Informal Bankruptcy

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Abstract

The economics literature generally views personal bankruptcy as the consumer's only alternative to the repayment of debts. This paper focuses instead on *informal bankruptcy*, the term we propose for non-repayment without the benefit of the formal bankruptcy process. Using data from a large credit card issuer, we find evidence that informal bankruptcy is quite prevalent—even among individuals who qualify for preapproved gold cards—and we explore the factors that determine its use. We estimate a nested logit model in which a borrower first chooses between on-time repayment and delinquency; and following delinquency, chooses among informal bankruptcy, formal bankruptcy, and delayed repayment. Observe that formal and informal bankruptcy should be regarded as substitutes, and state variation in garnishment laws provides a clear way to see the substitution empirically. Strict garnishment laws in states such as Tennessee make it easy for creditors to attach debtors' paychecks, rendering informal bankruptcy costly and inducing individuals to substitute heavily into formal bankruptcy. However, the unavailability of garnishment in states such as Texas reduces the cost of informal bankruptcy, and individuals pursue it at much higher rates. Our results suggest that previous research may have substantially understated the degree to which garnishment laws drive bankruptcy filings. By contrast, homestead exemptions apply under both formal and informal bankruptcy, so they should be expected to have little effect on the choice between formal and informal bankruptcy. Indeed, our results suggest that homestead exemptions operate mostly on the margin between repayment and nonrepayment. Finally, we find that borrowers living in higher-percentage African-American neighborhoods are far more likely to choose informal bankruptcy than those in other neighborhoods. This result suggests that analyses focusing on formal bankruptcy alone may overlook the real problem of financial distress among racial minorities, who may be less likely to avail themselves of the protections of the formal legal system.

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1. Introduction

The economics literature generally views personal bankruptcy as the consumer's only alternative to the repayment of debts. Bankruptcy provides a formal legal procedure giving debtors protection from their creditors. Chapter 7 offers a discharge of debts, providing the individual with a "fresh start," while Chapter 13 allows a delayed repayment schedule. Both bankruptcy provisions halt the collection process and often enable the consumer to emerge from insolvency with some property intact.

However, formal bankruptcy is not the only alternative available to an insolvent consumer. Instead, a debtor can simply stop making payments, without seeking the protections of the law. The defaulter can place the burden of collection on the creditor, by ignoring collection letters and hanging up on telephone calls. He can impose costs on the creditor, by changing his telephone number or moving without leaving a forwarding address. The aggressive nonpayer can structure his affairs to make his income particularly difficult to garnish and his property particularly difficult to attach.[1] Moreover, even outside the bankruptcy process, the defaulter benefits from federal and state limitations on garnishment and, importantly, the same property exemptions as within a bankruptcy filing.

Informal bankruptcy, the term we propose in this paper for non-repayment without the benefit of the formal bankruptcy process, has received minimal attention in the economics literature. By contrast, formal bankruptcy has become a major focus for research since the recent dramatic increase in personal bankruptcies[2] and the perennial debate of a bankruptcy bill in Congress.[3] However, in the real world, informal bankruptcy is also quite prevalent. According to Visa U.S.A., some 67% of credit card loans in 1999 were charged off[4] for reasons other than

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[1] For example, he can eschew relationships with banking institutions and he can take employment where he is paid in cash.

[2] According to the official statistics of the Administrative Office of the United States Courts, personal bankruptcies in the U.S. jumped from 780,455 in 1994 to 1,350,118 in 1997, and reached 1,625,208 in 2003.

[3] Bankruptcy bills were introduced in Congress and subcommittee hearings were held in 1998, 1999, 2001 and 2003. Bills passed the House of Representatives and the Senate in 2000, but a conference committee failed to report a compromise bill following a veto threat. Bills again passed the House and Senate in 2001, and a conference committee bill was reported in 2002, but the House and Senate failed to pass the conference committee bill.

[4] A *chargeoff* is a loan that the lender has written off as a loss for regulatory purposes. However, the loan may still be collectable unless the account was charged off for bankruptcy discharge, death, or fraud. Under current federal banking regulations, credit card accounts should be charged off when they are 180 days delinquent. Accounts in bankruptcy should be charged off within 60 days of notification of bankruptcy filing. Throughout this paper, the estimates exclude losses due to fraud.

bankruptcy, and this percentage has been nearly constant in recent years.[5] In the dataset of credit card accounts examined in the current paper, 50.7% of all charged-off accounts (and 45.8% of credit losses in dollars) occurred without the debtor filing for bankruptcy.[6]

At first blush, informal bankruptcy may seem to be a less-than-optimal choice. After all, the formal bankruptcy system is often the target of criticism for its leniency: "Our lax bankruptcy system doesn't even ask people to consider paying what they owe. … Why pay your bills when you can walk away with no questions asked? Why honor your obligations when you can take the easy way out through bankruptcy?"[7] Arguing that the laxity of the current system has caused the run-up in filings, credit card and other financial institutions have expended considerable resources in lobbying for legislation that would toughen bankruptcy law.[8]

A closer examination reveals a number of costs associated with formal bankruptcy. The consumer who files a Chapter 7 bankruptcy is effectively renouncing his claim on non-exempt assets.[9] Note that, in some states, nearly all assets are non-exempt: for example, Delaware has no homestead exemption and only a $5,000 personal property exemption. The consumer who files a Chapter 7 bankruptcy foregoes the option value of waiting to file until later, since a Chapter 7 filing is permitted only once every six years. In addition, a bankruptcy stays on an individual's credit report longer, and may be viewed as a worse signal, than a simple default.[10] Finally, the legal and court costs associated with a bankruptcy filing, though small relative to most other legal proceedings, are nonnegligible, especially for an insolvent consumer.

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[5] *1999 Annual Bankruptcy Survey*, Visa U.S.A. Inc., September 2000.

[6] According to a survey produced by the American Bankers Association, between 55 and 65% of credit card loans were charged off for reasons other than bankruptcy. This survey also shows that losses due to default without bankruptcy, as a percentage of outstanding balances, have grown substantially over the past five years. [American Bankers Association, *Bank Card Industry Survey Report*, American Bankers Association, 1997] In addition, the *1998 Credit Collections Survey* conducted by the Consumer Banker's Association estimated that 60% of all credit card accounts that were charged off for tax purposes, and 70% of chargeoffs on other consumer loans, were the result of long term delinquency rather than bankruptcy (*Consumer Bankruptcy News*, February 12, 1998).

[7] Senator Chuck Grassley (R-Iowa), *Senate Debate on Bankruptcy Reform Bill*, September 28, 1999.

[8] See Shenon, Philip, "Hard Lobbying On Debtor Bill Pays Dividend," *The New York Times*, March 13, 2001, p. A1.

[9] Chapter 7 is by far the most common type of personal bankruptcy. As of 2003, roughly 70% of all personal bankruptcies were Chapter 7.

[10] A credit bureau is required to delete a bankruptcy from a consumer's credit report after ten years, but must delete a chargeoff from a credit report within seven years of the first missed payment that led to the chargeoff. Thus, a formal bankruptcy may effectively be a worse blemish on one's credit record than an (informal) chargeoff. At the same time, creditors may not necessarily view a Chapter 7 bankruptcy as an unambiguously worse signal than an informal bankruptcy. Some creditors are reported to seek out borrowers who have recently filed Chapter 7 bankruptcies, in part because these borrowers are barred from filing again for six years.

These considerations suggest that, for many consumers, informal bankruptcy is a feasible and low-cost alternative to formal bankruptcy; and casual data suggests that it may be equally prevalent. Michelle White (1998), in trying to explain why only about 1% of the U.S. population files for bankruptcy each year whereas 15% would seemingly benefit from filing, recognizes that "some debtors default but do not file for bankruptcy … because they obtain the benefits of bankruptcy without bearing the costs of filing." However, there appear to be no papers in the economic (or non-economic) literature that document the prevalence of informal bankruptcy, explain the factors affecting its incidence, or explore its wider implications.

There are several reasons why it is important to study informal bankruptcy. Focusing exclusively on formal bankruptcy may be tantamount to looking only at the tip of the iceberg as regards consumer insolvency. An economic model of consumer lending that assumes formal bankruptcy as the only alternative to repayment misses an essential branch of the tree. It mischaracterizes the strategies available to consumers and it misstates the payoffs to all of the economic agents. Moreover, when such a model is used as the second stage of a two-stage game in which agents initiate loans in the first stage, the model is likely to yield unsatisfactory conclusions as to the availability and terms of credit.

An exclusive focus on formal bankruptcy would not be so much of a problem if it consistently omitted a constant percentage of defaults. But, in fact, we find that the relative incidence of formal and informal bankruptcy varies significantly according to a number of legal, demographic and economic factors. For example, it is often viewed as puzzling that Tennessee consistently ranks as having one of the highest bankruptcy rates in the nation, whereas Texas, famous for its unlimited homestead exemption, has a considerably lower bankruptcy rate. However, treating "formal bankruptcy" as synonymous with "default" completely misses the point. We find that informal bankruptcies are comparatively infrequent in Tennessee, but quite prevalent in Texas. This is explained by the strict garnishment laws of Tennessee, which make it easy for creditors to attach debtors' paychecks, rendering informal bankruptcy problematic for many individuals. By contrast, debtor-friendly Texas permits no garnishment at all.

We also find that recognition of informal bankruptcy presents a more complete picture of the level of insolvency in some groups. Past studies have found race to be statistically and economically insignificant as a predictor of bankruptcy (see, e.g., Domowitz and Eovaldi, 1993), and we replicate this result in our regressions of formal bankruptcy alone. However, in a model

that includes informal bankruptcy, we find that borrowers living in higher-percentage African-American neighborhoods are far more likely to choose informal bankruptcy than those in other neighborhoods. This result suggests that analyses neglecting informal bankruptcy may understate the level of insolvency among racial minorities, who may be less likely to take advantage of the protections of the formal legal system.

Furthermore, identifying and studying groups or communities where informal bankruptcy is common may give us additional insights into other "informal" economic practices. In the same groups or communities, unconventional transactional and lending institutions such as check-cashing outlets, pawnshops and payday loans may replace checking accounts and bank loans. Informal employment relationships, with wages paid in cash, may become increasingly common. Individuals outside the predominant financial and employment institutions may be more apt to operate outside the formal legal system and, in turn, their lack of attachable assets and paychecks inhibits collections and facilitates informal bankruptcy.

