruptcy filing months later. While we possess reasonably sophisticated models of household default, we do not possess a comparably sophisticated model about the timing of a delinquent household's filing decision. The purpose of this project is to take a step toward developing such a model.

There are some potentially interesting facts (and related questions) regarding bankruptcy that a model of the *timing* of bankruptcy filing can address. The first such fact is the phenomenon of "informal bankruptcy" wherein a debtor neither files for bankruptcy nor makes any effort to repay the loan. Why do debtors choose informal bankruptcy and why is it in the interests of creditors to not pursue such delinquent debtors? What determines the size of the pool of informal bankrupts and how would the size change with a change in bankruptcy law?

The second interesting fact regarding the timing of bankruptcy filings has already been mentioned: it appears that debtors wait for some time before they file. The fact debtors typically wait to file is perhaps most clearly evident in the pattern of bankruptcy filings following the passage of the 2005 Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA). This Act was designed to discourage individuals from defaulting on their loans by requiring that debtors pass a means test in order to file under Chapter 7 and by increasing pecuniary as well as the non-pecuniary costs of a bankruptcy filing. The Act was

accompanied by a very sharp upward spike relative to trend in Chapter 7 filings just prior to the law taking effect in mid October 2005 and an equally sharp drop-off in filings after the Act came into effect. A likely explanation of the surge in filings and the subsequent drop is that some debtors who were waiting to file at some date beyond mid-October chose to file under the debtor-friendly law right before it passed out of existence. Why do debtors typically wait before they file? And why is it beneficial for *some* debtors (filings did not fall to zero after the new came into effect) to wait to file until until the last moment before the change in law took effect? Did the incentives of creditors to pursue delinquent debtors also change prior to the change in the law? Did these changes contribute to the surge in filings?

A third reason for developing a model of the timing of bankruptcy filings is to better understand the effects of consumer and debtor-protection laws on the frequency of bankruptcy filings as well as the effects of improvements in collections technology on the secular trend in bankruptcy filings. The federal Fair Debt Collections Practices Act limits the tactics that debt collectors can use against delinquent debtors. State-level variation in the enforcement of debtor-protection laws will engender corresponding state-level variation in the bankruptcy filing rate: states with strong enforcement of debtor protection laws are likely to see fewer bankruptcy filings and more informal bankruptcy. There has also been dramatic improvements in collections technlogy over time. Aside from altering the supply of consumer credit, these technological changes affect the distribution of delinquent debtors between formal and informal bankruptcy. Part of the rising trend in bankruptcy filings over the last 30 years is attributable to the shift of delinquent debtors from informal to formal bankruptcy, induced by a reduction in the cost of debt collection. A model of the timing of bankruptcy filing can potentially quantify the effects of spatial variation in the law and secular improvements in technology on filing rates.

A fourth reason is the following. Suppose we are interested in learning about the propensity to default from bankruptcy filing patterns. For instance, quantitative-theoretic models of bankruptcy suggest that the propensity to default on any given loan ought to be lower follow-

ing the passage of BAPCPA. However, extracting any information regarding the propensity to default from post-BAPCPA filing data is made difficult by the fact that the Act also made filing more costly. The increased cost of filing may increase the length of time individuals spend in delinquency. Also, both the means test and the increased filing cost may alter the size of the pool of"informal" bankrupts. These effects will tend to confound the effects of changes in the propensity to default on filing rates. A model of the timing of bankruptcy filings, in conjunction with a model of default, can help to sort through these different effects.

The paper is organized as follows. Section 2 reviews the literture on bankruptcy filings with a special emphasis on studies that have focused on the phenomenon of informal bankruptcy. Section 3 introduces and solves a delinquent debtor's decision problem, wherein the debtor chooses the timing of his filing or repayment decision. Section 4 introduces the creditor's decision problem, wherein the creditor's decision to pursue a delinquent debtor or not is analyzed. In section 5, the model is used to understand the observed pattern of bankruptcy filings around the time the Bankruptcy Abuse and Prevention and Consumer Protection Act (BAPCPA) took effect in mid October 2005.

