Bankruptcy and Delinquency in a Model of Unsecured Debt

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Abstract

Limited commitment for the repayment of consumer debt originates from two places: (i) formal bankruptcy laws granting a partial or complete legal removal of debts under certain circumstances, and (ii) informal default and renegotiation, "delinquency." In the US, both channels are used routinely. The usefulness of each of these routes as a way out of debt depends on the costs and benefits available through the other: delinquency exposes a household to collections processes initiated by lenders, while formal bankruptcy appears to carry more visible consequences for future transactions, including restrictions to even secured forms of credit.

This paper introduces a model of unsecured consumer credit markets in the presence of both bankruptcy and delinquency. A key feature of our model is to allow lenders to deal with debtors in delinquency by choosing the (implicit) interest rate on debt owed by delinquent borrowers to maximize the market value of these obligations.

We show that these two options to default on unsecured debt indeed interact in important ways. We first show that households with a large amount of debt who have received negative income shocks prefer delinquency. As long as their income does not improve, they remain there. This behavior occurs as lenders' optimal behavior is to offer write-offs to households in delinquency, but only when they have very low incomes. As income improves, lenders can extract more from the households that stay delinquent, so the households look to reorganize their financial situation by either repaying the debt or filing for bankruptcy.

We also show that stricter control of delinquency, defined by a relatively high ability to garnish wages, increases the risk of bankruptcy and lowers equilibrium credit use, in line with cross-state comparisons in the U.S. From a normative perspective, such policies lower welfare, in part because they encourage excessive use of bankruptcy.

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1 Introduction

Personal bankruptcy is a formal procedure that removes unsecured debt obligations subject to some costs. It is used by a large number of U.S. households each year, with greater than 1 million filings annually in each of the past two decades. Bankruptcy is, however, not the only route available for households to delay or lower their debt obligations: they can simply stop repaying as promised—and payment delayed can become payment denied. Faced with such actions by borrowers, lenders retain access to the legal right to seize resources from such delinquent account holders. Most prominently, lenders may garnish wages, subject to court approval. However, lenders' ability to credibly promise to take such actions ex-post is limited by the fact that the household always retains formal bankruptcy as an option. Subject to this constraint, competitive lenders will be forced, ex-post, to strike a deal—generally by revising the principal and/or interest on the loan.

The process of obtaining debt relief via delinquency has been termed "informal bankruptcy" by Ausubel and Dawsey (2004), who analyze data from a large United States issuer of MasterCard and Visa card accounts and find that a nontrivial fraction of debts do get modified in this way: In their data, 8.8 percent of the debtors were delinquent for at least two months, 1.3 percent entered informal bankruptcy and had their debts written off by lenders, and 1.5 percent filed formally for bankruptcy.[1] They conclude that "an economic model of consumer lending that assumes formal bankruptcy as the only alternative to repayment misses an essential branch of the tree."

Our goal in this paper is to model this branch and understand the role it plays in unsecured credit allocation to US households. The ability to default on debt without formal declaration of personal bankruptcy is important for at least two related reasons. First, as mentioned above, the option to informally default through delinquency may matter for the decisions of households with respect to formal bankruptcy–and vice versa. Agents who opt to become or remain delinquent and put off bankruptcy choose to face the costs of delinquency because they view them as preferable to the costs they associate with formal bankruptcy, even when the latter leaves any future income "free and clear" (in the case of

[1] Their study is representative of approximately the top 50% of the U.S. population as ranked by credit history.

the predominant form, Chapter 7 "liquidation" bankruptcy). The reasons here have to do with the relative short-term costs of the option, but also with the path of expected future income. In the case of delinquency, these costs are expected levels of wage garnishment and potentially increased costs of rolling over debt. In the case of formal bankruptcy, the losses are determined by the extent to which agents face court- and stigma-related costs.

Importantly, one possibility is that households routinely find delinquency preferable to bankruptcy, at least initially. That is, delinquency may simply be a stop en route to a bankruptcy that was always part of a household's optimal plan. However, it may also be a gamble by households that, by surviving temporarily via delinquency, they will receive better income draws that will allow them to avoid any costs associated with bankruptcy. Of course, the costs of delinquency at any date will rise as expected future household income rises—since the expected present value of payment via garnishment will rise, all else equal. Thus, bankruptcy may even be used by some agents with high expected future incomes, but who currently have large debts. *Ex ante*, this constellation of outcomes is unlikely, but this consideration shows that the interaction of these options may be important for the dates, states, and extent to which households repudiate debt.

Second, the option to remain delinquent means that households still retain the ability to partially repudiate debts, even when legally speaking, they are obligated to repay. This observation implies that the reach of formal bankruptcy law—including bankruptcy *reform*—is potentially quite limited in its ability to alter allocations. In essence, limits to commitment for debt repayment may well be insensitive to what the law notionally suggests it is.

From a positive perspective, the potential limitations on the ability of bankruptcy reform to affect real allocations in the presence of delinquency is obviously of entirely practical concern. In 2005, there was a sweeping reform of bankruptcy law (BAPCPA) that, in principle, made legally binding debt relief substantially more difficult to obtain. Under the reform, a measure of households that would have previously qualified for a discharge from their unsecured debts would now be forced—if they took the route of bankruptcy—to reschedule a portion of that debt. Of course, households could also simply stop paying and

obtain debt relief. To the extent that this option is seen as better, the bite of the reform would be limited. Unfortunately, the timing of the reform coincided with the deepest financial crisis and recession since the Great Depression, confounding meaningful empirical inference about its effect.

Nonetheless, recent work is suggestive that the relative costs of default matter in a related manner. Li, White, and Zhu (2010), Ashcraft, Astrid, and Morgan (2007), Lilienfeld-Toal and Mookherjee (2010) have all suggested that the reform led to greater *mortgage* default, as households worked harder to repay unsecured debts than they otherwise might. While our focus is not on the choice between mortgage default and unsecured debt default (in part because such a question would require a model of house price declines given the secured nature of mortgage debt), what *is* relevant is that there may indeed be a tradeoff between delayed repayment or non-repayment in one form versus another.

From a normative perspective, there is an important reason to allow for a meaningful delinquency option. Existing research aimed at measuring the role played by bankruptcy has concluded that punishments harsh enough to rule out any possibility of debt default are always preferable to policies that allow repudiation. In fact, barring the case where households obtain insurance from bankruptcy because they face shocks large enough to render their budget sets empty, Athreya, Tam, and Young (2009) show that, for a very wide constellation of preferences and endowment processes, allowing default leads to worse allocations than "banning it."

The problem is that "banning it" may simply not be a reasonable policy implication. Societies seem uninterested in creating, not to mention imposing, draconian penalties. One reason could simply be because the models miss something important in their specification of preferences and endowments but, as noted, this is not an easy intuition to validate with standard models. The other reason is that societies may suspect that the real tradeoff is *not* between harsh bankruptcy and lax bankruptcy law at all—as all existing work has emphasized—but rather between "(more) bankruptcy vs. (less) delinquency."

If harsh bankruptcy law simply generates higher socially-costly delinquency rates, then unless one views delinquency as less socially costly (at least *ex post*), there may be little

gain, and possibly a loss, from such a policy. Conversely, a harsh regime of garnishment for those opting to remain delinquent may simply lead the majority of such households to go bankrupt and, moreover, to do so immediately upon receipt of any relatively bad shock to labor income. Thus, the relative costs borne by individuals and society through both the deadweight losses coming from each of these two routes and the implications of each for the pricing of debt (and hence access to credit) are what will determine the desirability of any level of *relative* harshness in bankruptcy law.

In this paper, we contribute to the literature by taking seriously the positive and normative aspects of the preceding logic. We provide, to our knowledge, the first analysis of consumer credit in the presence of both formal bankruptcy and informal bankruptcy or "delinquency." To do so requires us to endow the household with an extra option absent in existing work and to work backward to determine the role played by delinquency and bankruptcy in limiting or enhancing the attractiveness of the other option. Our goal is to better isolate and understand the nature of the relationship between the two empirically most relevant ways in which households alter repayment relative to *ex ante* agreements. To this end, we will study the consequences of borrowing, default, and welfare of a more stringent "wage garnishment" regime.

Lastly, from a purely empirical perspective, there is an important payoff to our approach. By including delinquency we provide an explanation for the apparently low formal filing rates first identified by Fay, Hurst, and White (1998): many households choose delinquency initially; some eventually become solvent, some never repay and are effectively written off, and some formally file for debt relief. On this point, we show that, in broad terms, bankruptcy and delinquency are "substitutes," with increases in the costs of one option substantially increasing use of the other. We also show that, indeed, many who eventually declare bankruptcy "pass through" delinquency first. We show that increases in the stringency of delinquency by means of high permissible levels of garnishment are rather counterproductive: it increases credit losses to lenders and as a result inhibits household risk management and lowers welfare. We also find that delinquency is likely to be of help to households that are temporarily dealing with large transitory shocks, as such events are

by definition hard to deal with without some delay in repayment, but unlikely to last long enough to justify paying the costs of formal bankruptcy.