A key observation of the present paper is that formal bankruptcy and informal bankruptcy are usefully viewed as economic *substitutes*: increasing the price of one causes substitution into the other. For example, strict garnishment laws, enabling creditors to easily attach debtors' paychecks, effectively raise the cost of informal relative to formal bankruptcy. We find empirical support for this conceptual view by showing that strict garnishment laws induce considerable substitution from informal to formal bankruptcy. We also find immediate application for this insight to bankruptcy policy. The bankruptcy bill nearly enacted in 2002 and reintroduced in 2003 sought to erect barriers to Chapter 7 discharges, effectively raising the cost of formal relative to informal bankruptcy. A policy analyst using a model that equates default with formal bankruptcy would expect the bankruptcy bill to reduce defaults. Even in a world where the effect of the bill is primarily substitution, he would find his beliefs confirmed in the empirical evidence of reduced bankruptcy filings. However, this would mask a wave of informal bankruptcies, and the true incidence of default might be minimally reduced.

A principal reason for the neglect of informal bankruptcy in the literature has been a dearth of appropriate data. Accurate aggregate statistics on formal bankruptcies are easily available from the government, almost contemporaneously, at a quarterly interval and at a county

level.[11] However, useful information on defaults (and, hence, informal bankruptcies) is extremely difficult to come by. Aggregate default statistics are typically obtained from lender firms, and are typically organized at the *firm* level, or groups of firms. The analysis of default generally requires information about *borrower* location; the deficiency in the data is particularly obvious with credit card debt, where there is often no relation between lender and borrower locations, and much of the lending emanates from Delaware and South Dakota. Individual-level default data is typically based on consumer surveys. The samples are small, and geographic information is generally obscured. Crucially for an insolvency study, the variables of interest are self-reported, and embarrassing information is likely to be withheld from survey takers. In particular, it has long been understood in the survey methodology literature that bankruptcy filings are substantially underreported.[12] One might expect similar (or even more severe) undermeasurement of informal bankruptcies.

We circumvent the previous difficulties in addressing informal bankruptcy by utilizing a confidential dataset from a large United States issuer of MasterCard and Visa card accounts. Our dataset follows 47,798 credit card consumers for a 21–28 month period after they opened their accounts. It includes their 5-digit zip codes, as well as a rich set of credit-bureau variables, including credit score at the time of solicitation, concerning their prior loans and credit histories. Each month, it records the consumers' new charges and payments on the card, and it includes indicators for chargeoffs and for bankruptcy filings. Other than income (which is self-reported), all other information is internally generated by the credit card issuer or obtained from credit bureaus. The dataset lends itself to a straightforward empirical definition: an informal bankruptcy is a chargeoff without any associated bankruptcy filing.

The structure of our data also serves to mitigate supply effects and adverse selection problems, which are endemic to bankruptcy studies. For example, if a lender finds the legal environment of one state to be more favorable than another, the researcher will find it difficult to

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[11] See, for example, http://www.uscourts.gov/Press_Releases/index.html and http://www.usdoj.gov/ust/statistics/stats-new/statistics.htm.

[12] Bradburn and Sudman (1979) constructed a small sample of people who, according to bankruptcy court records, had recently filed for bankruptcy. Asked whether they had filed for bankruptcy, 32% of respondents in a face-to-face survey and 29% of respondents in a telephone survey answered "no". Among samples of people who had not filed for bankruptcy, there appeared to be no incorrect responses in the opposite direction. In addition (and especially relevant to any study of informal bankruptcy), 90% of the failures to interview subjects from the bankruptcy sample were due to the interviewers' inability to locate the respondent. Analogous underreporting was found in samples of people who had been charged with driving while intoxicated. Analogous overreporting was found of voting in elections. (Bradburn and Sudman, 1979, Table 2, p. 8.)

disentangle the resulting supply effects from the borrower's response to state bankruptcy rules. However, the fact that our dataset includes the credit scores and credit limits of consumers (and the fact that these appear to be constructed independently of the consumer's state of residence) would tend to minimize the presence of any supply effects in our estimation. At the same time, credit offers with different terms yield customer pools with different unobserved characteristics, and absence of the interest rate or other credit terms from the dataset may yield a serious adverse selection problem. However, our dataset organizes accounts according to the "market cell" in which they were solicited and all accounts within a market cell received identical terms; by controlling for market cells, we are able to eliminate this adverse selection problem.

The paper is organized as follows. In the next section of the paper, we briefly discuss exemption and garnishment laws, and we review the literature investigating their influence on borrowers' insolvency decisions. In Section 3, we examine appropriate empirical models. Section 4 describes the data. In Sections 5 and 6, we present our results from non-nested and nested specifications, respectively. Section 7 concludes.

2. Background and Motivation

As discussed above, only one paper, White (1998), questions the completeness of the standard dichotomous bankruptcy model. She finds that, if formal bankruptcy and repayment are the only options allowed to borrowers, then 15% of U.S. households who select repayment appear to choose suboptimally. In fact, resolving White's puzzle of why bankruptcy rates are so low is only one of several advantages of a model that includes informal bankruptcy. Chief among these is the elucidation of the effects of exemption and garnishment law on bankruptcy filings.

A. Exemption and Garnishment Law

Nearly all consumer bankruptcies are filed under either Chapter 7 or Chapter 13,[13] and Chapter 7 is more popular by far. In general, a borrower filing a Chapter 7 bankruptcy surrenders a portion of her property to her creditors, to be divided and sold as payment of her debts. In return, the borrower receives a discharge of debt, regardless of the amount of debt actually paid.

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[13] Individuals with substantial debts and assets can choose to file under Chapter 11, and family farmers can choose to file under Chapter 12. These chapters are rarely used by individuals, and will not be considered here.

Under current law,[14] a borrower does not need to prove an inability to repay her debts in order to file a Chapter 7 bankruptcy. However, the Chapter 7 discharge is limited in several ways. If collateral secures a creditor's loan, such as a mortgage, the creditor has rights to the collateralized property up to the value of his loan. Several types of loans are not dischargeable under bankruptcy including taxes, child support payments, student loans, and debts owed as damages due to driving while intoxicated. In addition, if the borrower has acted in a fraudulent way, such as moving to a higher exemption state with the clear intention of declaring bankruptcy under more lenient conditions, the courts can refuse discharge. As mentioned above, a borrower cannot file under Chapter 7 if she has done so within the previous six years.

Exemption law determines the amount of property an individual may retain when obtaining a discharge. Table 1 provides a summary of state laws on exemptions and garnishment.[15] The federal government sets national exemptions, but also allows states to set their own exemption levels—and all states have opted to do so. The state exemption level takes precedence over the federal exemption level; however, the state may further allow its citizens the option of selecting the federal exemptions. Eighteen states allow this choice.[16] The details of state and federal exemption laws are generally complex and often include specific descriptions of the property that a bankrupt individual may keep. Typically, the most valuable exemption is the homestead exemption. A few states (e.g., Florida and Texas) are notorious for unlimited homestead exemptions, but also note that 24 states set their homestead exemptions at $15,000 or less, including one state (Delaware) with no homestead exemption.

The second most common form of personal bankruptcy is the Chapter 13 bankruptcy, under which a consumer receives additional time to repay and often a partial discharge. A plan, submitted by the debtor, determines her schedule of repayments, under which she pays all "disposable income" for a three- to five-year period. The consumer must repay at least as much as she would under Chapter 7, which will vary according to the applicable Chapter 7 exemptions.

One of the benefits of a formal bankruptcy filing under either Chapter 7 or 13 is that the debtor receives an automatic stay, that is, an immediate cessation of all collections actions.

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[14] See the Conclusion for a discussion of proposed changes to U.S. bankruptcy law.

[15] Table 1 summarizes the exemption and garnishment laws as of 1996, the year in which most of the credit card accounts in our dataset originated.

[16] When consumers elect the federal exemptions, they must adhere to the federal exemption laws entirely: for example, a borrower cannot take the federal property exemption and the state homestead exemption.

Because the bankruptcy court serves this role of protector from collections, laws governing collection by creditors are also crucially important to understanding the debtor's bankruptcy decision. A creditor seeking to collect a debt has several options. First, he may attempt to seize property. However, an unsecured creditor may not take property that is exempt from a Chapter 7 bankruptcy proceeding. Before seizing non-exempt property, a creditor must obtain a judgment and surpass other legal hurdles. Alternatively, the creditor may solicit payment from debtors, but the Fair Debt Collection Practices Act restricts credit collection agents from inconvenient or harassing contact with debtors.[17] For example, collection agents are only permitted to call during certain hours of the day, and cannot threaten actions that they do not plan to take.

A final, often highly effective method of collection is through garnishment, where the creditor collects a proportion of the debtor's property in the possession of a third party, such as wages or bank accounts. Wage garnishment laws regulate the percentage of a borrower's earnings a creditor can collect directly from the borrower's employer. Federal law shields 75% of a borrower's weekly wages or 30 times the minimum wage (whichever is greater). States are permitted to protect a greater proportion of borrowers' wages and sixteen states have done so,[18] including six states that have eliminated wage garnishment altogether.[19]

B. Economic Literature on Exemption and Garnishment Law

A substantial amount of research has focused on the role of bankruptcy exemptions, particularly on the question of whether borrowers respond to generous exemptions by choosing bankruptcy more often. The results are inconclusive: while several studies find that generous exemptions increase the number of bankruptcies,[20] others have found no effect.[21] At least one study found that generous exemptions actually decrease the incidence of formal bankruptcy.[22]

This confusion may be due to several limitations in the literature. First, these studies are unable to control for credit supply effects. Gropp, Scholz and White (1997) present evidence that

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[17] Title VIII Consumer Protection Act, §§ 801-818, 15 U.S.C. § 1692 (1988).

[18] In addition, three states have set absolute minima above the federal limit of 30 times the minimum wage.

[19] Under the Federal Debt Collection Procedures Act, garnishment for the collection of federal debts (e.g., unpaid U.S. income taxes) is determined by federal law, and is therefore legal in all states.

[20] See Domowitz and Sartain (1999) and Nelson (1999).

[21] See, for example, Hynes (1998) and Weiss, Bhandari and Robins (1996).