2 Literature Review

Consumer bankruptcy has been an area of active research and there is now a fairly extensive empirical and quantitative-theoretic literature on the subject. Turning first to the empirical literature that bears most directly on the topic, Dawsey and Ausubel (2004) were the first to analyze informal bankruptcy and gave the phenomenon its name. They defined informal bankruptcy as "non-repayment without the benefit of the formal bankruptcy process." Using data from a large credit card issuer, they established the prevalence of informal bankruptcy and provided compelling evidence on the importance of the strength of creditor rights in determining the extent to which delinquent debtors resort to informal bankruptcy. In follow-up work, Dawsey, Hynes and Ausubel (2008) further explored the role of creditor rights in

pushing debtors into or out of informal bankruptcy. Among earlier studies, White (1998) noted that more debtors should be filing for bankruptcy than we actually see filing (see also Fay, Hurst and White (2002) and Gross and Souleles (2002)). These studies suggest that bankruptcy may have non-pecuniary costs and that debtors may have substitutes for formal bankruptcy. The current paper builds upon the insights in these papers.

Hunt (2007) has reviewed the evolution of the credit collections industry in the US. He documents the changes in the industrial organization of this industry from small "mom-and-pop" firms to giant collections firms employing sophisticated information and communications technology to pursue delinquent debtors. He also documents that delinquent accounts on the books of original creditors (credit card banks, typically) are now typically sold to these large collection firms. Fedaseyeu (2010) studies the role of the collections industry in determining the supply of unsecured consumer credit by credit card companies.

On the quantitative-theoretic side, Athreya (2002), Chatterjee et al (2007) and Livshits, McGee and Tertilt (2007, 2009) and others have developed general equilibrium models of consumer bankruptcy and used them to understand aggregate statistics on consumer debt and bankruptcy. These studies assume that all defaults lead to formal bankruptcy. Staying within this formulation, Li and Sarte (2006) have studied the decision to file for bankruptcy under Chapter 7 (which gives discharge of debt in return for non-exempt assets) versus Chapter 13 (in which debtors keep their assets but promise to make repayments on the defaulted debt).

The literature on consumer bankruptcy shares many common elements with the literature on sovereign defaults begun in Eaton and Gersovitz (1981). Recent studies (Yue (2009), Benjamin and Wright (2009) and D'Erasmo (2008)) have extended the Eaton-Gersovitz framework to allow for renegotiation of debt following default. Insights from these studies could inform our understanding of the renegotiation between a delinquent debtor and a collections company.

3 Delinquent Debtor's Decision Problem

Consider the decision problem of a delinquent debtor who has income y, needs to repay X, and has experienced past collection efforts summarized by the variable D. As described below, the stock variable D increases if a collection effort is made. What is owed to a creditor by a delinquent debtor typically increases with the length of delinquency because of the accrual of penalty interest payments and various fees. However, a creditor need not collect on everything that is legally owed to him by the delinquent debtor. Here, X is simply that amount that the debtor must pay in order to stop the creditor from harrassing her.

There are three actions available to the debtor. She can file for bankruptcy, she can repay, or she can do neither. We describe the payoff from each of these actions under the assumption that the debtor faces a collection decision rule $z(X, D, y)$, where $z(X, D, y) = 1$ means that the creditor will make collection efforts every period until the debtor either files or repays and $z(X, D, y) = 0$ means that the creditor will not make any collection efforts now or in the future.

The lifetime utility under filing option is given by

$$V^F(X, D, y) = u(y - C) - \theta + \beta/(1 - \beta)u(y). \tag{1}$$

If she files she consumes $y-C$, incurs a psychological discomfort θ (which could be interpreted as stigma costs or other costs from the loss of reputation) and begins next period without having to worry about creditors, the value of which we take to be $(1 - \beta)^{-1}u(y)$.

The lifetime utility under the repayment option is given by

$$V^R(X, D, y) = u(y - X) + \beta/(1 - \beta)u(y). \tag{2}$$

If she repays, her current consumption decreases by X and she does not have to worry about

creditors in the future.

The lifetime utility under not filing or repaying when $z(D, X, y) = 1$ is given by

$$V_1^I(X, D, y) = u(y) - h(D) + \beta V_1(X, D + 1, y), \tag{3}$$

where $h(\cdot) : \mathbb{R}_+ \to \mathbb{R}_+$ is a strictly increasing, continuous, and bounded function. Observe that the disutility stemming from collection efforts, $h(D)$, is experienced only if the creditor makes a collection effort. Here the superscript I is meant to indicate informal bankruptcy.