2 Model

We introduce delinquency into an otherwise standard (see e.g. Athreya, Tam, and Young, 2009) quantitative model of life cycle consumption-savings with bankruptcy; delinquency is a mean of delaying the option of bankruptcy, which requires one period of legal exclusion from credit markets to exercise and also carries a utility cost, or stigma. We endogenously determine the interest rate on delinquent accounts by allowing lenders to "mark up" or "charge off" delinquent accounts, but their ability (and interest) to do so is limited by both the option to declare bankruptcy and the presence of potential entrants; interest rates on new loans are competitively determined by zero-profit conditions. We then use the model to address a variety of facts about unsecured credit (e.g., the fraction of households with negative net worth and debt-income ratios among borrowers), formal bankruptcy (e.g., filing rates and debt discharged via bankruptcy), and delinquency (e.g. delinquency rates and delinquency histories).

2.1 Endowments

Households live for $j = 1, 2, ..., J$ periods and receive stochastic endowments as a function of their permanent "type" y, to be interpreted as a household's formal schooling attainment level. Let the mean of log endowments at age-j for a type-y household be given by $\omega_{j,y}$. Households face risk to their incomes that arise from both persistent components, $e_{j,y}$, and transitory components, $\nu_{j,y}$

At any age-j, a household wishing to borrow may issue one-period debt with a face value b_j. Households issue all debt to a single lender. In the following period, the household can do one of three things: (i) they can repay their debts as promised, (ii) they can file for formal bankruptcy protection that immediately relieves them of any obligations to repay their debt, or, as will be emphasized here, (iii) they can simply not repay the debt as

promised. The last option is what we refer to as "delinquency."

Let $\mathbb{I} = (y, e, \nu, j)$ denote a household's characteristics. Let b_j denote debt issued in the current period. The ability to avoid a full repayment when it is due in the following period implies that the household's debt will be discounted relative to its face value with price $q(b, \mathbb{I}) : b \times \mathbb{I} \longrightarrow [0, 1)$. We now detail the effects of each option on current resources and then turn to the differing dynamic consequences each choice induces.

2.2 Budget Constraints

A household that repays its debts as promised has a completely standard budget constraint. It is given as

$$c_j + q(b_j, \mathbb{I})b_j = b_{j-1} + \omega_{j,y} e_{j,y} \nu_{j,y}. \tag{1}$$

A household that formally declares bankruptcy is, as noted, relieved of any obligations to repay its debts. However, there is an immediate consequence that appears in the budget constraint: the household cannot save or borrow in the current period, and formally declares bankruptcy consumes real resources ζ, arising from court costs and legal fees. Therefore consumption is

$$c_j = \omega_{j,y} e_y \nu_y - \zeta, \tag{2}$$

and where

$$b_j = 0. \tag{3}$$

Lastly, a household that decides to skip debt payments, but does not seek formal bankruptcy protection, is said to be in delinquency. In this case, the household's budget constraint is again one where the household cannot borrow or lend in the current period. However, a household that is delinquent immediately faces garnishment of its income. As a result, given that a proportion of its income $\psi \geq 0$ is garnished, the household is left with current period consumption

$$c_j = (1 - \psi)\left(\omega_{j,y} e_{j,y} \nu_{j,y}\right). \tag{4}$$

In terms of current consequences for available resources, then, the difference between bankruptcy and delinquency is simply the income lost in delinquency. However, there are also consequences for the effect of expenditures on the utility of current consumption, as well as differing dynamic consequences, as we now describe.

2.3 Value Functions

It is easiest to describe the household's problem in recursive terms. First, let $\mathbb{I}' = (y, e', \nu', j+1)$, n_j be the effective size of the household in adult-equivalents, σ be the coefficient of relative risk aversion, and $s_{j,y}$ be a household's one-period-ahead conditional survival probability. Let b_{-1} denote debt due in the current period, and b denote any new debt issued in the current period. The discount factor β_y is permitted to vary by education. Lastly, let the indicator $d = \{0, 1, 2\}$ denote complete repayment, delinquency, and bankruptcy, respectively.

We assume the felicity function is CRRA with parameter $\sigma > 1$. Thus, for a household that chooses in the current period to repay debt normally, the optimal solution of the household's problem satisfies

$$v^{d=0}(b_{-1}, \mathbb{I}) = \max_{b} \left\{ \frac{n_j}{1-\sigma} \left(\frac{c_j}{n_j} \right)^{1-\sigma} + \beta_y s_{j,y} \sum_{e',\nu'} \pi(e'|e)\, \pi(\nu')\, v(b, \mathbb{I}') \right\}, \tag{5}$$

subject to (1).

The remaining lifetime utility of a household that chooses not to repay, but instead becomes delinquent, obeys the functional equation

$$v^{d=1}(b_{-1}, \mathbb{I}) = \frac{n_j}{1-\sigma} \left(\frac{c_j}{n_j} \right)^{1-\sigma} - \delta + \beta_y s_{j,y} \sum_{e',\nu'} \pi(e'|e)\, \pi(\nu')\, v(h(b_{-1}, \mathbb{I}), \mathbb{I}') \tag{6}$$

subject to (4).

We see here that the household not only faces wage garnishment in each period, but also faces a utility cost $\delta > 0$, reflecting all additional costs associated with remaining delinquent. This cost includes, most obviously, any "psychological" costs of lenders' collections

efforts, along with a variety of costs associated with poor credit. The key to this problem is that in the following period the household faces a revised debt obligation $h(b_{-1}, \mathbb{I})$.

Lastly, when a household invokes formal bankruptcy protection, the continuation payoff is given by the solution to

$$v^{d=2}(b_{-1}, \mathbb{I}) = \frac{n_j}{1-\sigma}\left(\frac{c_j}{n_j}\right)^{1-\sigma} - \lambda + \beta_y s_{j,y} \sum_{e',\nu'} \pi(e'|e)\,\pi(\nu')\,v(0, \mathbb{I}'), \tag{7}$$

$$\text{subject to (2).}$$

Here, it should be noticed that the key advantage of bankruptcy relative to delinquency is that the household will enter the next period with *no debt*—as seen in the term $v(0, \mathbb{I}')$. However, in the current period, we see that, as with delinquency, household expenditures generate a lower level of utility than they would otherwise. We allow the transactions costs on consumption expenditures arising from the default actions of delinquency and bankruptcy to vary, rather than restricting them to be equal. Indeed, they will not be equal: it will turn out in our calibration that $\lambda > \delta$; i.e., bankruptcy is costlier than delinquency in terms of the current effect on the utility of consumption.

Given the options available to a household in a given period, their expected maximal lifetime utility satisfies

$$v(b_{-1}, \mathbb{I}) = \max\left\{v^{d=0}(b_{-1}, \mathbb{I}), v^{d=1}(b_{-1}, \mathbb{I}), v^{d=2}(b_{-1}, \mathbb{I})\right\}.$$

In addition to the effects on current income or utility, the main distinction between bankruptcy and delinquency is that the latter leaves the household with remaining debt obligations. To describe this, consider a household that has ceased repayments and now stands delinquent. In this case, the lender must decide how to restructure in light of the household's decision. It will choose the revised face value of debt $\widehat{b}$ to maximize the value of obligations, taking as given the household's future options to declare bankruptcy, remain delinquent, or become "current" on debts. Let the mapping from initial delinquent debt

b_{-1} and the revised debt, as a function a household's characteristics, $\mathbb{I}$, be given by $h(\cdot)$:

$$h\left(b_{-1}, \mathbb{I}\right) = \arg\max_{\hat{b}} \left\{ \hat{b} q\left(\hat{b}, \mathbb{I}\right) \right\}. \tag{8}$$

This function is key in our analysis because it determines the evolution of the face value of debt in the case of delinquency. The revision of debt implies an interest rate on delinquent debt that we will focus our theoretical section on characterizing.

The problem that leads to the function $h(\cdot)$ can be thought of as arising from a take-it-or-leave-it bargaining game, in which the lender makes the offer. However, since the borrower has the option to do nothing (that is, to remain delinquent) and also to go bankrupt, it is not obvious that the lender has a significant amount of bargaining power.