[22] Shiers and Williamson (1987).

creditors restrict lending to risky individuals in states with lenient exemptions. In studies that do not control for the supply of credit, this supply effect will bias downward the parameter estimates of the borrower's response to exemptions. Second, these studies are generally based on aggregate data or on individual-level data from relatively small samples. Since bankruptcy is an event with an unconditional probability of less than 1.5% per year, studies using individual-level data will typically base their conclusions on relatively few observations. Third, to the extent that these studies rely on data drawn from survey responses, they may suffer from the underreporting problems reviewed in the Introduction.

Garnishment laws have been studied less exhaustively than exemptions in the literature, and their predicted effect is also ambiguous. We might expect that, like strict exemption laws, strict garnishment laws would discourage risky borrowing behavior. However, the relatively few bankruptcy studies that have included garnishment variables find that the more that creditors can garnish, the more likely it is that debtors will choose bankruptcy.[23] A likely explanation for this effect is that debtors declare bankruptcy in order to forestall garnishment, since a formal bankruptcy filing produces an automatic stay. A survey conducted by Visa in 1998 supports this theory: It found that 13.4% of borrowers declaring bankruptcy cited garnishment as the "last straw" before bankruptcy, and 59.3% cited other creditor remedies.[24] Therefore, garnishment laws may influence the personal bankruptcy decision in three ways: (1) strict laws may discourage risky borrowing behavior, decreasing the probability of default, (2) after a missed payment, they may increase the likelihood of repayment over informal bankruptcy, and (3) after a missed payment, they may increase the likelihood of formal over informal bankruptcy. Testing all three of these effects requires a model that includes informal bankruptcy.

3. The Empirical Bankruptcy Decision Model

Because previous bankruptcy studies generally have not examined informal bankruptcy, we will spend some time discussing how to incorporate informal bankruptcy into a comprehensive bankruptcy decision model. In Section 5, we first establish that borrowers view informal bankruptcy as a distinct choice from both formal bankruptcy and repayment. We then discuss results of both non-nested and nested discrete choice models in Sections 5 and 6.

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[23] See Hynes (1998) and Barron, Staten, and Wilhusen (2002).

[24] *1998 Bankruptcy Debtor Survey*, Visa U.S.A. Inc, November, 1998.

One aspect of our modeling strategy should be explained here: we do not use a duration model. In general, hazard models could be attractive for at least two reasons: First, they could smoothly incorporate additional variables, such as monthly charges and outstanding balances, which are somewhat awkward to include in point-in-time models. Second, informal bankruptcy could be defined as a "spell" of non-repayment, and the borrower could enter either formal bankruptcy or repayment at the end of the spell. Thus formal bankruptcy, informal bankruptcy and repayment would not necessarily be mutually exclusive choices.

However, for our particular study, a duration model would add very little. In particular, many of our important independent variables, such as the outstanding balances on other cards and the credit score, are only reported at the time that the credit card is issued. The monthly credit card charges variable is likely to be highly endogenous: individuals are likely to run up charges in anticipation of default. The state of residence (which determines the applicable state law) is reported over the entire time period, but it changes for less than one percent of the borrowers in our dataset. Therefore, we are able to avoid duration models and can capture the relevant information in simpler, point-in-time models.

A. Informal Bankruptcy as a Distinct Choice

As a new addition to the personal bankruptcy decision, informal bankruptcy must first be established as a distinct choice from either formal bankruptcy or repayment. Following Hill (1983), we test whether borrowers see informal bankruptcy as distinct by comparing the standard dichotomous model to a trichotomous model, which assumes that the choices of informal and formal bankruptcy are independent.

We specify the trichotomous model as a choice among three alternatives: formal bankruptcy (B), informal bankruptcy (I), and loan repayment (L). Let V_j denote a borrower's maximized utility under repayment status j, where $j = B, I, L$. Assume that her indirect utility function is composed of an observed, non-stochastic component (S) and an unobserved, stochastic component (E), such that:

$$V_j = S_j + E_j \ .$$

Then the probability that the borrower chooses repayment status j equals:

$$P_j = \Pr \left[S_j + E_j > S_k + E_k, \ \text{for } k = B, I, L \text{ and } k \neq j \right] \ .$$

Let us assume that the stochastic terms have independent, identical Weibull distributions, and that the non-stochastic portion takes a linear form $(S_j = A_j' X)$. One possible specification is a dichotomous model that restricts the coefficients for formal bankruptcy and informal bankruptcy to be equal. In this case, the probability of repayment equals:

$$P_L = \frac{e^{A_L' X}}{e^{A_{BI}' X} + e^{A_L' X}},$$

where L subscripts loan repayment and BI subscripts the combination of bankruptcy and informal bankruptcy. The probability of formal and informal bankruptcy is analogous. An alternative specification is a dichotomous model that restricts the coefficients for loan repayment and informal bankruptcy to be equal. In this case, the probability of formal bankruptcy equals:

$$P_B = \frac{e^{A_B' X}}{e^{A_B' X} + e^{A_{LI}' X}},$$

where B subscripts bankruptcy and LI subscripts the combination of loan repayment and informal bankruptcy. If the coefficients on informal bankruptcy are not the same as either those on formal bankruptcy or repayment, then a dichotomous model cannot correctly specify the personal bankruptcy decision.

In Section 5, we will report the results of two tests: first, we test whether borrowers view informal bankruptcy as distinct from bankruptcy; and then we test whether they view informal bankruptcy as distinct from repayment. The null hypothesis for the first test is $A_B = A_I$, and the null hypothesis for the second test is $A_L = A_I$. Each can be checked using a likelihood ratio test. For each test, let $L(A_r)$ be the restricted log-likelihood function, and let $L(A_u)$ be the unrestricted log-likelihood function. Under each null hypothesis, the test statistic, Q, defined by:

$$Q = -2[L(A_r) - L(A_u)],$$

has an asymptotically chi-square distribution with k degrees of freedom, where k is the number of restrictions.

B. Discrete Choice Models

Once we have established from the data that a model which specifies independence between the choices of informal and formal bankruptcy is more appropriate than a model which requires complete equality, we can generalize this model by allowing relatedness between the choices of informal and formal bankruptcy. There are two reasons that a more general model may be superior to the trichotomous logit model described above. First, we might expect a borrower's utility from informal bankruptcy to be linked to her utility from formal bankruptcy. For example, the borrower may place high value on having a good credit rating relative to other borrowers, which would decrease her utility from both informal and formal bankruptcy but would not be observable to a creditor. Or she may have high asset levels, which we cannot control for completely in our estimation, which would decrease her utility from both informal and formal bankruptcy: Both choices leave some of her assets vulnerable to forfeiture.

Second, an implication of the independent error terms in the non-nested multinomial logit is the independence of irrelevant alternatives assumption (IIA). If this assumption holds, then the inclusion of an additional choice in an individual's decision problem does not change her preferences over the other choices. Conversely, removing one of the choices from an individual's decision function should leave the coefficients on the other choices largely unchanged, which forms the basis of a test developed in Hausman and McFadden (1984). The null hypothesis for this procedure is that the coefficients on informal and formal bankruptcy are independent, and rejecting the null is evidence of relatedness.

One computationally tractable way to handle relatedness between informal and formal bankruptcy is to allow their error terms, E_I and E_B, to be jointly distributed according to the Gumbel Type B bivariate extreme-value distribution, with correlation coefficient $1 - \alpha^2$. This error structure yields a nested logit. Under these assumptions, we would describe the borrower first choosing between repayment and non-repayment, and, after non-repayment, then choosing between formal and informal bankruptcy.

Alternatively, we could specify a slightly different nested structure, such that the borrower first chooses between on-time repayment and delinquency, and then chooses among

informal bankruptcy, formal bankruptcy, and delayed repayment.[25] In this specification, the probability of repayment becomes:

$$(1) \qquad P_L = \frac{e^{A_L' X}}{\left[1 + e^{A_I' X / \alpha} + e^{A_B' X / \alpha}\right]^{\alpha} + e^{A_L' X}} \ .$$

Note that because only $n - 1$ parameter vectors can be identified for n alternatives in each stage of the nested model, we normalize:

$$A_D' X = A_R' X = 0 \ .$$

D subscripts the choice of delinquency in the first stage, and R subscripts delayed repayment in the second stage.

The probability of formal bankruptcy is now the product of the probability of delinquency and the probability of bankruptcy conditional on delinquency:

$$P_B = P_D \cdot P_{B|D} \ ,$$

where:

$$(2) \qquad P_D = 1 - P_L \ ,$$

and:

$$(3) \qquad P_{B|D} = \frac{e^{A_B' X / \alpha}}{1 + e^{A_I' X / \alpha} + e^{A_B' X / \alpha}} \ .$$

The probability of informal bankruptcy is analogous.

4. The Dataset

For the analysis of this paper, we use a dataset of 50,831 pre-approved gold card recipients from a large U.S. credit card issuer. Summary statistics of the credit card recipients are in Table 2.

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[25] Because the second stage of this nested model is a multinomial logit, we verified that this stage (the choice of delayed repayment, formal or informal bankruptcy) does not violate the IIA assumption.

The issuer collected this data to study the characteristics and behavior of borrowers who respond to different credit card offers, randomly assigning potential recipients into "market cells." All individuals in the same cell received the same offer, while individuals in different cells received offers that differed in their interest rate or length of a low interest introductory period. The issuer subsequently collected data on recipients' responses and, if they accepted the offer, their behavior over a 21–28 month period.[26] The dataset consists of three separate mailings, each containing four to seven different offers, to individuals with credit scores within the range that would pre-qualify them for gold cards.

The data includes an extensive set of variables from the borrowers' credit histories, including the number of times the borrower has been delinquent, her balances and limits on revolving and non-revolving loans, the number and size of her mortgages, and her highest balance and limit on an existing bankcard. In addition, the lender also recorded monthly variables describing each borrower's use of the credit card, including how much she borrowed and paid off each month on her new card, whether and how long she was delinquent, whether the account was charged-off, and whether the chargeoff had an associated bankruptcy filing. Because the credit card offers were for pre-approved gold cards, our empirical results should be taken with the caveat that they may not be applicable to the entire population of U.S. borrowers. We will discuss this issue in the next section.

We can also use the data to control for credit supply effects. Several studies have hypothesized that supply effects may obscure the impact of exemptions on individuals' behavior. If creditors tighten lending in lenient exemption states, the pool of borrowers in these states will be less likely to engage in risky borrowing behavior than borrowers in strict exemption states. In the extreme case, if lenders restrict credit supply severely enough, regressions will indicate that tough bankruptcy exemptions *increase* the probability an individual will file for bankruptcy.