The lifetime utility under not filing or repaying when the $z(X, D, y) = 0$ is given by

$$V_0^I(X, D, y) = u(y) + \beta V_0(X, D, y). \tag{4}$$

And, finally,

$$V_z(X, D, y) = \max\left\{V^F(X, D, y), V^R(X, D, y), V_z^I(X, D, y)\right\}. \tag{5}$$

Proposition 1. There exist unique and bounded $V_z(X, D, y)$, continuous in D, that solve the functional equation (5). Furthermore, $V_z(X, D, y)$ is decreasing in D.

Proof: Let B be the set of bounded continuous functions defined on $\mathbb{R}_+$ taking values in $\mathbb{R}$. Endow B with the sup norm $\|\cdot\|$. Then, $(B,\|\cdot\|)$ is a complete metric (Banach) space. The functional equation (5) defines the operator $T_{X,\,y,\,z}$ given by

$$T_{X,\,y,\,z}(V)(D) = \max\{V^F(X, D, y), V^R(X, D, y), u(y) - h(D) \cdot z + \beta V(X, D + z \cdot 1, y)\}.$$

We may easily verify that (i) $T_{X,\,y,\,z}(B) \subset B$ (ii) For $V' \geq V$, $T_{X,\,y,\,z}(V') \geq T_{X,\,y,\,z}(V)$ and (iii) For $a > 0$, $T_{X,y}(V + a) \leq T_{X,y}(V) + \beta a$. Thus, $T_{X,\,y,\,z}$ is a Contraction Mapping with modulus β. By the Contraction Mapping Theorem, there exists a unique $V_z(X, D, y) \in B$

that solves (5). Next, observe $T_{X,y,z}$ maps decreasing functions into decreasing functions. Since subset of B consisting of decreasing functions is closed, it is a Banach space in its own right. Therefore, for any decreasing function $\hat{V} \in B$, $\lim_{n\to\infty} T^n(\hat{V})$ is also decreasing. Hence, the solution to (5) is decreasing in D.

□

For $z = 0$ we can guess that $V_0(X, D, y)$ is simply $u(y)/(1-\beta)$. Substituting this guess into (4) and the resulting expression into (5) reveals that the guess, in fact, is correct. Thus, if a debtor is not being pursued, the optimal action is to stay in a state of informal bankruptcy.

If the debtor is being pursued, her optimal behavior depends on the value of θ. We have the following proposition:

Proposition 2. There exists a cut-off θ, denoted $\theta(X, y)$ such that the filing option strictly dominates the repayment option if and only if $\theta < \theta(X, y)$. Furthermore, $\theta(X, y)$ is increasing in X and decreasing in y.

Proof: Note that future utility under either option is the same. So, which option is better is determined simply by the current return. The cut-off θ is determined by equating (1) and (2). This gives $\theta(X, y) = u(y - C) - u(y - X)$. The fact that $\theta(X, y)$ increases with X is obvious; the fact that it decreases with y follows from the strict concavity of u.

□

If $X \leq C$ then $\theta(X, y) \leq 0$. Since $\theta \geq 0$ by assumption, it follows that repaying is either strictly better or at least as good as filing regardless of the psychological cost of filing. Hence, it will be never optimal to file for bankruptcy on small amounts of debt. For $X > C$, $\theta(X, y) > 0$. In this case, for low psychological costs of filing, the filing option is better and for high psychological costs from filing the repayment option is better. Thus, given $X > C$

and y, the debtors get divided into two types depending on their θ. The low θ types are filers and the high θ types are repayers. We can analyze the behavior of filers and repayers separately.

Proposition 3. Suppose the person is a filer. Then (i) there exists $D^F(y) \geq 0$ such that it is (strictly) optimal to file iff $D > D^F(X, y)$ and (ii) if $h(0) = 0$, then $D^F(X, y) > 0$.