2.4 Pricing Function

The price function will, of course, be very important for our analysis. It is trivial in the case of saving, $b \geq 0$,

$$q\left(b, \mathbb{I}\right) = \frac{s_{j,y}}{1+r}, \tag{9}$$

where r is the risk-free rate. However, when households borrow, $b < 0$, the price function will be the solution to a functional equation. In particular, this function will solve

$$q\left(b, \mathbb{I}\right) = s_{j,y} \frac{\mathbb{Q}}{1+r+\phi}, \tag{10}$$

where ϕ is a transaction cost of intermediation that applies only to borrowing and $\mathbb{Q}$ is given as follows:

$$\begin{aligned} \mathbb{Q} = & \sum_{e',\nu'} \pi\left(e'|e\right) \pi\left(\nu'\right) \times \\ & \left(\mathbf{1}\left(d\left(b, \mathbb{I}'\right) = 0\right) + \mathbf{1}\left(d\left(b, \mathbb{I}'\right) = 1\right) \left[\psi\left(\omega_{j+1,y} e'_y \nu'_y\right) + \frac{q\left(h\left(b, \mathbb{I}'\right), \mathbb{I}'\right) h\left(b, \mathbb{I}'\right)}{b} \right] \right). \end{aligned}$$

The last equation should be carefully considered. This is the price function for debt with risk of bankruptcy *and* risk of delinquency. First, consider states in which the household chooses the case of full repayment, denoted by the case $d = 0$. In these cases, lenders get one dollar per dollar lent. Next, consider the role of states in which households choose

bankruptcy ($d = 2$). Given that lenders obtain nothing in cases of bankruptcy, no terms referring to that state are explicitly included. Notice that in this case both $d \neq 0$ and $d \neq 1$. Therefore, the RHS of the preceding equation collapses to zero in all states next period in which bankruptcy is declared. Finally, and more interestingly, focus on states that lead households to choose delinquency, whereby $d = 1$. In these cases, the final term on the RHS is activated. Because lenders can garnish part of the household's income, we obtain the term $\psi\left(\omega_{j+1,y} e'_y \nu'_y\right)$. But creditors of currently delinquent borrowers can also adjust the interest rate or the face value of debt for the next period. Recall that this decision is made to maximize the market value of debt per dollar lent, $q\left(h\left(b, \mathbb{I}'\right), \mathbb{I}'\right) h\left(b, \mathbb{I}'\right)/b$, where the choice of h was described in equation (8). Thus, we have a recursive representation for the evolution of debt and interest rates *along the path* in which in households remain delinquent.[2]

3 Theoretical characterization

We now present a theoretical characterization of our model. Before that, we add an assumption that will hold in all our quantitative exercises. In particular, we assume that the costs in the current period of delinquency are smaller than the costs in the current period of bankruptcy: $\delta < \lambda$. However, because bankruptcy generates complete debt forgiveness both may be used in equilibrium.

The first property of our model that is worth highlighting is that h is independent of previous obligations b_{-1}. As a consequence, hereafter we write it as $h\left(\mathbb{I}\right)$.[3] This observation makes it feasible for us to prove the following proposition.

Lemma 1 *$v\left(b_{-1}, y, e, \nu, j\right)$ is weakly increasing in b_{-1} and strictly increasing in ν.*

[2]The fact that one can write these prices as functional equations was noticed in the literature on international finance by Hatchondo and Martinez (2009) and Chatterjee and Eyigungor (forthcoming) and also used by Hatchondo, Martinez, and Sanchez (2011) in a model of mortgage default.

[3]In the presence of interest rate ceilings, this independence may not hold; we are studying the effects of ceilings in ongoing work.

This result is used in the next lemma, which characterizes the default decision in terms of the current amount of debt, b_{-1}.

Lemma 2 *The following statements are true about the current stock of debt, b_{-1}, and the decision between bankruptcy, delinquency, and debt repayment:*

1. *Suppose a household with state $(b_{-1}, \mathbb{I})$ chooses bankruptcy. Then, a household with state $(\widehat{b}_{-1}, \mathbb{I})$ with $\widehat{b}_{-1} < b_{-1}$ also would choose bankruptcy*
2. *Suppose a household with state $(b_{-1}, \mathbb{I})$ chooses delinquency. Then, a household with state $(\widehat{b}_{-1}, \mathbb{I})$ with $\widehat{b}_{-1} < b_{-1}$ also would choose delinquency*
3. *Suppose a household with state $(b_{-1}, \mathbb{I})$ chooses debt repayment. Then, a household with state $(\widehat{b}_{-1}, \mathbb{I})$ with $\widehat{b}_{-1} > b_{-1}$ also would choose debt repayment.*

This results implies that households with little debt choose repayment and households with large debt choose either delinquency or bankruptcy. It also implies that the choice between these two decisions depends on income and not on the stock of debt.

The next proposition states the main theoretical result.

Proposition 1 *A delinquent household borrows the amount of debt in delinquency until the next period at an implicit interest rate that can never be higher than the corresponding market rate.*

The intuition is simple. Households in delinquency are forcing creditors to lend the delinquent amount. If the interest rate that creditors apply to that debt is higher than a market rate that is available for a households with those characteristics trying to borrow the amount to be able to rollover those obligations, then the household would prefer avoiding delinquency.

4 Calibration

We now study the quantitative properties of the model. To maintain comparability to existing work, wherever possible, the parameters are taken from previous estimations.

Notably, the income process is completely standard and partitions households into three educational groups: those with less than a high-school education, those who have completed high school and those who have completed college. We follow, in particular, the work of Hubbard, Skinner, and Zeldes (1995).

We focus throughout on stationary equilibria in which decisions remain constant functions of the household's state over time. Both the income process and risk-free rate are, for simplicity, modeled as exogenous. Other parameters are calibrated to match specific targets regarding bankruptcy. We calibrate five parameters in this manner: β's, preference discount factor for each education group; δ, cost of delinquency; and λ, cost of bankruptcy. The targets are five moments: the bankruptcy rate for each of the three education groups, the relative income of bankruptcy filers to the entire population, and the median age of bankruptcy filers. For the benchmark model we set the garnishment rate ψ to zero.

The obtained parameters and the model's fit of targeted moments are presented in Table 1. The incidence of bankruptcy, as measured by the bankruptcy rate, and the characteristics of bankrupt households, as described by relative income and median age, are replicated by the model remarkably well.

The parameters obtained by this method are in the range of values used in previous studies. Nevertheless, our benchmark calibration implies that the households under study are less patient than is typically implied by models that assume complete markets. In models such as ours with incomplete markets stemming from uninsurable risk, discount factors of close to 0.9 are not unusual. For example, Davila, Hong, Krusell, and Rios-Rull (2011) features discount factors below 0.9, as does the earlier estimation of Cagetti (2003); these papers require a low discount factor in order to mitigate strong precautionary savings motives. In contrast, our focus is on households' use of expensive unsecured credit—in order for households to borrow at observed interest rates they must be quite impatient on average.

Our model's risk aversion coefficient of four is also somewhat larger than complete markets models dictate. This, as above, is related to our allowance for market incompleteness as well as the life cycle dimension of the model. Specifically, the coefficient of risk aversion

also dictates the interest elasticity of saving, the desire for intertemporal smoothing, and hence, households' demand for borrowing. And here again, our parametrization is close to values formally estimated using SCF and PSID data in the similar model of Cagetti (2003).[4]

5 Further characterization of the model

5.1 The incidence of delinquency and the implied interest rates

There are two questions about the performance of the model that will be discussed now. The first important question is: will bankruptcy and delinquency coexist in equilibrium? While our model allows for both, there is no guarantee that they will be used in equilibrium.

Table 2 shows that the answer is "yes." The model predicts that some households will enter into delinquency, and remain there. Table 2 presents statistics of delinquency generated with the benchmark model. The percentage of accounts in delinquency is different for the three education groups considered. Households with a college education enter delinquency only in 0.47 percent of the cases. Households with less education are delinquent more often. The delinquency rate for households with a high school education or less than high school education is 3.2 percent and 1.8 percent, respectively. This rate is similar to, but somewhat lower than, the measure of delinquency reported by the Federal Reserve: between 2004 and 2007 the 30-day delinquency rate is between 3.6 and 4.6 percent for credit cards and between 2.7 and 3.2 percent for all consumer loans.[5] The fact the delinquency rate is lower in the model than in the data is expected because delinquency in the data is reported based on a 30-day period and in the model a household must be at least a year delinquent (thus, our model will miss delinquency lasting less than one year). To the extent that in reality delinquency is a transitory phenomena, the model will predict a lower delinquency rate.

Table 2 also presents other measures of delinquency, such as the percentage of debt

[4] In fact, Cagetti (2003) estimates values for some educational groups in excess of five.

[5] Obtained from the Federal Reserve Board website.

in delinquency and the recovery rate for debt in delinquency. These statistics show that delinquency is actually important in the model. However, we emphasize that it is not straightforward to locate a well-documented empirical counterpart for this set of statistics.