Our data contains the lender's own assessment of each individual's default risk, the credit score,[27] which is a good proxy for the borrower's ability to obtain credit. Therefore, we can directly test whether creditors account for bankruptcy laws when assessing borrowers' credit worthiness by regressing their credit scores on state bankruptcy law variables. The results of this

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[26] Except where noted, we estimated separate intercepts for each market cell.

[27] Unless otherwise noted, "credit score" refers to the borrower's risk credit score, the creditor's assessment of the borrower's probability of default. The creditor also uses other behavioral scores that include measures of predicted profitability.

regression are presented in Table 3. Though we had no specific information about which variables were included in credit scores, all the variables used to compute the scores were included in our data set. These 39 potential covariates included information on number of loans, types of loans, balances on loans, delinquencies, and chargeoffs. Coefficients 1–23 were all significant at the 0.01% level. Only nine coefficients were not significant at the 5% level even in this crude estimation, and only six were not significant at the 10% level. By contrast, the coefficients on homestead exemptions, personal property exemptions, and garnishment laws had P-values of 32%, 52%, and 14% levels, respectively. A test could not reject the null hypothesis that the coefficients on state laws were jointly zero. We repeated our test for card limits, and we found that state laws did not affect the limit that a borrower was assigned. These results clearly indicate that the bank did not include state bankruptcy or garnishment law variables in its construction of credit worthiness variables.

Our data also includes each respondent's five-digit zip code for every month of the experiment period. Merging other data sets on zip code allowed us to include such variables as the median home value in a borrower's zip code, the rate of unemployment, and other demographic characteristics, such as the zip code's racial composition.

We also merge data describing each borrower's state exemption and garnishment laws. The garnishment laws are relatively straightforward to encode. As discussed in Section 2A, states either set no maximum salary garnishment level, in which case the federal 25% maximum applies, or set a percentage below the federal level. The garnishment variable ("Garnishment Strict") that we use in most model specifications of this paper is a dummy which equals one if garnishment is allowed up to the federal maximum, and zero otherwise. As discussed below, we also performed robustness tests using alternative constructions of the garnishment variable.[28]

Nearly every state allows borrowers to protect at least some equity in a homestead. As Table 1 shows, the amounts of these exemptions vary widely from state to state. Six states allow borrowers to keep homes of unlimited value, and all of our results were robust to several classifications of these unlimited exemptions.

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[28] In a few cases, states set absolute salary minima in addition to the percentages of salary. Converting these absolute restrictions into percentages or each borrower's income, or converting the percentage restrictions into dollars of income, had no effect on our results.

Other exemption laws, however, proved more difficult to categorize. Some states set extensive and detailed personal property exemptions, yet do not specify dollar limits on the value of specific items. However, it would be inappropriate to designate these exemptions as unlimited. Even a casual inspection of the case law in these states indicates that judges often disallow particularly valuable items, even if these items are categorized without limit in the state code. To further complicate classification of these laws, some states allow borrowers a maximum assessed value for any property, without restricting the type of property the borrowers can choose to exempt. A few states provide both property and property value restrictions, and we used these exemptions to match property descriptions to allowable values.[29] Our estimates are presented in Table 1. In spite of these efforts, we were unable to obtain consistent results for personal property exemptions, and so our discussion will follow previous studies and focus on the homestead exemption.[30]

Variable definitions are presented in Table 4. Data on the borrower's credit history, such as balances, limits, and number of loans, were recorded by the credit reporting agency immediately prior to solicitation. A few variables, including balances transferred, (self-reported) income, and credit limit, were recorded by the issuer at the beginning of the experiment period. We did not use monthly information on balances or other borrowing behavior which is likely to be endogenous, as discussed above. These effects are beyond the scope of this paper, but are further examined in Dawsey and Ausubel (2002).

The dataset also indicates whether the borrower was delinquent on her loan in each given month, whether her loan was charged off and, if so, whether there was an associated bankruptcy filing. From this information, we constructed two outcome measures. First, we specified the borrower's bankruptcy decision as a trichotomous choice among bankruptcy, informal bankruptcy, and repayment, as described above in Section 3. The following definitions were used:

Formal Bankruptcy – Borrowers who declared bankruptcy within the period tracked.

Informal Bankruptcy – Borrowers who did not make payments on their cards for six months (i.e., were charged off), with no associated bankruptcy filing.

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[29] Where more than one state set value limits on a specific type of property, we took the median value. Taking the maximum or the minimum did not affect our results.

[30] See Hynes (1998) for a critique of this approach.

> *Loan Repayment* – Borrowers who were not categorized into either formal or
>> informal bankruptcy.

We also constructed a second outcome measure which specified borrowers' choosing among four choices: repayment, delayed repayment, formal and informal bankruptcy:

> *Formal Bankruptcy* – Same definition as above.

> *Informal Bankruptcy* – Same definition as above.

> *Delayed Repayment* – Borrowers who became 60-days delinquent on their accounts,
>> but resumed payment before being categorized as either informally or formally
>> bankrupt.[31]

> *Repayment* – Borrowers who were not categorized into any of formal bankruptcy,
>> informal bankruptcy, or delayed repayment.

2,066 observations could not be matched to zip code data, and an additional 967 individuals were deleted for late delinquency, leaving a sample of 47,798 observations.

5. Results from Non-Nested Specifications

In this section, we examine the results of several non-nested specifications. Using a likelihood ratio test, we conclude that consumers treat informal bankruptcy as a separate choice, distinct from repayment and formal bankruptcy. A multinomial logit model allows a straightforward comparison between the standard result of no significant relationship between neighborhood racial composition and formal bankruptcy, and our new results finding a strong relationship with the various default variables. The additional structure and computational simplicity of the multinomial logit also enable an examination of some potential selection issues. While these results from non-nested specifications are enlightening, the Hausman test ultimately rejects the IIA assumptions. Therefore, the nested specification of Section 6 is more appropriate, and we defer much of our detailed discussion until the next section.

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[31] Borrowers who began their spell of delinquency within six months of the end of the period tracked were deleted from the sample, since there was insufficient time to distinguish between delayed repayment and informal bankruptcy.

A. Dichotomous vs. Trichotomous Model

The likelihood ratio tests described in Section 3A clearly indicate that we should reject the hypothesis that the coefficients on informal bankruptcy are equal to either the coefficients on bankruptcy or on repayment. We reject the null hypothesis that individuals equate informal bankruptcy and either formal bankruptcy or repayment at a degree of significance less than one percent. We also reject the null hypothesis in a model where the bidder chooses among four options: on-time repayment, severe delinquency followed by repayment, informal bankruptcy, and bankruptcy.

Table 5 presents a comparison between the standard dichotomous model and a trichotomous model that includes informal bankruptcy. The entries in the first column of Table 5 represent the change in the probability of formal bankruptcy versus the combination of repayment and informal bankruptcy, measured at the parameter means. The factors indicating creditworthiness, such as credit score, median home value in the individual's zip code, and months on file, decrease the probability of formal bankruptcy. Likewise, the factors suggesting difficulty in repayment, such as revolving balances at the time of solicitation and the state unemployment rate, increase the likelihood of formal bankruptcy.

The second and third columns of Table 5 provide the main results for the trichotomous model. Note that the formal-bankruptcy coefficients on the variables discussed in the previous paragraph are similar in the trichotomous model, and the informal-bankruptcy coefficients are almost the same. One notable difference occurs in the garnishment strict variable: in the trichotomous model, the informal-bankruptcy coefficient becomes strongly negative while the formal-bankruptcy coefficient remains strongly positive. This difference—indicative of the substitutability of formal and informal bankruptcy—is central to our results and is discussed further in Section 6.

A second notable difference occurs in the % black zip variable, representing the percentage African-American in the consumer's zip code. As in Domowitz and Eovaldi (1993), race appears to have little predictive value in the dichotomous bankruptcy model. However, the picture dramatically changes in the trichotomous model. Consumers living in higher-percentage African-American neighborhoods are somewhat less likely to choose formal bankruptcy (relative to repayment) than those in other neighborhoods, but are far more likely to utilize informal bankruptcy.

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A third notable difference is in the number of loans variable, indicating the number of other open credit accounts at the time of solicitation. The informal-bankruptcy coefficient becomes strongly negative while the formal-bankruptcy coefficient remains strongly positive. One potential explanation of this result is found in the Creditor's Dilemma model (see Jackson, 1986). In this model, creditors pursue repayment more aggressively when they are in competition with other creditors. Thus a borrower with more creditors (holding the dollar amount of debt constant) would find informal bankruptcy less tenable, and would be more likely to enter formal bankruptcy.

B. Selection Issues

One question that arises in interpreting the results of this paper is exactly what population our dataset reflects. Indeed, the accounts studied were generated by preapproved gold card solicitations. The issuer attempted to limit the customer pool to individuals with incomes of $25,000 per year or higher, and to exclude individuals with serious problems (e.g., past bankruptcies) on their credit records. Our rough assessment is that our dataset is approximately representative of the top 50% of the U.S. population as ranked by credit history.

A second potential selection issue relates to possible supply effects. As we have seen in Section 4, it appears that our credit card lender did not use geographic information in assigning credit scores or setting credit limits. However, suppose that competing credit card lenders followed the strategy suggested by Gropp, Scholz and White (1997) and applied tighter standards in issuing credit in states such as Florida and Texas with lenient bankruptcy exemptions. As argued in Ausubel (1999), any competition among credit card issuers can give rise to an adverse selection problem, and adverse selection is in fact observed in our dataset. If the posited supply effect were important, then our lender might face a worse adverse selection problem in the lenient-bankruptcy states shunned by competing lenders. In that event, our regressions explaining formal and informal bankruptcy might overstate the borrowers' responses to exemption laws by picking up defaults in fact attributable to heightened adverse selection.

The experimental nature of our dataset enables us to indirectly test whether adverse selection induced by supply effects is a problem. Ideally, we would examine whether our lender's solicitations were more likely to be accepted in states with lenient bankruptcy rules, indicating that consumers in those states received fewer offers from competing lenders. Unfortunately, we lack geographic data on nonrespondents. However, our dataset does include

randomized variation on the interest rate in the solicitation. Observe that, if consumers in lenient bankruptcy states had less access to credit, then they would be apt to accept even high-interest-rate offers. Consequently, the combination of residing in a lenient bankruptcy state and accepting a high interest rate should convey strongly adverse information about the prospects for default. We can test this by including interaction terms between interest rate and state bankruptcy rules in our regressions.