Proof: (i) It is sufficient to establish that if it is strictly optimal to file for $D = \hat{D}$, it is strictly optimal to file for $\tilde{D} > \hat{D}$. Observe that if it is optimal to file for $\hat{D}$ then $V^F(X, \hat{D}, y) > V^0(X, \hat{D}, y)$. Now consider $\tilde{D} > \hat{D}$. $V^F(X, \tilde{D}, y) = V^F(X, \hat{D}, y)$ (because V^F is independent of D). And, by the assumption that h is increasing in D, that $z(X, D, y)$ is increasing in D, and (Proposition 1) $V(X, \tilde{D} + 1, y) \leq V(X, \hat{D} + 1, y)$, it follows that $V^F(X, \tilde{D}, y) > V^0(X, \tilde{D}, y)$.

(ii) To prove that if $h(0) = 0$ the threshold cannot be 0 assume to the contrary. Then, $u(y - C) - \theta + [\beta/(1 - \beta)]u(y) \geq u(y) + \beta V(X, 1, y)$. By the threshold property it must be optimal to file for $D = 1$. Hence, $V(X, 1, y)$ must the value from filing. Therefore $u(y-C) - \theta + [\beta/(1-\beta)]u(y) \geq u(y) + \beta\left[u(y - C) - \theta + [\beta/(1 - \beta)]u(y)\right]$. Simplifying this leads to $(1 - \beta)[u(y - C) - \theta] + \beta u(y) \geq u(y)$ which, for $\beta < 1$, is obviously false. Therefore, $D^F(X, Y) > 0$.

□

The same logic applies to the repayment decision as well.

Proposition 4. Suppose the person is a repayer. Then (i) there exists $D^R(X, y) \geq 0$ such that it is (strictly) optimal to repay iff $D > D^R(X, y)$ and (ii) if $h(0) = 0$, then $D^R(X, y) > 0$.

The threshold property makes it easy to get simple expressions for the filing and repayment thresholds. For instance, by the definition of the filing threshold, we know $V(X, D^F(X, y) + 1, y)$ must be given by $u(y - C) - \theta + \beta/(1 - \beta)u(y)$, since it is optimal to file for any

$D > D^F(X, y)$. Therefore, $D^F(X, y)$ is given by

$$D^F(y) = h^{-1}([1 - \beta][u(y) - u(y - C) + \theta]). \tag{6}$$

Similarly, the repayment threshold is given by

$$D^R(X, y) = h^{-1}([1 - \beta][u(y) - u(y - X)]). \tag{7}$$

These expressions for the thresholds allows us to prove some useful properties. The first property is that, given X and y, a filer's filing threshold is lower than a repayer's repaying threshold. This is because the utility flow from repaying is the same for all debtors with the same X and y. Since a filer has a lower psychological discomfort from filing than a payer, a filer is less tolerant of harassment than repayer. Second property is that both thresholds are decreasing in y and, finally, the filing threshold is independent of X and the repayment threshold is increasing in X.

Proposition 5. (i) $D^F(X, y) < D^R(X, y)$, (ii) $D^F(X, y)$ and $D^R(X, y)$ are decreasing in y and (iii) $D^F(X, y)$ is independent of X and $D^R(X, y))$ is increasing in X.

Proof: A debtor is a filer if $u(y - C) - \theta > u(y - X)$. Thus (i) follows from (6) and (7) and the fact that $h(D)$ is strictly increasing in D; (ii) follows from the fact that $u(\cdot)$ is strictly concave; and (iii) is obvious.

□

In what follows,let $f_1(X, d, y)$ and $r_1(X, D, y)$ be the decision rules for filers and repayers who are being pursued by creditors. That is, $f_1(X, D, y)$ is 0 for all $D \leq D^F(X, y)$ and 1 otherwise, and, similarly, $r_1(X, D, y)$ is 0 for all $D \leq D^R(X, y)$ and 1 otherwise.

4 Creditor's Decision Problem

In this section, we determine the creditor's one-time decision rule $z(X, D, y)$. We assume that a creditor observes a debtor's X, C and y but does not observe her θ. Because θ is not observable, the creditor must make assessment of the likelihood that a delinquent debtor is a repayer or a filer. Let p denote the probability that the creditor assigns to the debtor being a repayer.