The second relevant question to evaluate the quantitative relevance of the model is: does the model generate high interest rates? Table 3 presents the mean of interest rate spreads for borrowers of different education groups. Recall that the transaction cost associated with lending is 3 percent. Thus, in the absence of delinquency and bankruptcy we would expect an interest rate spread of only 3 percent. The model generates much higher spreads, as shown in Table 3. Additionally, spreads are of similar magnitude in the data: this spread was about 7 percent in 2008, and it is between 6.7 and 11 percent in our model.[6]

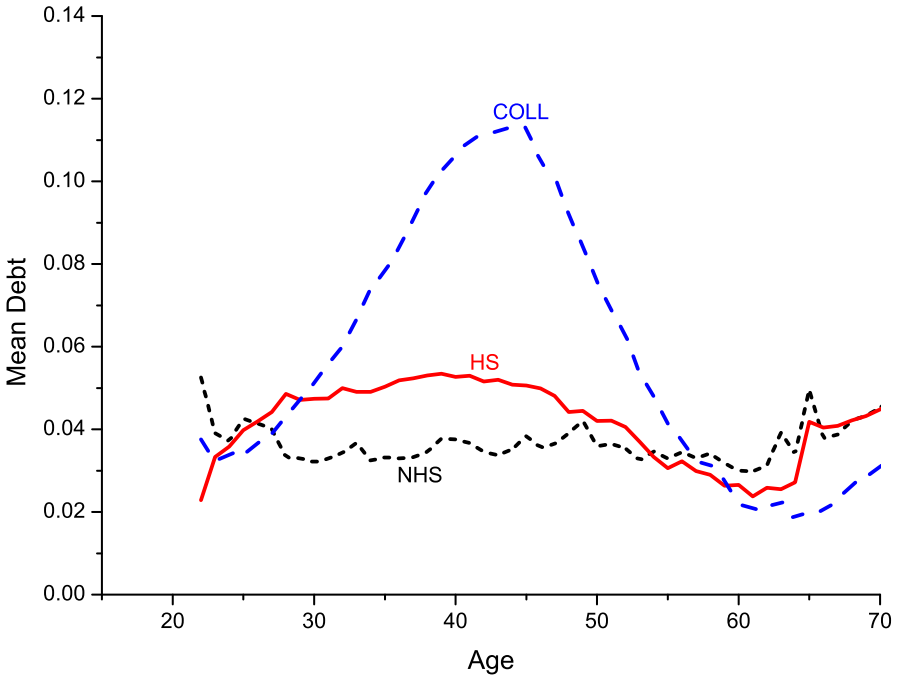
5.2 Debt and default over the life cycle

Which groups of households borrow more, and when, in the life cycle? Figure 1 displays the evolution of mean debt over the life cycle. The most clear pattern is that households with more education have more debt and display a more pronounced hump-shaped profile of debt. For scale, note that we normalize overall mean income to one and that the skill premium for college graduates is approximately 1.6. In particular, the debt of households with a college education increases rapidly until age 34 and then decreases. The debt for households with high school education peaks earlier, at 28 years old, and its level is lower; additionally, both the rise and the drop are less pronounced. Finally, the life cycle profile of the mean debt for households with less than high school education is relatively flat. The indebtedness of this group is lower than that of the two other groups until age 46, but then is higher.

This raises the question: what explains the life-cycle profiles of borrowing? The explanation is in Figures 2 and 3. First, households borrow to smooth the life-cycle profile of consumption relative to the one for income. In particular, Figure 2 shows that the productivity profile of households with college education is very steep and peaks very late, at more

[6]The measure in the data is computed as the credit card interest rate (from the Federal Reserve Board website) minus banks prime loans obtained from the same source.

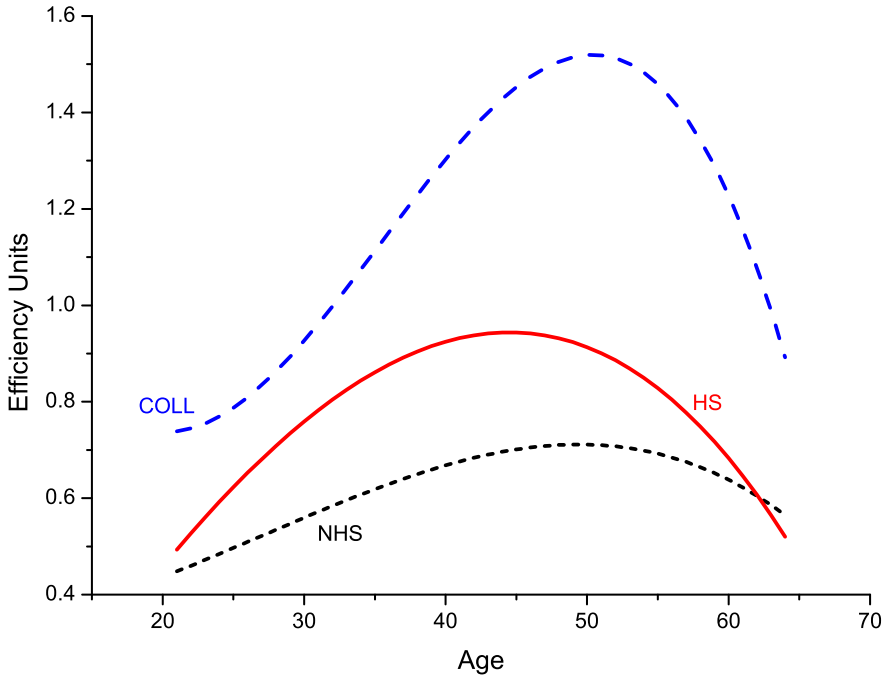
Figure 1: Life-cycle profile of debt by education group



than 50 years of age. The productivity profile of households with high school education is less steep and peaks earlier, which clearly explains the difference in the profile of debt of these two groups. Second, the corresponding profile of households with less than a high school education is quite flat and peaks at a similar age to that of the college-educated households.

It may seem puzzling the households with more income actually borrow more. The steepness of productivity profiles mentioned above is part of the explanation of this phenomenon. But the supply of credit also plays an important role here. Figure 3 shows (on the y axis) how many goods lenders are providing today to a household promising to pay $-b$ (x axis) in the next period, per good promised. Notice the values for college-educated households are above the corresponding values for households with less education: households with more education have cheaper access to credit. This result arises partly as a function of the costs of default (either kind) being direct losses of utility; direct utility costs are larger (in consumption terms) for households with higher consumption, who in

Figure 2: Life cycle profile productivity



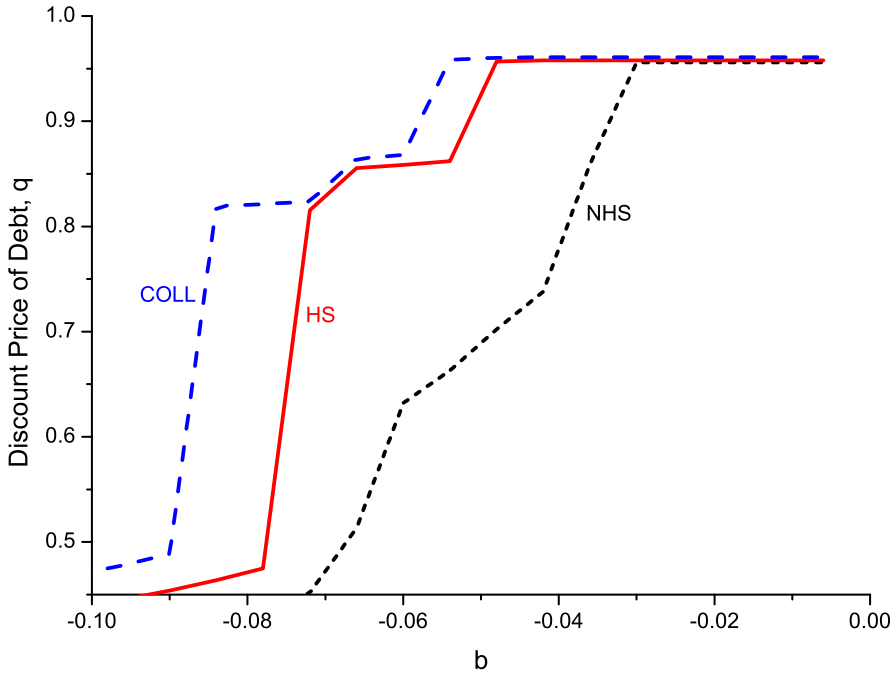
turn have higher education on average.

How do the profiles of debt translate to delinquency and bankruptcy rates? Figures 4 and 5 show the density of delinquency and bankruptcy over the life cycle. Notice that delinquency and bankruptcy are phenomena associated with young to middle-aged households. Recall, though, that the median age of bankruptcy filers was one of the targeted moments.