In Columns 4 and 5 of Table 5, we include interactions between interest rate and policy parameters. The direct effect of the interest rate is to increase the probability that the borrower chooses informal or formal bankruptcy over repayment, consistent with Ausubel (1999). All of the coefficients on the interaction terms are statistically insignificant. If adverse selection induced by supply effects were an important problem, we would expect that the coefficient on the interaction between exemption laws and the interest rate would be positive. In fact, we find that these coefficients are negative. As a result, we conclude that adverse selection induced by supply effects is not driving our results.[32] We explore supply effects further in Dawsey and Ausubel (2002).

Though these multinomial results are informative, the Hausman test rejects the IIA assumptions. Excluding repayment significantly changes the coefficients on informal and formal bankruptcy, indicating that we should reject the null hypothesis that these choices are independent. Our data fails this test in both the three- and four-choice specifications, indicating a non-nested model is not the most appropriate specification.

6. Results from Nested Specifications

We estimate the three- and four-branch nested logit models described in Section 3 using a full information maximum likelihood procedure, with initial values estimated from a sequential method described in Maddala (1983).[33] The four-branch specification, which includes the choice of repaying the loan after going delinquent, seems preferable to the three-branch specification

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[32] Since we have data on the interest rate associated with the market cell for only about half the sample, our number of observations in these regressions drops from 47,903 to 24,832, and we cannot rule out the possibility that our estimates' imprecision is due to the decline in sample size.

[33] See Hensher (1986) for a discussion of the importance of consistent starting values in nested logit estimation.

because it better matches the temporal sequence of decisions that the borrower faces.[34] Since we prefer the four-branch specification, and since the modeling choice does not fundamentally alter our results, we will base our subsequent discussion on the four-branch model. The results of the three-branch model can be found in Tables 6 and 7.

Tables 8 and 9 present the central empirical results of the paper. Table 8 reports coefficient estimates for the four-branch nested specification of Eq. (1).[35] The coefficients should be interpreted with some care: the slope of each outcome with respect to a parameter depends on the coefficient estimates for each choice.

Our detailed discussion of the results will use Table 9. A good measure of each coefficient's impact is its marginal effect. Table 9 reports marginal effects, computed at the sample means; standard errors are estimated using the delta method. The first three columns of Table 9 report the marginal effects of variables on the *unconditional* probabilities of repayment, informal bankruptcy and formal bankruptcy, respectively (see Eqs. (1) and (2)). The fourth and fifth columns report the marginal effects of variables on the probabilities of informal and formal bankruptcy, *conditional* on delinquency.

As seen in Column 1, many of the variables help to predict the outcome of on-time repayment (versus delinquency). The key credit-bureau variables of credit score, revolving balances and credit limits are strong predictors of on-time repayment, each with t-statistics exceeding ten. Months on file, the best available proxy for the borrower's age, has a positive and strongly significant coefficient, indicating that more experienced consumers are more likely to repay their loans on time. All other things being equal, an extra ten years of experience reduces

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[34] The three-branch specification implicitly assumes that the borrower makes a decision to default, and then chooses between formal and informal bankruptcy. The four-branch specification takes the more realistic approach that the borrower allows his account to become 60 days past due and then, in the ensuing four months until a chargeoff would occur, decides among formal bankruptcy, informal bankruptcy and repayment. This has the particular advantage of allowing the borrower to choose among the bankruptcy alternatives and repayment based on intervening events, including attempts by creditors to garnish his wages or seize his property, or the outcomes of economic occurrences.

[35] We estimated two additional regressions of the four-branch nested model: The first included additional geographic covariates, including regional dummies and level of urbanization, and additional state level effects, such as per capita state personal income and gross state product. The second added several variables describing balances on loans other than revolving cards. These variables had very little explanatory power, and our primary results were robust to their inclusion. Unfortunately, α, the measure of relatedness between informal and formal bankruptcy, was estimated at 2.82, which is not interpretable as a correlation coefficient. While our coefficient estimates were quite robust, our estimate of α varied from .66 to over 3. We chose not to include or exclude variables based on α in order to avoid pretest bias.

the probability of delinquency by one percentage point. Consistent with our discussion in Section 5A, the coefficient on the % black zip variable is negative and significant.

Theoretically, the effect of credit limit is somewhat ambiguous. The two primary effects are likely to improve on-time repayment. First, the credit limit that the issuer chooses to assign is positively related to the borrower's creditworthiness. Second, a higher credit limit facilitates the consumer's ability to implicitly use this account to make minimum payments on other loans and vice versa, deferring the ultimate date of insolvency. On the other hand, all other things being equal, a higher credit limit exacerbates the moral hazard problem of spending and not repaying, possibly increasing the probability of delinquency and default. In our results, we find that the first two effects appear to dominate the third: higher credit limits are associated with significantly higher probabilities of repayment.

Interestingly, the state law variables have only modest impact on the probability of on-time repayment. Perhaps the explanation is that borrowers do not become informed about the relevant state laws until they turn delinquent. But, as we shall soon see, once delinquent, borrowers become highly responsive to state laws.

Next we turn to our results on informal and formal bankruptcy. Months on file significantly decreases the unconditional probability that the borrower chooses either bankruptcy alternative. However, conditional on delinquency already occurring, experience does not significantly affect the outcome further. Unemployment in the consumer's state of residence increases the probability of informal and formal bankruptcy, both unconditionally and conditionally, and by essentially equal magnitudes.

Observe that the log income variable tends to increase the probability of formal, and especially, informal bankruptcy. Note that it is, uniquely, a self-reported variable, and (to the extent that it is accurate) it is highly correlated with the median home value in the consumer's zip code. Meanwhile, median home value tends to decrease the probability of both forms of bankruptcy. One possible interpretation is that, all other things being equal, a high income report may be indicative of a borrower's willingness to deal less than candidly with creditors, a characteristic that may also be associated with informal bankruptcy.

Our estimates of the impact of the number of loans are consistent with our findings from the non-nested specification. Increasing a borrower's number of loans (while holding the dollar amount fixed) increases her probability of formal bankruptcy following a default, and decreases

her probability of informal bankruptcy. In addition, as in the non-nested model, borrowers living in neighborhoods with higher percentages of African-Americans are more likely to enter informal bankruptcy, and less likely to enter formal bankruptcy, than other borrowers.

The central conclusions that we take from Table 9 concern the state law variables. Strict garnishment has a positive and strongly significant impact on the probability of formal bankruptcy. Strict garnishment has an opposite and modestly significant impact on the probability of informal bankruptcy. These findings resolve the Tennessee puzzle posed in the Introduction. A delinquent borrower in a strict garnishment state is likely to quickly find his paycheck attached, a process that is stopped only by repayment or a formal bankruptcy filing. A delinquent borrower in a no-garnishment state such as Texas may be able to remain in informal bankruptcy indefinitely while continuing to receive his full paycheck. The strong substitution between formal and informal bankruptcy would be masked in a standard two-branch model that equated bankruptcy with default.

A higher homestead exemption increases the probability of both formal and informal bankruptcy. The explanation why the signs are the same is that exemption laws benefit consumers equally inside and outside of formal bankruptcy, so higher exemptions imply lower prices for *both* informal and formal bankruptcy. As discussed above, probably due to the difficulty of quantifying personal property exemptions and their relatively smaller dollar value, the personal property exemptions do not appear significantly in the regressions.

Table 10 reports the results of a model identical to the one just discussed, except that an additional garnishment dummy was added. Thus, in Table 10, "Garnishment Moderated" is a dummy variable that equals 1 if the borrower lives in a state where garnishment is permissible, but restricted by law to less than the federally-mandated maximum of 25% of wages. As before, "Garnishment Strict" is a dummy that equals 1 if the borrower lives in a state that allows garnishment at the maximum federal level. Both of these dummies will be 0 if the borrower lives in a state where garnishment is not allowed at all. This model serves as the basis for Table 11.

In order to attempt to assess the importance of state laws in our data, we construct Table 11. We perform the thought experiment of moving the borrower from a consumer-friendly state to a consumer-unfriendly state, and observing the impact on repayment and bankruptcy outcomes. In the second row of Table 11, the entries labeled "None" can be interpreted as predicted probabilities for each individual (and averaged over all individuals) if they lived in

states that did not allow garnishment. The row labeled "Strict" represents the average predicted probabilities if they lived in states allowing creditors to garnish 25% of wages, the federal maximum. In the third row, the entries labeled "Unlimited" represent the average predicted probabilities if all consumers lived in states with unlimited homestead exemptions. The entries labeled "Federal" show the average predicted probabilities if they all lived in states with the federal homestead exemption, which equaled $15,000 at the relevant time for this study. The first three columns of Table 11 report the predicted unconditional probabilities of on-time repayment, informal bankruptcy and formal bankruptcy, respectively, while the last two columns report the predicted probabilities conditional on delinquency.

The effects of state laws are significant, both statistically and economically. From the estimates of Table 11, we find that moving an individual from a no garnishment state to a strict garnishment state has only a slight impact on that individual's probability of loan repayment: the predicted probability of repayment actually decreases (but insubstantially, by around half of a percentage point[36]). However, garnishment has a large impact on the unconditional probability of formal bankruptcy: a strict garnishment regime yields an average probability of formal bankruptcy 74% higher than a no garnishment regime. At the same time, a strict garnishment regime yields an average probability of informal bankruptcy 23% lower than a no garnishment regime. Much of the increase in formal bankruptcy appears to be substitution from informal bankruptcy: formal bankruptcies increase by 0.75 percentage points, while informal bankruptcies decrease by 0.40 percentage points.

The relationship between garnishment law and the two types of bankruptcy is much more pronounced following a default. Moving a borrower from a strict garnishment state to a no garnishment state causes a decrease in formal bankruptcy that is very nearly offset by the increase in informal bankruptcy. The conditional probability of formal bankruptcy decreases from 24% to 16%, while the conditional probability of informal bankruptcy increases from 18% to 24%. In this specification, the fall in formal bankruptcies of 8.1 percentage points is almost matched by the rise in informal bankruptcies of 6.2 percentage points.