Let $\pi(X, D, y, p)$ be the expected value to a creditor of pursuing a delinquent debtor in state X, D, y until she repays or files, given that the probability the debtor is a repayer is p. Let $N^R(X, D, y)$ be the *smallest* integer such that $D + N^R(X, D, y) > D^R(X, D, y)$ and let $N^F(X, D, y)$ be the *smallest* integer such that $D + N^F(X, D, y) > D^F(X, D, y)$. Then, N^R and N^F are the number of collection efforts (equivalently, time periods) needed to get a repayer to pay or a filer to file, respectively. Then,

$$\begin{aligned}\pi(X, D, y, p) = p\left\{-k - \frac{k}{1+i} \ldots - \frac{k}{(1+i)^{N^R(X,D,y)-1}} + \frac{X}{(1+i)^{N^R(X,D,y)-1}}\right\} \\ +(1-p)\left\{-k - \frac{k}{1+i} \ldots - \frac{k}{(1+i)^{N^F(X,D,y)-1}}\right\}. \qquad (8)\end{aligned}$$

The decision rule will depend critically on p. We will assume that the creditor assigns probabilities taking into account the decision rules of repayers and filers, namely, the functions $r(X, D, y)$ and $f(X, D, y)$. Note, first that, in fact,

$$p(X, 0, y) = 1 - F(\theta(X, y)), \qquad (9)$$

that is, if the debtor has not been pursued at all, the probability of her being a repayer is simply the probability that her θ exceeds $\theta(X, y)$ – the threshold above which the psychological cost is high enough to make repaying a better option than filing. If the stock of collection efforts, D, is positive (the debtor has been pursued in the past) then cred-

itors must take account of the fact that D has not been sufficiently high to make the person file. Therefore, it must be the case that debtor's θ must be at least as large as $\theta(C, D, y) = h(D)/(1-\beta) - [u(y) - u(y-C)]$. Finally, the creditor must take into account also the fact that if , in fact, the debtor has been pursued beyond the point where she should have filed, she must be a repayer; recall that by Proposition 5, the filing threshold is lower than repayment threshold. Putting all this together we have

$$p(X, D, y) = \begin{cases} \int_{\theta(X,y)}^{\infty} \frac{f(\theta)d\theta}{1-F(\theta(C,D,y))} & \text{if } \theta(C, D, y) < \theta(X, y) \\ 1 & \text{if } \theta(C, D, y) \geq \theta(X, y). \end{cases} \tag{10}$$

Substituting the expression for $p(X, D, y)$ into the expression for $\pi(X, D, y, p)$ gives an expression entirely in terms of the primitives of the environment, which we will denote by $\pi(X, D, y)$. The one-time decision rule $z(X, D, y)$ can be recovered from this expression: $z(X, D, y) = 1$ for all (X, D, y) such that $\pi(X, D, y) > 0$ and 0 otherwise.

We now turn to some properties of $\pi(X, D, y)$. The first property we will establish is that undertaking collection efforts against a delinquent debtor makes the debtor's account more valuable to the creditor. That is, $\pi(X, D, y)$ is increasing in D. Also, the debtor's account is more valuable to the creditor if the debtor has higher income. That is, $\pi(X, D, y)$ is increasing in y.

Proposition 6. $\pi(X, D, y)$ is increasing in D and y and decreasing in k

Proof: From equation (10) it follows that $p(X, D, y)$ is increasing in D. And, both $N^R(X, D, y)$ and $N^F(X, D, y)$ are decreasing in D. Thus, as D increases, the weight of the negative terms in (8) falls. Hence, $\pi(X, D, y)$ increases with D.

An increase in y decreases $\theta(X, y)$ (Proposition 2) and therefore increases $p(X, D, y)$ and an increase in y decreases both $D^R(X, D, y)$ and $D^F(X, D, y)$ (Proposition 5) and, therefore, both $N^F(X, D, y)$ and $N^R(X, D, y)$. All these effects work to increase $\pi(X, D, y)$.

Evidently, the expression in (10) is decreasing in k and, hence, $\pi(X, D, y)$ is decreasing in k.

□

Somewhat surprisingly, $\pi(X, D, y)$ is not monotonic with respect to X. When X increases, the payoff from repayment goes up but by Proposition 2, $\theta(X, y)$ increases and therefore $p(X, D, y)$ falls. Also, by Proposition 5, the repayment threshold increases and therefore $N^R(X, D, y)$ increases. The fall in p and the increase in $N^R(X, D, y)$ work against the increase in X and thus the effect on $\pi(X, D, y)$ of an increase in X is ambiguous. Basically, the higher is X the more likely it is that the the debtor will turn out to be a filer. And, if the debtor is a repayer, it will take longer for the debtor to repay.