5.3 Why do households choose delinquency?

Why would households choose delinquency? To answer this question, it is crucial to understand the how lenders respond to households that decide to be delinquent, as described by the function h in our framework. Figure 6 explains how h is determined and why some households may find delinquency an appealing option. This figure plots the amount of

Figure 3: Debt price by education group



resources, $-bq\left(b,e\right)$, delivered to a household that promises to pay back b next period, conditional on having a persistent component of income e. First, notice how h is determined: it is the value of the promised amount b that maximizes the current market value of that obligation, $-bq\left(b,e\right)$. For a household with a high persistent component of income, e_H, this amount is the highest value of the dashed blue line, denoted $h\left(e_H\right)$ in Figure 6. Similarly, for households with a low persistent component of income, e_L, the value of h is determined using the function described by the red solid line. The maximizer is referred to as $h\left(e_L\right)$. Two things are worth noticing. First, the level of the face value of debt that a delinquent debtor will have next period is increasing in the persistent component of income; i.e., $-h\left(e_H\right) > -h\left(e_L\right)$ in Figure 6. As explained further below, this generates the pattern that leads households to leave delinquency through bankruptcy when income rises. Second, since the choice of h is independent of the amount of debt b with which a household enters delinquency with, households with very small debt will generally face high interest rates. Of course, as a consequence, they will decide to make the payment instead

Figure 4: Delinquency, life-cycle profile

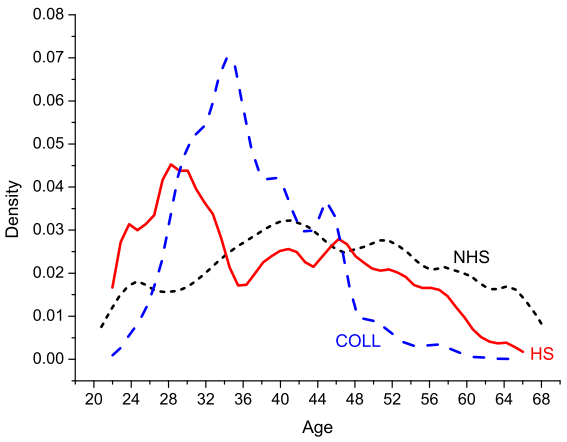
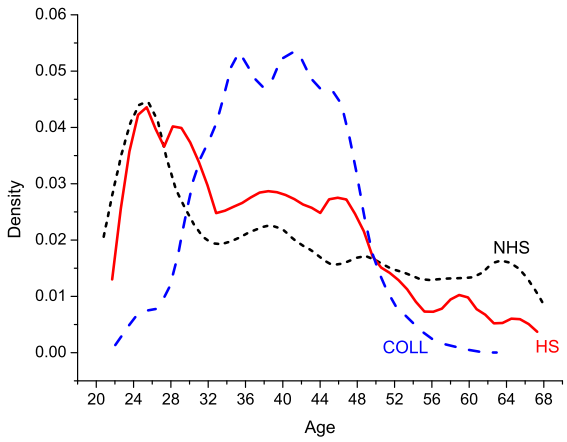


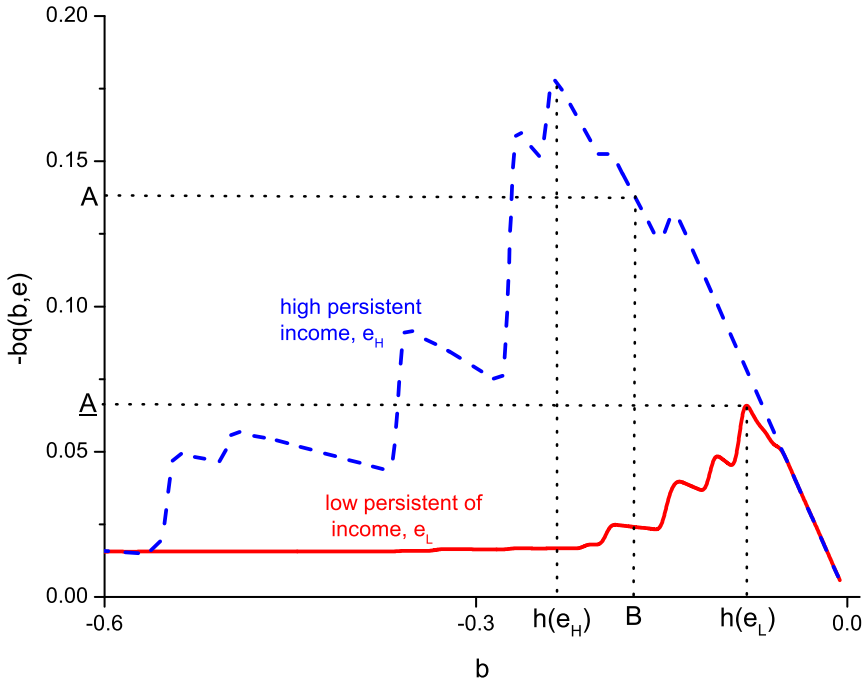
Figure 5: Bankruptcy, Life-cycle profile



of skipping it, which leaves such rates unobserved in the data, even as their presence alters decisions.

The decision of delinquency can also be analyzed with Figure 6. Consider a household with current debt $b = A$ in the figure. Would this household find delinquency attractive? The answer depends on the current level of the persistent component of income, e. First, it is easy to see that for $e = e_H$ the household would be strictly better off by rolling over all the debt, so it will never choose delinquency. Notice that to rollover A the household can go to the credit market and promise to pay exactly B tomorrow. With this strategy, the household does not need to make any payment in this period. If the household decides to be delinquent, consumption today will be exactly the same as that under the roll-over strategy because there is no debt payment made this period. However, in the next period, the amount owed will be $h(e_H)$, which is strictly larger than B. Second, consider a household with a low persistent component of income, e_L. Notice that there is no way that this household can roll over the total amount of debt A at the competitive price offered in the credit market. Indeed, this household could at most obtain the amount $\underline{A}$ in the market. This amount of debt, $\underline{A}$, implies that the household must repay $A - \underline{A}$ this period and will owe exactly the amount of debt $h(e_L)$ in the next. Instead, if this household chooses delinquency, the amount owed for the next period will be the same, $h(e_L)$, but it will force the incumbent lender to refinance the total amount of debt A so consumption

Figure 6: Why would households choose delinquency?



this period will be higher. This household could indeed find delinquency attractive.

5.4 The dynamics of delinquency and bankruptcy

A key payoff from modeling consumer credit to include delinquency in addition to bankruptcy is that it helps us understand how these two decisions interact over the life of households. For instance, we can employ the model to assess the extent to which delinquency may allow an indebted household to "wait for conditions to improve" so that they can avoid the potentially larger costs associated with bankruptcy. Specifically, the next figures illustrate the persistence of delinquency and the role of delinquency as a transition state toward bankruptcy.

Figure 7 selects all households that were delinquent and normalizes that period to zero. We then plot the fraction of those households that were delinquent in the subsequent periods. Take the households with high school education, represented with a red solid line in Figure 7. The fraction of those households delinquent in the next period ($t = 1$) conditional

on being delinquent in the previous period ($t = 0$) is 42 percent! For perspective, notice that the unconditional delinquency rate for this education group is only around 3 percent. As before, this pattern exists across all education groups.

Figure 7: High persistence in DQ

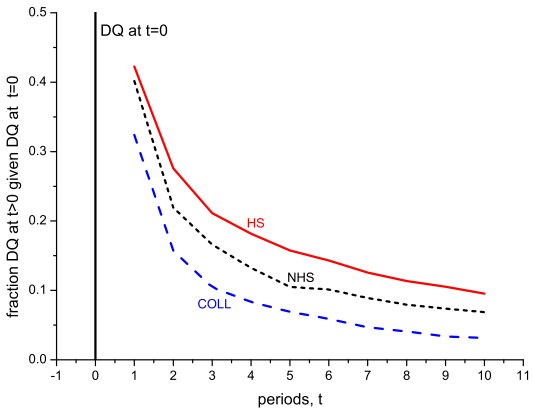
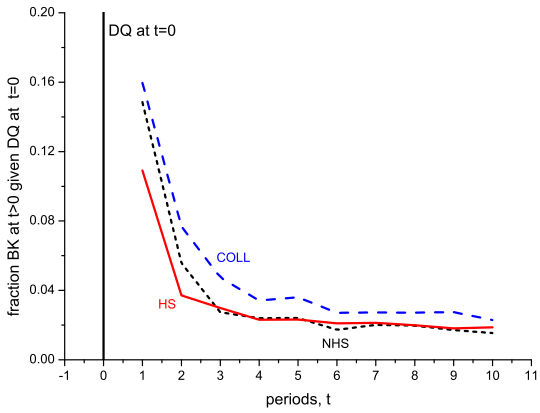