Garnishment laws appear to operate largely on the margin between formal and informal bankruptcy. To a limited degree, they also operate on the margin between repayment and nonpayment, but this effect appears slight. Moreover, while strict garnishment laws may also

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[36] As shown in Table 9, the opposite result is found when the garnishment variable is binary.

increase the probability of repayment, our results suggest that by far the strongest effect is simply to increase formal bankruptcies.

Homestead exemptions also have strong effects on the probability that individuals choose either type of bankruptcy, both unconditionally and conditional on default. As in our other specifications, strict homestead exemptions yield relatively lower default activity, while unlimited homestead exemptions yield relatively high default activity. In the specification of Tables 10 and 11, moving an individual from one of the many states with the federal exemption to Texas or Florida, notorious for unlimited homestead exemptions, has a far greater impact on her probability of choosing informal bankruptcy than on her probability of choosing formal bankruptcy.[37] The unconditional probability of formal bankruptcy would increase quite substantially—by 60%. However, this would mask an even larger jump in the probability of informal bankruptcy—a formidable 160% increase.

7. Conclusion

The broader view of bankruptcy taken in this paper has immediate implications for evaluating potential policy prescriptions. We have argued that formal bankruptcy and informal bankruptcy are usefully viewed as substitutes. Moreover, the empirical analysis has demonstrated that the actual degree of substitutability between them is substantial.

Adopting strict garnishment laws is an example of a change that raises the implicit cost of informal bankruptcy relative to that of formal bankruptcy, so it might be expected to induce substitution from informal into formal bankruptcy. Variation among state garnishment laws enables us to perform the thought experiment of moving from a legal environment of no garnishment to one of strict garnishment. Table 11 reports that the substitution effect is large: all other things equal, strict garnishment laws raise the average conditional probability of formal bankruptcy (following severe delinquency) from 16% to 24%, while lowering the average conditional probability of informal bankruptcy from 24% to 18%. Indeed, the observed shift in bankruptcy composition swamps the mild impact on overall default activity.

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[37] However, this result concerning the relative change of formal versus informal bankruptcies in response to a change in the homestead exemption is relatively sensitive to the model specification. In the specification reported in Table 9, the unlimited homestead exemption increases formal bankruptcy more than informal bankruptcy.

In the recent bankruptcy reform debate, the potential policy changes can be divided into two categories. Some proposals, such as "needs-based" bankruptcy requirements[38] or limitations on dischargeability,[39] raise the cost of formal bankruptcy without affecting the cost of informal bankruptcy. As such, these are likely to induce a substantial shift from formal to informal bankruptcy, without necessarily reducing overall defaults. The official bankruptcy statistics may be improved, but insolvency and default will go on. Other proposals, such as capping the unlimited homestead exemption in Florida and Texas, raise the implicit costs of both formal and informal bankruptcy.[40] The logic of this paper suggests that such a policy change might reduce defaults without merely inducing substitution, and the results of Tables 9–11 suggest that a uniform nationwide homestead ceiling would likely reduce both formal and informal bankruptcies. However, the conference report adopted by House and Senate conferees in 2002 and reintroduced in 2003 permits states to maintain unlimited homestead exemptions for residents of two years or more, so that one of the most effective components of bankruptcy reform seems unlikely to be implemented anytime soon.

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[38] For example, borrowers may be required to pass a "means test" before filing for Chapter 7, and individuals who could pay a prescribed proportion of their loans would be required to file under Chapter 13.

[39] A provision in currently pending legislation prevents discharge of credit card debts incurred while the borrower did not have a reasonable expectation of repayment. Under current law, these debts would be discharged unless the borrower engaged in fraudulent or intentionally harmful conduct.

[40] As we have seen in Section 2, creditors are also restricted in their ability to seize exempt property outside of formal bankruptcy.

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Table 1. State Garnishment, Homestead and Property Exemptions

State	% Garn[1]	Home[2]	Property	State	% Garn	Home	Property
AK	FED	$54,000	$8,000	MT	FED	$40,000	$5,700
AL	FED	$5,000	$6,925	NC	0%	$10,000	$5,000
AR	FED	Unlimited	$1,400	ND	FED	$80,000	$7,425
AZ	FED	$100,000	$9,250	NE	15%	$10,000	$2,550
CA	FED	$50,000	$8,350	NH	0%	$30,000	$11,350
CO	FED	$30,000	$4,800	NJ	10%	$15,000	$12,200
CT	FED	$75,000	$7,100	NM	FED	$30,000	$8,050
DE	15%	$0	$5,000	NV	FED	$95,000	$4,500
FL	FED	Unlimited	$2,000	NY	10%	$10,000	$7,400
GA	FED	$5,000	$5,400	OH	FED	$5,000	$2,900
HI	19%	$20,000	$2,000	OK	FED	Unlimited	$10,925
IA	FED	Unlimited	$10,600	OR	FED	$25,000	$9,150
ID	FED	$50,000	$5,750	PA	0%	$15,000	$12,200
IL	15%	$7,500	$7,125	RI	FED	$15,000	$12,200
IN	FED	$7,500	$4,000	SC	0%	$15,000	$12,200
KS	FED	Unlimited	$24,650	SD	20%	Unlimited	$3,250
KY	FED	$5,000	$6,500	TN	FED	$5,000	$7,925
LA	FED	$15,000	$15,125	TX	0%	Unlimited	$30,000
MA	FED	$15,000	$12,200	UT	FED	$8,000	$9,925
MD	FED	$0	$6,000	VA	FED	$5,000	$14,750
ME	FED	$12,500	$9,550	VT	0%	$30,000	$9,400
MI	FED	$15,000	$12,200	WA	FED	$30,000	$12,675
MN	FED	$200,000	$13,000	WI	20%	$40,000	$7,200
MO	10%	$8,000	$3,000	WV	20%	$15,000	$12,200
MS	FED	$75,000	$10,000	WY	FED	$10,000	$9,675

[1] *"FED" indicates that garnishment up to the federal maximum of 25% of salary is allowable.*
[2] *If a state allows consumers to choose between the federal and state homestead exemption, the table entry is the higher of the federal or state exemption.*

Table 2. Means by Outcome

	Total Sample	Delinquent[1]	Informal Bankruptcy	Formal Bankruptcy
Months on File	140.22 (87.29)	111.19 (79.34)	94.39 (81.91)	123.90 (75.65)
Revolving Balances	$6,556 ($10,568)	$8,663 ($11,477)	$7,468 ($8,179)	$13,790 ($12,185)
Revolving Limits	$29,402 ($27,772)	$22,146 ($21,795)	$16,558 ($17,660)	$28,213 ($21,787)
Balance Transferred	$1,478 ($2,579)	$1,022 ($2,366)	$630 ($2,053)	$1,319 ($2,828)
Unemployment	5.47 (1.05)	5.51 (1.00)	5.62 (.923)	5.49 (1.08)
Income	$47,136 ($29,775)	$40,889 ($30,595)	$36,957 ($46,286)	$39,118 ($20,981)
Homestead Exemption	$65,509 ($91,274)	$70,130 ($95,673)	$79,201 ($102,203)	$75,166 ($96,807)
Property Exemption	$9,832 ($6428)	$10,105 ($6,895)	$10,400 ($7,734)	$10,230 ($6,955)
Percentage Salary Garnishable	18.2% (9.5)	17.9% (9.7)	16.8% (10.4)	19.3% (9.2)
Number of Loans	15.8 (8.6)	13.6 (8.5)	10.3 (6.7)	16.85 (8.62)
Percentage Zipcode Black	7.6% (13.6)	10.4% (17.1)	13.6% (6.7)	8.5% (13.4)
Median Zipcode Home Value	$107,012 ($74,201)	$103,270 ($74,214)	$99,832 ($70,605)	$95,598 ($65,374)
Limit	$7,339 ($3,786)	$5,752 ($3,328)	$4,824 ($2,764)	$5,733 ($3,040)
Credit Score	628.36 (88.34)	576.90 (94.28)	560.27 (90.81)	561.95 (97.87)
Observations	48,530	4,251	610	716

[1] *Defined as all borrowers delinquent for two months or longer during experiment period.*

Standard deviations in parentheses.

Table 3. Linear Regression of Credit Score on Credit History Variables

	Estimate	T Stat	Pr > |T|
Variables 1 – 23*	.	.	0.0001
Variable 24	0.00006	3.61	0.0003
Variable 25	-5.07674	-3.43	0.0006
Variable 26	-0.65107	-3.44	0.0006
Variable 27	0.01704	2.98	0.0029
Variable 28	-4.87168	-2.61	0.0092
Variable 29	-17.95368	-2.18	0.0292
Variable 30	-9.52352	-2.10	0.0355
Variable 31	-11.00485	-1.93	0.0530
Variable 32	-9.18290	-1.84	0.0663
Variable 33	0.81706	1.77	0.0766
Variable 34	0.21592	1.41	0.1594
Variable 35	0.08487	1.20	0.2305
Variable 36	-0.19875	-0.86	0.3872
Variable 37	0.00034	0.55	0.5844
Variable 38	-0.00001	-0.25	0.7988
Variable 39	0.08204	0.22	0.8252
Homestead Exemption	0.00000	1.00	0.3193
Personal Property Exemption	-0.00004	-0.65	0.5173
Garnishment Strict	-1.40136	-1.48	0.1390

*Credit score variables.
H0: Coeffs of State Laws are 0:
Chi-Square (3) =2.83
Prob > Chi-2 =.4194
R-square = 0.511

Table 4. Definition of Variables

	Description
Credit Record Variables[1]	Months on file – The number of months the borrower has been on file with the credit reporting agency.
	Revolving/Non-revolving balances – The total balances the borrower has on all revolving/non-revolving loans.
	Revolving/Non-revolving limits – The borrower's total limits on all revolving/non-revolving loans.
	Revolving/Non-revolving loans – The borrower's total number of revolving/non-revolving loans, at the time of the credit report.
	Credit Score – A measure, compiled by the credit reporting agency, meant to capture the borrower's probability of default.
Merged Variables[2]	Unemployment Rate – The unemployment rate of the borrower's state of residence.
	Median Home Value – The median home value in the borrower's zip code.
	Percentage white/black/nonwhite – Racial demographics by zip code.
	Homestead/Personal Property Exemptions – The borrower's state's homestead/personal property exemptions, as described above.
	Garnishment Strict – A dummy variable which equals 1 if the borrower lives in a state where garnishment is allowed to the full federal maximum, 25% of wages.
	Garnishment Moderated – A dummy variable which equals 1 if the borrower lives in a state where state where garnishment is legal, but limited to a lower percentage than the federal limit.
Issuer Variables[3]	Zip code
	Balances Transferred – The balances transferred to the newly issued card.
	Income – The borrower's self-reported income.
	Credit Limit – The borrower's limit on the card.