Before we close this section we note one important consequence of Proposition 6. We have assumed thus far the that creditor's make a one-time decision whether to pursue a debtor or not. This assumption in not restrictive in the following sense. If a creditor were to revisit his decision to pursue a debtor, the creditor would want to continue to pursue. This follows from the fact that $\pi(X, D, y)$ is increasing in D: if $\pi(X, D, y) > 0$ for some D, it remains positive for all $D' > D$. We summarize this in the following:

Proposition 7. The creditor's decision rule $z(X, D, y)$ is time consistent.

5 Understanding the Effects of BAPCPA on the Pattern of Bankruptcy Filings

BAPCPA 2005 made filing for a discharge of debt more onerous and and disqualified above-median-income debtors from filing for discharge unless their debts were large relative to income. In this section we analyze the effects a tightening of bankruptcy law on the frequency of bankruptcy filings.

We first analyze the effects on the behavior of debtors and creditors following the passage of the law. Consider a delinquent debtor in state (X, D, y) who is no longer eligible to file for a discharge. The decision problem of the debtor who is being pursued then reduces to choosing the timing of repayment (the decision problem of a debtor who is not being pursued does not change). It is clear that the timing of repayment is given by the same expression as in the previous section. Namely, $r(X, D, y) = 0$ if $D \leq D^R(X, y)$ and 1 otherwise, where $D^R(X, y)$ solves equation (7).

Because filing is no longer an option for the debtor, the creditor has to no longer make an assessment whether the debtor is repayer or filer. In effect, $p(X, D, y) = 1$. Thus, $\pi(X, D, y)$ is higher following the passage of the law. This means that delinquent accounts that were not being pursued prior to the passage of the Act may be pursued by creditors after its passage. Therefore, on this count alone, there is likely to be a decrease in the stock of debtors in informal bankruptcy. Also, accounts that were being pursued prior to the change in law will continue to the pursued after its passage. Since all these accounts will now lead to repayment (eventually), the frequency of the filing rate will fall on this account.

Next consider the effects of an increase in filing costs C. Observe that increase in C lowers $\theta(X, y)$ and thus increases the fraction of delinquent debtors who find it optimal to repay rather than file. But the increase in C also increases the filing threshold $D^F(X, y)$ (while leaving the repayment threshold unchanged). The first effect raises $\pi(X, D, y)$ while the second effect lowers it. On balance, it is not clear whether this change will lead to greater or fewer numbers of delinquent debtors being pursued. In any event, the change will lengthen the time to filing for delinquent debtors who continue to find it optimal to file.

We now consider that effects on behavior of an anticipated tightening of bankruptcy law. We know that the law induced a huge spike in bankruptcy filings right before the it took effect. Can the model explain this behavior? To answer this question, assume that the intended passage of the law becomes known in the current period – period 0 to be concrete. The law is expected to take effect in period T.

Consider a delinquent debtor in state (X, D, y) who is currently being pursued by creditors and who is ineligible to file for bankruptcy under the new law. If the debtor is a repayer, the anticipated change in the law has no effect since the law takes away an option that is not relevant for her. If the debtor is a filer – i.e., she intends to file for bankruptcy under the current law – then two cases are possible. If $N^F(X, D, y) < T$ then, again, the anticipated change in the law has no effect on her behavior because she intends to file for bankruptcy before the new law takes effect. If $N^F(X, D, y) \geq T$ then the anticipated change does effect her since she can no longer follow through on her current plan.

This debtor has two set of options open to her. She could choose to file for bankruptcy any time between now (period 0) and period $T-1$, or, she could choose to repay her debt at any time. Since the option to repay is not affected in any way by the anticipated change in the law, the optimal time to repay continues to be $N^R(X, D, y)$ (which, by Proposition 5 is at least as large as $N^F(X, D, y)$, and, therefore, at least as large as T). Among her other set of options, given that she would prefer to file on or after period T, the best option is to file in period $T-1$. Thus, this debtor must choose between (i) filing in the period right before the new law goes into effect (period $T-1$) and (ii) repaying her debt in period $N^R(X, D, y)$.