Figure 8: DQ follows BK

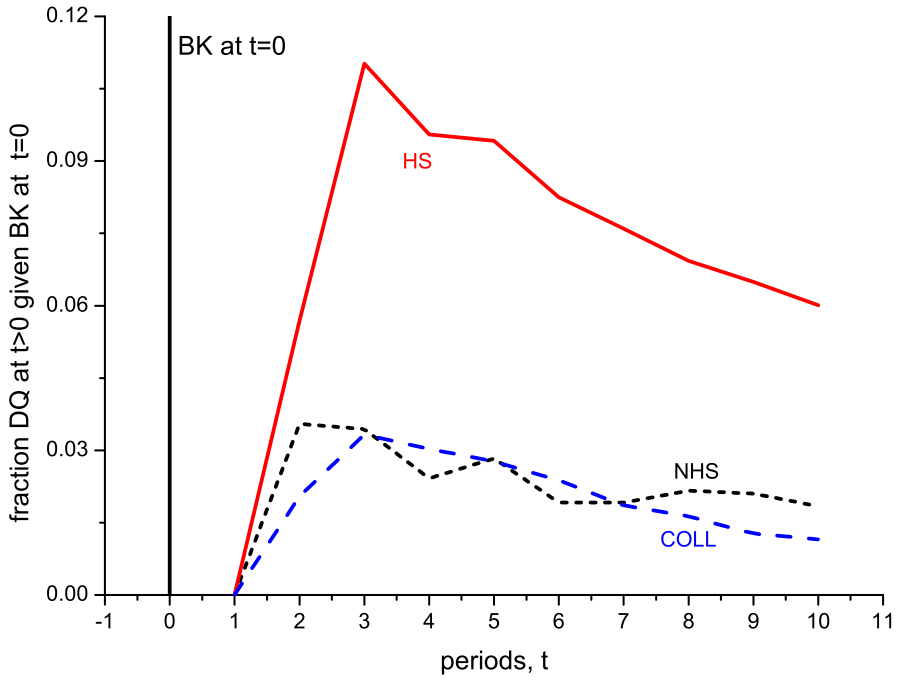


Now focus on Figure 8. It displays the fraction of households in bankruptcy in the periods following a delinquency episodes. For instance, the blue dashed line indicates that 16 percent of the college educated households that were delinquent in period t chose to file bankruptcy in period $t + 1$. This rate is again much higher than the unconditional bankruptcy rate for this group, which is only 0.5 percent. Together with the previous figure, this indicates that a typical pattern for a household with debt problems is to skip payments for two or three periods and then file bankruptcy. This finding is appealing, since in reality all the households go through some type of delinquency (at least 30 days) before filing bankruptcy.

In contrast, how does bankruptcy today affect the likelihood of delinquency in future periods? We selected households that file bankruptcy and reported the fraction that were delinquent in the subsequent periods. Figure 9 indicates not simply that bankruptcy is a rare event, but also that there is substantial persistence in the financial condition of households. Since households that file bankruptcy in a period start the next period with no debt, the fraction delinquent in that period is zero. However, in the following years the fraction in delinquency is much higher than the unconditional delinquency rate. For

instance, the delinquency rate of households with a high school education three years after filing bankruptcy is about 12 percent, much higher than the unconditional rate for this group, which is only 3.2 percent. This result is in line with the findings in Stavins (2000): one of the strongest factors increasing the probability of being behind on payments was having filed for bankruptcy in the past. Thus, in our model and in the data, bankruptcy is not that much of a "fresh start."

Figure 9: Persistence of poor financial conditions



We now consider the dynamics of income in the periods before delinquency and bankruptcy. In particular, what shocks drive households to delinquency and bankruptcy? Figures 10 displays the mean income of a cohort of households that is delinquent at a period normalized to zero. It shows, for all education groups, that households decide to enter into delinquency after a sequence of negative income shocks. For instance, the average income of college-educated households in delinquency declined by around 20 percent in the preceding three years. After delinquency, the average income of these households increases

sharply. Next, the same exercise was performed for a group of households that file for bankruptcy in a period (normalized to zero). The results are are shown in Figure 11. The most interesting finding is that, on average, the income of households that transition to bankruptcy increases. This happens because households with financial problems face an increasing burden from lenders as income increases. As a consequence, some of them file for bankruptcy to reorganize their financial condition.

Figure 10: Income trajectory around DQ

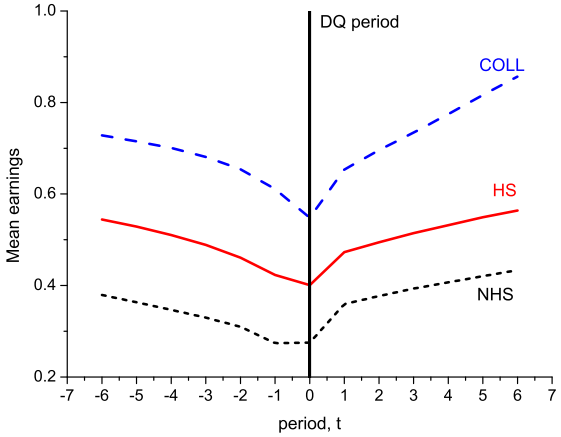
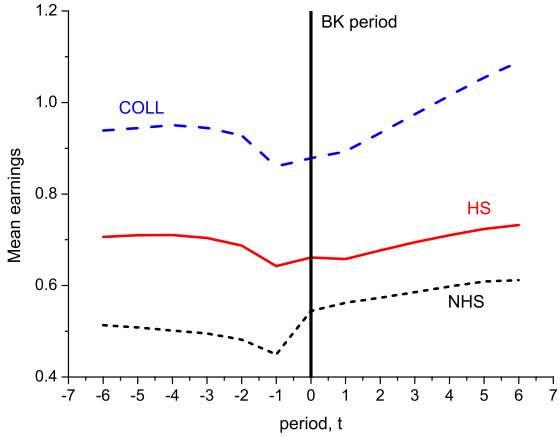


Figure 11: Income trajectory around BK



In sum, the model implies that the typical trajectory for a household in financial distress is the following. After a sequence of bad income shocks, the household decides to skip payments. As long as income does not recover, households stay in delinquency because its low income makes the interest rate it faces under delinquency relatively low—recall Figure 6. As soon as income starts to increase, though, the lender increases the interest rate on delinquent debt; as a result, the household more frequently prefers to exit delinquency by repaying its debt or filing for bankruptcy.[7]

6 Garnishment, Delinquency, and Bankruptcy

Having noted the benchmark calibration generates reasonable outcomes, and moreover

[7] Of course, lenders are acting optimally and take fully into account the effects on payoffs arising from pushing some debtors away from delinquency and into bankruptcy.

readily produces relatively high *competitive* interest rates on delinquent accounts, we perform a counterfactual exercise that sheds light on the relationship between bankruptcy and delinquency.

A key observation made by Ausubel and Dawsey (2004) is that bankruptcy and delinquency "are usefully viewed as economic substitutes: increasing the price of one causes substitution into the other." They find that strict garnishment laws in states such as Tennessee make it easy for creditors to garnish debtors' income and induce individuals to substitute delinquency with bankruptcy.[8]

As described earlier, delinquency regimes are defined in our model by the extent of lenders' ability to attach or garnish the labor incomes of debtors, as captured by the parameter ψ. We consider allocations and prices under two levels of garnishment: our benchmark economy, with $\psi = 0$, and a garnishment economy, with $\psi = 0.05$.[9]

The first important finding is that increasing garnishment decreases the risk of delinquency but increases the risk of bankruptcy. This is shown by comparing the trajectories of income before delinquency and bankruptcy in the economies with and without garnishment. This is preferable to comparing the incidence of bankruptcy because the bankruptcy rate depends also on the amount of debt taken by borrowers and in our steady-state comparison borrowing is primarily affected by the change in garnishment. Now, focus on Figure 12. The most striking difference between the economies considered is that in the economy with garnishment, households' average income around delinquency is significantly lower than in the benchmark economy. This indicates that increasing garnishment is effective in lowering the risk of delinquency—households need to face more severe income shocks to decide to enter delinquency. However, Figure 13 shows that there are side effects of this policy. The average income of households in bankruptcy is significantly higher in the economy with garnishment. Following the same reason as above, this indicates that increasing garnishment actually increases the risk of bankruptcy. This is the substitution effect identified by Ausubel and Dawsey (2004) in the data.

[8] See also the updated study by Hynes, Dawsey, and Ausubel (2012).

[9] We also computed economies with different values of garnishment and the qualitative (and most of the quantitative) results of this section are not affected.