[1] Data compiled by the credit reporting agency immediately prior to solicitation.

[2] Data merged from other sources. Demographic variables from U.S. Bureau of the Census (1990). If a borrower moved during the experiment period and defaulted, the borrower's residence was defined as the state and zip code where the default occurred. If the borrower moved and did not default, the borrower's residence was defined as the state where she lived longest during the experiment period. We found no correlation between individuals' probability of moving and either characteristics from their borrowing history or their probability of default or bankruptcy.

[3] Data recorded by the credit card issuer at the beginning of the experiment period of 21–28 months. We excluded factors determined by the borrower during the experiment period, such as monthly balances, which were likely to be highly endogenous to the borrower's bankruptcy decision.

Table 5. Marginal Effects of Dichotomous and Trichotomous Specifications

	Dichotomous	Trichotomous			
	FB vs. R, IB	Informal	Formal	Informal	Formal
Intercept	-0.0197159**	-0.0210427**	-0.0175784**	-0. 0209878**	-0. 0311046**
	(6.31E-03)	(5.56E-03)	(6.02E-03)	(7.41E-03)	(1.02E-02)
Months on File	-0.0000129**	-0.0000169**	-0.0000143**	-0.000011**	-2.26E-05**
	(4.68E-06)	(4.51E-06)	(4.65E-06)	(5.21E-06)	(6.12E-06)
Revolving Balances	5.70E-07**	6.06E-07**	6.29E-07**	3.15E-07**	4.73E-07**
	(3.79E-08)	(4.06E-08)	(3.86E-08)	(4.29E-08)	(4.45E-08)
Revolving Limits	-3.09E-07**	-3.14E-07**	-3.25E-07**	-1.21E-07**	-2.29E-07**
	(2.72E-08)	(3.04E-08)	(2.71E-08)	(3.09E-08)	(2.96E-08)
Balance Transferred	8.86E-08	-3.90E-07	4.47E-08	9.71e-08	3.16E-07**
	(1.44E-07)	(1.69E-07)	(1.42E-07)	(1.41E-07)	(1.35E-07)
Unemployment Rate	0.001077**	0.001166**	0.0011006**	0.0007503*	0.0005254
	(3.45E-04)	(3.19E-04)	(3.425E-04)	(3.93E-04)	(4.36E-04)
Log Income	0.0010075*	0.0018656**	0.0010052**	0.0008635	0.0016609**
	(5.18E-04)	(4.82E-04)	(5.09E-04)	(5.27E-04)	(8.18E-04)
Homestead Exemption	1.03E-08**	9.26E-09**	1.08E-08**	1.33E-08	1.51E-08
	(3.76E-09)	(3.27E-09)	(3.73E-09)	(1.95E-08)	(2.26E-08)
Property Exemption	4.22E-08	3.84E-08	5.13E-08	1.43E-07	6.66E-07**
	(5.09E-08)	(4.27E-08)	(5.04E-08)	(2.64E-07)	(3.20E-07)
Garnishment Strict	0.0033936**	-0.0014436**	0.0032644**	-0.002932	0.000830
	(6.91E-04)	(5.97E-04)	(6.84E-04)	(3.69E-4)	(4.34E-03)
Number of Loans	0.0005878**	-0.0001677**	0.0005725**	-0.0003304**	0.0003987**
	(4.44E-05)	(5.52E-05)	(4.44E-05)	(6.57E-05)	(5.16E-05)
Percentage Zipcode Black	-0.0019145	0.008888**	-0.001109	0.0086135**	0.0003427
	(2.23E-03)	(1.59E-03)	(2.21E-03)	(2.00E-03)	(2.87E-03)
Median Zipcode Home Value	-1.54E-08**	-1.43E-08**	-1.56E-08**	-5.39E-09	-7.69E-09
	(5.67E-09)	(4.73E-09)	(5.61E-09))	(5.70E-09)	(7.06E-09)
Credit Limit	-1.35E-06**	-1.64E-06**	-1.39E-06**	-9.05E-07**	-1.16E-06**
	(1.42E-07)	-(1.49E-07)	(1.42E-07)	(1.45E-07)	(1.58E-07)
Credit Score	-0.0000501**	-0.0000333**	-0.0000512**	-0.0000197**	-3.71E-05**
	(4.29E-06)	(3.89E-06)	(4.32E-06)	(4.69E-06)	(5.57E-06)
Interest Rate				0.0011132*	0. 0018847**
				(6.15 E-04)	(7.28E-04)
Interest* Garnishment				0.000418	.0001274
				(6.13 E-04)	(7.40E-04)
Interest* Homestead Exemption				-8.93E-09	-8.84E-10
				(3.23 E-09)	(3.82E-09)
Interest* Property Exemption				-1.76E-08	-1.08E-07**
				(4.38 E-08)	(5.51E-08)
	(N= 47,903)			(N=24,832)	

Standard errors in parentheses
* significant at 10% level
** significant at 5% level

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Table 6. Two Stage Nested Logit Coefficients, 3 Outcome Model

	First Stage	Second Stage
	Repayment	**Formal Bankruptcy**
Intercept	2.15498**	7.51414
	(7.80E-01)	(1.74E+00)
Months on File	2.08E-03**	-2.93E-03*
	(8.55E-04)	(1.50E-03)
Revolving Balances	-3.08E-04**	-3.02E-04**
	(1.44E-05)	(2.09E-05)
Revolving Limits	3.88E-05	6.13E-06**
	(5.08E-06)	(8.75E-06)
Balance Transferred	1.07E-04	7.55E-05*
	(2.50E-05)	(4.34E-05)
Unemployment Rate	-0.091504*	4.97E-03**
	(6.58E-02)	(1.31E-01)
Log Income	-0.299366	2.23E-06
	(6.54E-02)	(1.27E-06)
Homestead Exemption	-0.01745	-1.54E-05**
	(9.73E-03)	(1.62E-05)
Property Exemption	9.60E-08	-0.505191
	(6.33E-07)	(1.46E-01)
Garnishment Strict	1.30E-05**	0.033518**
	(8.34E-06)	(1.64E-02)
Number of Loans	0.25068	0.401408**
	(1.21E-01)	(2.39E-01)
Percentage Zipcode Black	-0.242267**	0.768096**
	(3.60E-01)	(7.31E-01)
Median Zipcode Home Value	2.28E-06**	1.47E-06**
	(1.01E-06)	(2.08E-06)
Credit Limit	1.88E-04	4.14E-05
	(2.46E-05)	(4.55E-05)
Credit Score	4.91E-03**	4.10E-03**
	(7.14E-04)	(1.37E-03)

* significant at 10% level.
** significant at 5% level.
Standard errors in parentheses.

Table 7. Two Stage Nested Logit Coefficients, 4 Outcome Model

	First Stage	Second Stage	
	Repayment	Informal Bankruptcy	Formal Bankruptcy
Intercept	1.90575** (0.633334)	-5.44502** (1.81361)	-1.85216 (2.03863)
Months on File	0.00222535** (0.00057644)	.135458E-02 (0.00140889)	6.39443E-04 (0.0014499)
Revolving Balances	-2.2445E-05** (4.4655E-06)	.116286E-03** (1.5866E-05)	7.62162E-05** (1.1313E-05)
Revolving Limits	4.2187E-06 (2.8007E-06)	-.880321E-04** (1.279E-05)	-5.30310E-05** (8.2508E-06)
Balance Transferred	1.5684E-05 (1.7139E-05)	-.203414E-03** (6.3417E-05)	7.51778E-05** (4.2262E-05)
Unemployment Rate	0.080835* (0.046635)	.368445** (0.131253)	0.306592** (0.113485)
Log Income	0.050998 (0.047965)	0.617607 (0.153566)	0.164416 (0.189491)
Homestead Exemption	6.4948E-07 (4.8546E-07)	2.26742E-06** (1.2256E-06)	2.71412E-06** (0.189491)
Property Exemption	-3.555E-06 (6.7358E-06)	-1.61920E-06 (1.5764E-05)	4.10799E-06 (1.1920E-06)
Garnishment Strict	0.20842** (0.08297)	-0.084221 (0.224016)	1.05106** (1.6490E-05)
Number of Loans	0.00493825 (0.00636345)	-0.055694** (0.019445)	.125332** (0.231141)
Percentage Zipcode Black	-0.998254** (0.245409)	0.547955 (0.547965)	-2.10896** (1.33231)
Median Zipcode Home Value	-1.6482E-06** (5.6693E-07)	-6.85087E-06** (1.7525E-06)	-5.74179E-06** (0.731521)
Credit Limit	-1.3598E-05 (1.671E-05)	-3.68234E-04** (5.2213E-05)	-2.62494E-04 (0.00130933)
Credit Score	0.00215816** (0.00052578)	-1.59469E-03 (0.00132882)	-5.90031E-03** (1.7746E-06)

* significant at 10% level
** significant at 5% level
Standard errors in parentheses