Which of these two option dominates depends on upon how much higher $N^F(X, D, y)$ is in comparison to $T-1$. Since filing on $N^F(X, D, y)$ is strictly better than repaying on $N^R(X, D, y)$, filing on $T-1$ might be the best option if $T-1$ is close to $N^F(X, D, y)$. In this case, the loss in utility from moving up the filing date will be small and would, presumably, continue to dominate the repayment option. On the other hand, if $N^F(X, D, y)$ is well beyond $T-1$, the loss in utility from moving up the filing date to $T-1$ might make the repayment option more attractive. Thus, the model is consistent with the spike in filing observed just before the new law took effect. However, the model also predicts that not all debtors who would have filed in the absence of the change in law would be part of this "rush to file." Some erstwhile filers would prefer to forgo the option to file and repay their debts some time after the new law takes effect.

We turn now to the effects on debtors who remain eligible to file under the new law but face a higher filing cost if they file on or after T than if they file on or before $T-1$. Once again, the anticipated change in the law affects only those debtors who intended to file on or after T. The options open to these debtors are to (i) file under the old law in period $T-1$ (by the same logic as above, we can ignore the option to file earlier than $T-1$), (ii) repay their debt on $N^R(X, D, y)$, or (iii) file on $\bar{N}^F(X, D, y)$, where $\bar{N}^F$ is the optimal filing date under the new, higher, filing cost; it is evident from equation (6) that $\bar{N}^F(X, D, y) > N^F(X, D, y)$.

Once again, there are two dimensions that are relevant for predicting which option the debtor will choose. The first dimension is how close $T-1$ is to $N^F(X, D, y)$. If the two dates are close, the utility loss (holding fixed the filing cost) of moving up the filing date will be small. The second dimension is how much less utility is afforded by the best of the other two option relative to the utility of filing on $N^F(X, D, y)$ under the old filing cost. For debtors for whom there is a relatively large gap between these utilities and who would have filed on or shortly after T under the old law, the best option is likely to be (i) – that is, these debtors would file right before the new law takes effect and thus contribute their numbers to the spike in filings.

We now turn to the impact on creditors of the anticipated change in the law. From the perspective of creditors, the expected profitability from pursuing a debtor with $N^F(X, D, y) \leq T-1$ is unaffected by the anticipation of the change in bankruptcy law. Thus, if the debtor was worth pursuing prior to the anticipation of the change, she will be worth pursuing following the change.

Consider, then, the expected profitability from pursuing a debtor for whom $N^F(D, X, y) \geq T$ and who would become ineligible to file for bankruptcy following the change in the law. Then, if this debtor is a filer under the old law, she will either choose to file in period $T-1$ or she will repay in period $N^R(X, D, y)$. Both these new possibilities increase expected profitability. The latter increases it for the obvious reason. The former increases it because it reduces the loss a creditor suffers from pursuing a debtor who turns out to be a filer: if the pursued debtor

is a filer, the sooner that fact is revealed to the creditor the lower his losses from pursuit. Thus, the anticipation of a tightening in bankruptcy law has the interesting effect of making some delinquent accounts more valuable conditional on being pursued. This means that accounts that were not pursued prior to the announcement of tightening may be pursued following the announcement. Since some of these accounts will result in a filing in period $T-1$, this is another channel contributing to the spike in filing immediately prior to the change in the law.

Next, consider debtors for whom $N^F(X, D, y) \geq T$ and who remain eligible for discharge following the change in the law. Then if this debtor would is a filer under the old law, she will either choose to (i) file in period $T-1$, (ii) repay in period $N^R(X, D, y)$ or (iii) file in period $\bar{N}^F(X, D, y)$. The first two effects work to make the delinquent account more valuable to creditors (conditional on pursuit) the third effect works to make it less valuable. This is so because if the debtor is a late filer under the new law, that fact will take longer to be revealed and the creditor will suffer bigger losses from the pursuit. Now the anticipation effect can go either way. An account that was valuable to pursue prior to the announcement may not be worth pursuing following the announcement or vice versa.

In summary, the effects of an announcement of a tightening of bankruptcy law in the model are consistent with a surge in filings just prior to the new law taking effect (as observed). The surge arises from changes in the behavior of both debtors who are being pursued by creditors, some of whom may choose to file right before the change in the law, and from changes in the behavior of creditors who may choose to pursue debtors they previously ignored.

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