Figure 12: Income, DQ, and garnishment

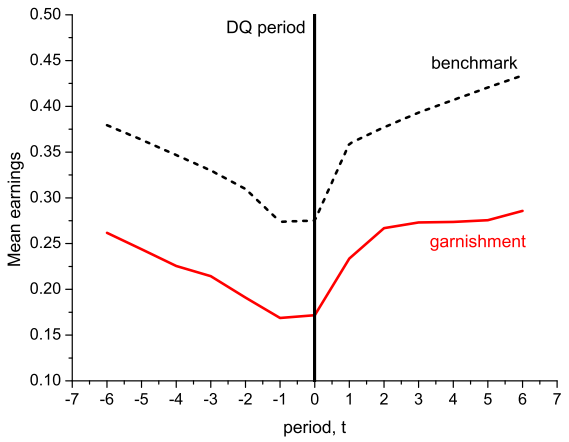
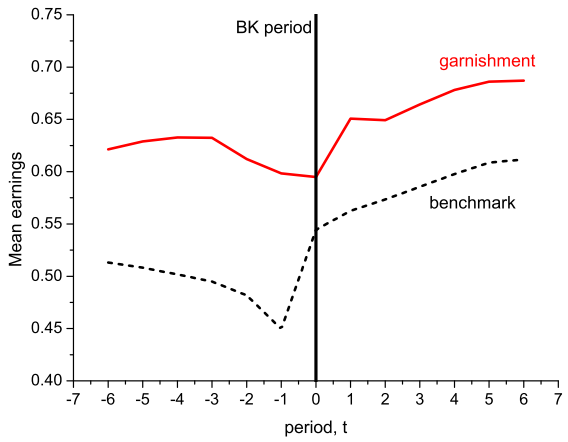


Figure 13: Income, BK, and garnishment



Next, we show that in our model, in which the pricing of debt is endogenous, the effect of increasing garnishment on the risk of bankruptcy actually operates through credit supply, and not directly on bankruptcy. First, Table 4 shows how garnishment affects both delinquency and bankruptcy. The impact on delinquency is clear and more obvious: increasing garnishment eliminates delinquency almost completely. The effect of bankruptcy is, *a priori*, less clear. As mentioned above, increasing garnishment increases the risk of bankruptcy. But it also restricts credit supply, so households will be forced to borrow less in equilibrium and as a consequence may have less incentive to file for bankruptcy. We find that in our quantitative model the second effect dominates. This result must be interpreted carefully. Since we are comparing two different steady states, households can perfectly adjust their level of debt; however, when we compute the transition explicitly we find that it happens within two periods, so simply comparing steady states is not misleading in this model.[10]

Thus, the bankruptcy rate actually decreases with garnishment. Notice that the effect on the bankruptcy rate is more pronounced for households with less than a high school education. It will be seen below that this group actually faces more severe tightening of

[10]Graphs of the transition for the bankruptcy rate, the delinquency rate, the aggregate level of debt, and the interest rate spread are available upon request; they show an immediate change at the imposition of the garnishment regime and remain constant. These patterns are consistent across values of ψ as well.

credit.

As we just described, the important mechanism at work (after an increase in income garnishment in delinquency) seems to operate through credit supply. We now show how the supply of credit tightens when garnishment increases. Figures 14 and 15 show the price of debt, q, in the economies with and without garnishment for households with a college education and households with less education, respectively. In both figures it is clear that garnishment actually reduces the availability of credit. Focus for instance in Figure 14 corresponding to college-educated households. For a level of debt of -0.066, the interest rate increases from 16 to 21 percent with the introduction of garnishment. Additionally, notice that the tightening of credit is more severe for households with less than a high school education. This is in line with the changes in the bankruptcy rate described above.

Figure 14: Debt prices (COLL)

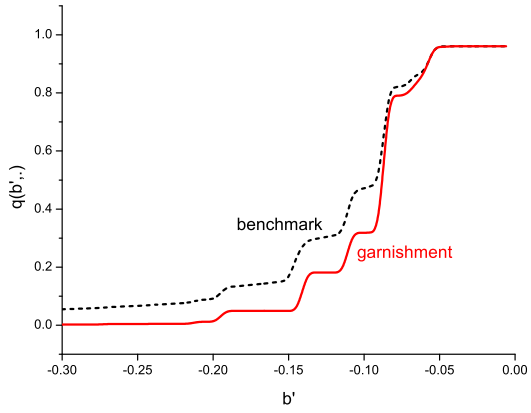
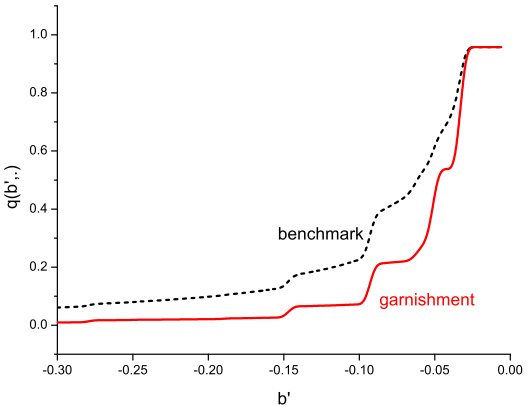


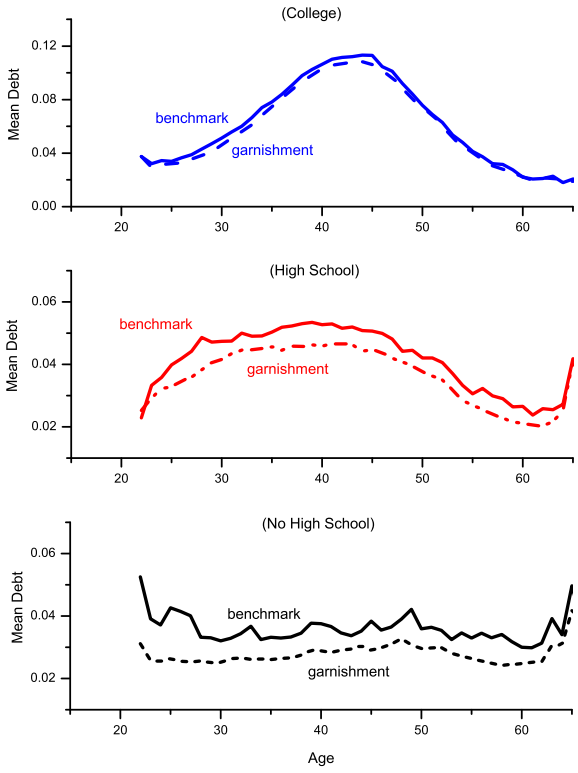
Figure 15: Debt prices (NHS)



As expected, the changes in the supply of credit are reflected in the life cycle profile of debt. Figure 16 displays the mean debt of the three educational groups considered over the life cycle. It shows that all the groups borrow less in the economy with garnishment. The decline is more evident for the groups with less education, for which delinquency is more widespread in the benchmark economy.

Finally, we study whether households would prefer to be born in an economy with or without garnishment. Table 5 shows the *ex ante* expected lifetime utility of our benchmark

Figure 16: Mean Debt, benchmark vs. garnishment

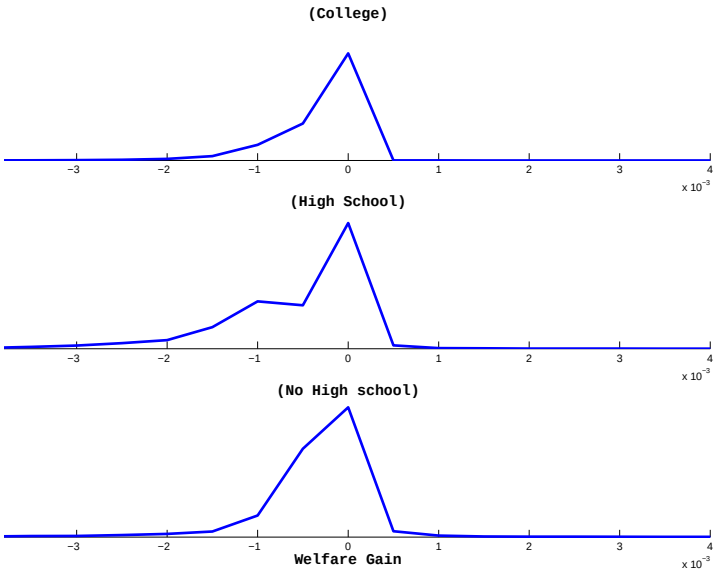


economy and the economy with 5 percent income garnishment. The main result is that households would prefer to be born in an economy without garnishment. For example, consider the households with high school education, which was the group using delinquency more intensively. They would be willing to give up almost 0.2 percent of their consumption every period to be able to eliminate the 5 percent garnishment rule.

Because our model features no connection between prices and the aggregate distribution of agents (and has trivial transitional dynamics), we can also compute the welfare costs for individuals conditional on their initial state. Figure 17 displays the distribution of welfare costs by education group.

The welfare changes are small (note the large spike near zero), and asymmetric: almost all agents not at zero experience a welfare loss, with only very small gains for a small

Figure 17: Welfare gains of increasing garnishment



measure of agents. Due to the large state space it is not straightforward to relate welfare costs to the individual states, but we can make some general statements. For college types, welfare changes are positively correlated with assets, age, e, ν; in relative terms age is the most important influence. For the lower education groups, the effect of e is reversed, so that the welfare change is negatively correlated with e.[11]

Most of the welfare results are easy to interpret, as they are primarily a reflection of the probability of borrowing in the future. Having a higher level of assets today implies the agent will borrow less in the future, meaning that the increased cost of borrowing is less important. Similarly, being older or having higher transitory income also lead to less borrowing. The effect of e depends on two opposing effects. On the one hand, having a high e today is associated with less borrowing, since it implies more resources. On the other hand, a high e is also associated with low borrowing costs, since such individuals are less likely to default tomorrow, so that households may actually borrow more via supply side

[11] We obtain these results by regressing the welfare change on b_{-1}, age, age squared, e, ν, and a constant, excluding those changes that are below a threshold magnitude. All of the coefficients are statistically different from zero, and the age squared coefficient is negligible.

effects. The differing effects of e by education group simply reflects the differing strengths of these two effects.