Table 8. Marginal Effects in Nested Model: Three-Outcome Model

	Unconditional Effects			Conditional
	Repayment	**Informal Bankruptcy**	**Formal Bankruptcy**	**Formal Bankruptcy**
Months on File	6.68E-05**	-4.52E-05**	-2.16E-05**	2.09E-04**
	(8.55E-06)	(4.82E-06)	(4.70E-06)	(1.06E-04)
Revolving Balances	-3.98E-06**	2.00E-06**	1.97E-06**	2.16E-05**
	(1.69E-07)	(1.13E-07)	(1.05E-07)	(1.28E-06)
Revolving Limits	7.57E-07**	-4.56E-07**	-3.02E-07**	-4.38E-07
	(5.10E-08)	(3.00E-08)	(2.89E-08)	(6.21E-07)
Balance Transferred	1.62E-06**	-8.83E-07**	-7.34E-07**	-5.39E-06*
	(2.75E-07)	(1.56E-07)	(1.47E-07)	(3.04E-06)
Unemployment Rate	-1.94E-03**	1.20E-03**	7.44E-04**	-3.55E-04
	(6.16E-04)	(3.72E-04)	(3.44E-04)	(9.37E-03)
Homestead Exemption	-1.59E-08**	1.30E-08**	2.95E-09	-1.59E-07*
	(6.17E-09)	(3.85E-09)	(3.29E-09)	(9.03E-08)
Property Exemption	-1.46E-07*	6.76E-08	7.89E-08*	-1.10E-06
	(8.35E-08)	(5.02E-08)	(4.49E-08)	(1.16E-06)
Log Income	-2.16E-03**	5.97E-04	1.56E-03**	3.61E-02**
	(8.10E-04)	(5.62E-04)	(3.59E-04)	(1.03E-02)
Number of Loans	-9.33E-05	8.86E-06	8.44E-05	2.39E-03**
	(1.06E-04)	(5.76E-05)	(5.60E-05)	(1.19E-03)
Garnishment Strict	-1.98E-03*	6.38E-04	1.35E-03**	0.028676*
	(1.18E-03)	(7.05E-04)	(6.51E-04)	(1.74E-02)
Percentage Zipcode Black	-0.011213**	7.98E-03**	3.23E-03*	-0.054873**
	(3.22E-03)	(1.94E-03)	(1.87E-03)	(5.24E-02)
Median Zipcode Home Value	3.56E-08**	-1.97E-08**	-1.59E-08**	-1.05E-07**
	(9.14E-09)	(5.64E-09)	(5.20E-09)	(1.48E-07)
Credit Limit	6.91E-05**	-3.65E-05**	-3.26E-05**	-2.93E-03**
	(7.13E-06)	(4.14E-06)	(3.95E-06)	(9.87E-05)
Credit Score	3.58E-06**	-2.13E-06**	-1.44E-06**	-2.96E-06**
	(2.46E-07)	(1.52E-07)	(1.36E-07)	(3.24E-06)

* significant at 10% level
** significant at 5% level
Standard errors in parentheses
Conditional Probability of Informal Bankruptcy = – (Conditional Probability of Formal Bankruptcy)

Table 9. Marginal Effects in Nested Model:

Total and Conditional on Severe Delinquency, Four-Outcome Model

	Unconditional Effects			Conditional	
	Repayment	Informal Bankruptcy	Formal Bankruptcy	Informal Bankruptcy	Formal Bankruptcy
Months on File	8.20E-05**	-7.27E-06**	-1.49E-05**	6.11E-05	2.03E-05
	(1.31E-05)	(1.94E-06)	(3.79E-06)	(6.95E-05)	(8.57E-05)
Revolving Balances	-2.10E-06**	3.88E-07**	5.58E-07**	4.95E-06**	3.07E-06**
	(1.05E-07)	(2.64E-08)	(3.32E-08)	(6.63E-07)	(6.92E-07)
Revolving Limits	1.02E-06**	-2.32E-07**	-2.99E-07**	-3.82E-06**	-2.03E-06**
	(6.22E-08)	(1.83E-08)	(2.34E-08)	(5.18E-07)	(5.06E-07)
Balance Transferred	9.92E-07**	-4.49E-07**	5.90E-08	-1.16E-05**	7.57E-06**
	(3.83E-07)	(1.01E-07)	(1.00E-07)	(3.04E-06)	(2.53E-06)
Unemployment Rate	-8.40E-04	5.58E-04**	7.89E-04**	1.48E-02**	1.38E-02**
	(1.01E-03)	(1.81E-04)	(2.81E-04)	(6.42E-03)	(6.60E-03)
Log Income	-2.09E-03*	1.13E-03**	6.01E-04	2.98E-02**	1.36E-03
	(1.10E-03)	(2.47E-04)	(5.42E-04)	(8.01E-03)	(1.18E-02)
Homestead Exemption	-5.56E-09	3.20E-09**	6.94E-09**	7.94E-08	1.36E-07**
	(1.07E-08)	(1.61E-09)	(3.02E-09)	(5.99E-08)	(6.90E-08)
Property Exemption	-1.75E-07	1.56E-08	4.47E-08	-1.43E-07	2.78E-07
	(1.53E-07)	(2.08E-08)	(4.20E-08)	(7.76E-07)	(9.74E-07)
Garnishment Strict	5.35E-04	-5.45E-04*	2.49E-03**	-1.94E-02*	6.64E-02**
	(1.82E-03)	(3.16E-04)	(5.80E-04)	(1.13E-02)	(1.28E-02)
Number of Loans	-5.58E-04**	-6.61E-05**	4.34E-04**	-4.69E-03**	8.57E-03**
	(1.44E-04)	(2.99E-05)	(3.67E-05)	(9.47E-04)	(8.39E-04)
Percentage Zipcode Black	-0.027168**	0.0045860**	-4.0469E-05	0.058703**	-0.138682**
	(5.97E-03)	(7.28E-04)	(2.07E-03)	(2.71E-02)	(4.22E-02)
Median Zipcode Home Value	9.78E-09	-9.71E-09**	-1.36E-08**	-2.75E-07**	-2.58E-07**
	(1.28E-08)	(2.61E-09)	(4.99E-09)	(8.71E-08)	(1.04E-07)
Credit Limit	3.29E-06**	-8.46E-07**	-1.16E-06**	-1.54E-05**	-1.10E-05**
	(3.44E-07)	(8.36E-08)	(1.19E-07)	(2.42E-06)	(2.60E-06)
Credit Score	1.46E-04**	-1.68E-05**	-4.24E-05**	1.64E-06	-3.43E-04**
	(1.20E-05)	(2.01E-06)	(3.44E-06)	(6.58E-05)	(7.20E-05)

* significant at 10% level

** significant at 5% level

Standard errors in parentheses

Table 10. Marginal Effects in Nested Model with Two Garnishment Dummies:
Total and Conditional on Severe Delinquency, Four-Outcome Model

	Unconditional Effects			Conditional	
	Repayment	**Informal Bankruptcy**	**Formal Bankruptcy**	**Informal Bankruptcy**	**Formal Bankruptcy**
Months on File	7.74E-05**	-6.90E-06**	-1.12E-05**	2.48E-05	6.26E-05
	(1.29E-05)	(1.92E-06)	(3.51E-06)	(4.86E-05)	(7.71E-05)
Revolving Balances	-1.91E-06**	3.37E-07**	4.66E-07**	3.35E-06**	2.97E-06**
	(1.01E-07)	(2.48E-08)	(2.99E-08)	(4.03E-07)	(5.69E-07)
Revolving Limits	9.62E-07**	-2.10E-07**	-2.61E-07**	-2.64E-07**	-2.11E-06**
	(6.12E-08)	(1.74E-08)	(2.16E-08)	(3.24E-07)	(4.23E-07)
Balance Transferred	2.49E-07	-1.91E-07*	2.82E-07**	-3.94E-06*	7.78E-06**
	(4.31E-07)	(9.82E-08)	(1.03E-07)	(2.19E-06)	(2.49E-06)
Unemployment Rate	-7.16E-04	4.75E-04 **	6.77E-04**	0.00955**	.013057**
	(9.86E-04)	(1.72E-04)	(2.59E-04)	(4.30E-03)	(5.84E-03)
Log Income	-1.41E-03	6.08E-04**	3.88E-04	.011030**	3.24E-03
	(1.05E-03)	(2.14E-04)	(5.28E-04)	(5.14E-03)	(.010597)
Homestead Exemption	-5.11E-09	3.38E-09**	2.47E-09	6.79E-08*	3.70E-08
	(1.09E-08)	(1.49E-09)	(2.79E-09)	(3.94E-08)	(6.20E-08)
Property Exemption	-3.76E-07**	-1.61E-08	1.53E-07**	-1.30E-06**	2.04E-06**
	(1.74E-07)	(2.47E-08)	(4.63E-08)	(6.46E-07)	(1.02E-06)
Garnishment Moderated	-.007357**	-.001211**	2.49E-03**	-.04676**	.028015
	(.003416)	(5.41E-04)	(1.13E-03)	(.01405)	(.023040)
Garnishment Strict	-.006423**	-7.89E-04*	4.27E-03**	-.03442**	.074318**
	(.003000)	(4.36E-04)	(9.28E-04)	(.01154)	(.019038)
Number of Loans	-5.05E-04**	-6.61E-05**	3.70E-04**	-2.80E-03**	6.66E-03**
	(1.41E-04)	(2.88E-05)	(3.28E-05)	(6.57E-04)	(7.27E-04)
Percentage Zipcode Black	-.02796**	4.39E-03**	4.56E-04	0.03620**	-0.10792**
	(5.88E-03)	(6.99E-03)	(1.95E-03)	(1.80E-02)	(.03902)
Median Zipcode Home Value	1.00E-08	-6.46E-09**	-1.28E-08**	-1.29E-07**	-2.63E-07**
	(1.26E-08)	(2.47E-09)	(4.61E-09)	(5.90E-08)	(9.24E-08)
Credit Limit	2.86E-06**	-6.18E-07**	-9.16E-07**	-7.72E-06**	-9.63E-06**
	(2.36E-07)	(7.58E-08)	(1.13E-07)	(1.53E-06)	(2.00E-06)
Credit Score	1.38E-04**	-1.62E-05**	-3.73E-05**	-4.74E-05	-2.98E-04**
	(1.20E-05)	(1.94E-06)	(3.20E-06)	(4.38E-05)	(6.32E-05)

* significant at 10% level
** significant at 5% level
Standard errors in parentheses

Table 11. Mean Predicted Probabilities by Insolvency Laws

	Total Sample			Conditional on Default	
	Repayment	**Formal Bankruptcy**	**Informal Bankruptcy**	**Formal Bankruptcy**	**Informal Bankruptcy**
Average Predicted Probability	0.92940	0.01516	0.01319	0.21346	0.18649
Garnishment					
None	0.93294	0.01024	0.01692	0.15702	0.24115
Strict	0.92743	0.01771	0.01297	0.23798	0.18002
Homestead Exemptions					
Unlimited	0.89692	0.02358	0.03257	0.22986	0.29408
Federal Level	0.93068	0.01477	0.01248	0.21210	0.18081
Average Charge Off					
Informal Bankruptcy			$4,687		
Formal Bankruptcy			$4,757		