7 Concluding remarks

Delinquency, whereby borrowers do not repay as initially promised, is different from bankruptcy protection. In the data, both delinquency and bankruptcy are used frequently as ways to *ex post* alter obligations previously established. The former merely allows a delay in repayment, with no legal implications for a household's liability, but where creditors retain rights to seize labor income, while the latter formally eliminates a debt obligation. The delay in repayment requires a restatement of the debt owed from that point onward, and this amount will determined under competitive conditions because households continue to hold bankruptcy as an option.

Ours is the first model of consumer borrowing that incorporates both the option to delay and the option to remove debts. Our model sheds light on costs and benefits of each and also helps uncover the limits of formal bankruptcy protection to alter allocations. Roughly, while existing work has suggested that strict bankruptcy laws can change credit terms and borrowing substantially (see Athreya, 2008), our work suggests that this conclusion depends on the alternatives available, notably, the alternative to simply remain delinquent. In particular, we show that stricter control of delinquency, as defined by a relatively high ability to garnish wages, leads to more risk of bankruptcy and lower welfare (on average).

Finally, we see our contribution as a first step towards understanding the interaction of formal and informal default in consumer credit markets, in the forms of bankruptcy and delinquency respectively. Our quantitative analysis was disciplined by available data, particularly those related to credit market aggregates and household-level income processes. As seen, the model suggested that formal and informal default interact in a rich manner, and in ways dependent on household income processes. In fact, it is clear from the results that our model offers many additional implications for the dynamics of household default and consumption that would be useful to more fully evaluate. However, the full set of these

quantitative implications simply requires better *panel* data on debts and forms of default than is currently available. We hope, therefore, that in the future, with the requisite data, research can advance along these lines.

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8 Appendix

8.1 Proof of Lemma 1

Proof: Notice that $v^{d=1}$ and $v^{d=2}$ are independent of b_{-1}. Thus, we must show that $v^{d=0}(b_{-1}, \mathbb{I})$ is increasing in b_{-1}. This problem can be written as

$$v^{d=0}(b_{-1}, \mathbb{I}) = u\left(b_{-1} + \omega_{j,y} e_{j,y} \nu_{j,y} - q\left(b^*, y, e, \nu, j\right) b^*, n_j\right) + \beta s_{j,y} \sum_{e',\nu'} \Pr\left(e', \nu' | e\right) v\left(b^*, \mathbb{I}'\right)$$

where b^* is the maximizer. Now, we take $\widehat{b}_{-1} > b_{-1}$ and show that $v^{d=0}\left(\widehat{b}_{-1}, \mathbb{I}\right) > v^{d=0}(b_{-1}, \mathbb{I})$. It is clear that

$$v^{d=0}(b_{-1}, \mathbb{I}) < u\left(\widehat{b}_{-1} + \omega_{j,y} e_{j,y} \nu_{j,y} - q\left(b^*, y, e, \nu, j\right) b^*, n_j\right) + \beta s_{j,y} \sum_{e',\nu'} \Pr\left(e', \nu' | e\right) v\left(b^*, \mathbb{I}'\right)$$

because u is increasing, and

$$u\left(\widehat{b}_{-1}+\omega_{j,y}e_{j,y}\nu_{j,y}-q\left(b^{*},y,e,\nu,j\right)b^{*},n_{j}\right)+\beta s_{j,y}\sum_{e',\nu'}\Pr\left(e',\nu'|e\right)v\left(b^{*},\mathbb{I}'\right)\leq v^{d=0}\left(\widehat{b}_{-1},\mathbb{I}\right).$$

because b^{*} is also available for the state $\left(\widehat{b}_{-1},\mathbb{I}\right)$ but it may not be the maximizer.

Similarly, to show that v is strictly increasing in ν notice that the utility from next period and on is independent of ν for any d. Then, since for $d=1$ or $d=2$ we have that $c_j=\omega e\nu$, we have that only need to show that $v^{d=1}$ and $v^{d=2}$ are strictly increasing in v. Thus, we only need to show that $v^{d=0}$ is strictly in increasing in v. It is straightforward to see that the same logic used above for b_{-1} applies also for v. ■

8.2 Proof of Lemma 2

Proof: These results are straightforward because $v^{d=0}$ is increasing in b_{-1} and both $v^{d=1}$ and $v^{d=2}$ are independent of b_{-1}. ■

8.3 Proof of Proposition 1

Proof: First, we define the implicit rate that is charged to a household in delinquency. This rate is

$$r^{D}(b_{-1},\mathbb{I})=h\left(\mathbb{I}\right)/b_{-1}-1.$$

Second, notice that in the competitive credit market the household could or could not be able to rollover the amount of debt b_{-1}. If it cannot, the proposition's statement is trivially true. If it can rollover b_{-1}, it means that there exist a $\overline{b}$ such that $\overline{b}q(\overline{b},\mathbb{I})=b_{-1}$. In this case, the market interest rate is

$$r^{M}(b_{-1},\mathbb{I})=\overline{b}/b_{-1}-1.$$

By contradiction, assume that

$$r^{M}(b_{-1},\mathbb{I})<r^{D}(b_{-1},\mathbb{I}),$$

and the households prefers delinquency; i.e.,

$$v^{d=1}(b_{-1},\mathbb{I})>v^{d=0}(b_{-1},\mathbb{I}).$$

We'll show this implies a contradiction. First, notice that

$$r^M(b_{-1}, \mathbb{I}) < r^D(b_{-1}, \mathbb{I})$$

implies

$$\overline{b}(b_{-1}, \mathbb{I})/b_{-1} < h(\mathbb{I})/b_{-1},$$

and

$$\overline{b}(b_{-1}, \mathbb{I}) > h(\mathbb{I}).$$

Now, since both are rolling over all the obligations, consumption this period is the same under both options (ignoring garnishment). But by borrowing at the market rate and avoiding delinquency the household eludes the utility cost δ. So, in terms the utility today, the household prefers avoiding delinquency. Then, since

$$v^{d=1}(b_{-1}, \mathbb{I}) > v^{d=0}(b_{-1}, \mathbb{I}),$$

it must be the case than the utility from tomorrow and on is larger if the households chooses delinquency today (in expected value),

$$\sum_{e',\nu'} \pi(e'|e)\,\pi(\nu')\,v\left(\overline{b}(b_{-1}, \mathbb{I}), \mathbb{I}'\right) < \sum_{e',\nu'} \pi(e'|e)\,\pi(\nu')\,v\left(h(b_{-1}, \mathbb{I}), \mathbb{I}'\right)$$

But this is contradicted, because $\overline{b}(b_{-1}, \mathbb{I}) > h(\mathbb{I})$ and v weakly increasing in b. ■

Table 1: Parameters, Targets of Calibration, and Fit

Parameter		Value
Parameters calibrated to match targets		
β^{COLL}, discount factor, college education		0.88
β^{HS}, discount factor, high school education		0.79
β^{NHS}, discount factor, less than high school education		0.79
δ, cost of delinquency		0.35
λ, cost of bankruptcy		0.57
Parameters calibrated from previous literature		
r, risk-free rate		0.01
ϕ, wedge on borrowing cost		0.03
ζ, real resources for formal bankruptcy		0.03
σ, relative risk aversion		4
Statistics	**Model**	**Data**
Bankruptcy Rate, households with less than high school	0.86%	0.86%
Bankruptcy Rate, households with high school	0.95%	0.88%
Bankruptcy Rate, households with college	0.55%	0.55%
Mean income of bankruptcy filers / Mean income all borrowers	0.76	0.83
Median age of bankruptcy filers	38	41

Sources: number of households, U.S. Census. Median age of bankruptcy filers, Thorne, Warren, and Sullivan (2008). The ratio of mean income between delinquent/bankrupt borrowers and all net borrowers comes from Ausubel and Dawsey (2004).

Table 2: Incidence of Delinquency in the model

Statistics	Model
Delinquency rate, college educated hhs	0.47%
Delinquency rate, hhs with high school education	3.22%
Delinquency rate, hhs with less than high school education	1.80%
Percentage of Debt in delinquency	3.53%
Recovery Rate for Debt in delinquency	67.4%

Table 3: Mean Interest Rate Spread, $r - r_f$

	Spread, %
Households with College degree	6.71
Households with high school education	8.37
Households with less than high school education	10.96

Table 4: The effect of garnishment on delinquency and bankruptcy

	Benchmark	Garnishment
DQ rate, college educated hhs	0.47%	0.00%
DQ rate, hhs with high school education	3.22%	0.00%
DQ rate, hhs with less than high school education	1.80%	0.03%
BK rate, college educated hhs	0.55%	0.42%
BK rate, hhs with high school education	0.95%	0.47%
BK rate, hhs with less than high school education	0.86%	0.15%

Table 5: Welfare gains of increasing garnishment

	College	High School	No high school
$\psi = 0 \to \psi = 0.05$	-0.054%	-0.171%	-0.070%