Working Paper Series

Fresh Start or Head Start? Uniform Bankruptcy Exemptions and Welfare

WP 03-03

Kartik Athreya
Federal Reserve Bank of Richmond

THE FEDERAL RESERVE BANK OF RICHMOND
RICHMOND ■ BALTIMORE ■ CHARLOTTE

Fresh Start or Head Start? Uniform Bankruptcy Exemptions and Welfare[*][†][‡]

Kartik Athreya
Research Department
Federal Reserve Bank of Richmond[§]
Working Paper No. 03-03R

July 26, 2004

Abstract

The 1990's witnessed a historically unprecedented number of personal bankruptcy filings. In response, Congressional debate over bankruptcy law has recently led to several proposals aimed at making it more difficult to exempt wealth in a bankruptcy. In this paper, I evaluate uniform exemption policy primarily within the context of the recent congressional proposal H.R. 975. I develop an incomplete markets model where secured and unsecured assets coexist and are treated differentially in a bankruptcy proceeding. I find that exemptions are associated positively with filing rates and the amount of equity held at the time of filing. Conversely, exemptions are strongly negatively associated with the availability of unsecured credit. The welfare consequences of exemptions, while small, are positive for high exemptions and negative for low ones. Steady state welfare is maximized under a full exemption, and is worth \$28.24 annually to the average household. The results are robust, and show that increases in bankruptcy exemptions beyond current state averages are largely a matter of indifference, and do not merit the heated debate they have generated.

[*]**JEL Classification:** D52; D58; G33

[†]**Keywords**: Bankruptcy; Exemptions, Risk-Sharing; Incomplete Markets

[‡]E-mail: kartik.athreya@rich.frb.org, Ph: (804) 697-8225.

[§]I thank the Editor, Wouter den Haan, and two anonymous referees for very helpful suggestions. I also thank John Weinberg, Richard Hynes, Steve Williamson, William Zame, Dirk Krueger, Jesus Villaverde, and colleagues at the Richmond Fed. For comments on earlier versions of this paper, I am grateful to seminar participants at CFS-Frankfurt, Illinois, Iowa, Colorado, CSUF, the Federal Reserve Board of Governors, and the Federal Reserve Banks of Atlanta, Cleveland, and Richmond. John Hejkal and Jon Peterson provided able research assistance. The views expressed here are those of the author.

1. Introduction

Personal bankruptcy filings have grown rapidly over the past decade. In 1990, there were approximately 700,000 filings. By 2003, filings had more than doubled to 1.6 million. The resulting losses to creditors have been estimated at over forty billion dollars annually (WEFA (1998)). Consequently, there is now an intense public debate on the desirability of comprehensive bankruptcy reform. In this debate, special emphasis has been placed on exemptions, which are the rules governing the amount of wealth that may be retained by a debtor in a bankruptcy filing. In particular, several recent recommendations have advocated a uniform, limited, and federally mandated exemption level, the most recent of which is the Bill in Congress entitled "Bankruptcy Abuse Prevention and Consumer Protection Act of 2003" (H.R. 975). The provisions of the bill with respect to exemptions concern the "homestead" exemption, which applies to home equity, and is for most households by far the largest exemption. Exemption "reform" has been a divisive legislative issue for several years. In 1997, a nine-member panel known as the National Bankruptcy Review Commission (NBRC) made recommendations to increase exemptions and eliminates states' rights to force households to use more restrictive state exemptions. These recommendations proved contentious, and survived only by a 5-4 margin. In a forceful reply to the majority opinion, dissenting Commission members (Jones and Shepard [1997]) argued that it was "...highly likely that these liberal exemptions [would] translate into the filing of more Chapter 7 liquidation cases". Secondly, the dissenters argued that the NBRC proposal gave "...debtors a head start, not a fresh start" by enabling "...many Americans to escape their contractual obligations while maintaining levels of wealth that the vast majority of Americans do not enjoy."[1]

In this paper I ask three questions. First, as some have argued, will dramatic changes in exemptions cause an equally dramatic change in bankruptcy rates, interest rates and consumer debt? Second, with respect to distributive effects, will high uniform exemptions give debtors a "head start" or just a "fresh start", and what do we mean by these terms? Third, what are the welfare consequences of exemptions, especially very low or very high ones? To address these questions, I develop a dynamic equilibrium model with incomplete insurance markets, secured and unsecured credit, and *endogenous* limits on unsecured borrowing. Most importantly, I incorporate a well defined bankruptcy law that distinguishes between secured and unsecured debt. I calibrate the model to the filing behavior of U.S. homeowners, and then study the effects of uniform exemptions. The model gives quantitative predictions for

[1] The NBRC also cites a Justice Department memorandum to it stating that it would favor "...more modest exemption levels" in a June 18, 1997 letter to NBRC Commission Chairman Brady Williamson from Francis M. Allegra, Deputy Associate Attorney General. The Justice Department made it known that it was "concerned that the asset levels tentatively adopted by the Commission are too high in light of the historical purposes of allowing property to be claimed as exempt".

the extent to which exemptions limit unsecured borrowing and affect welfare. Calculations of the welfare implications of exemptions are notably absent in the ongoing policy discussion.

The central tension in the model is between the insurance that exemptions can provide, and the increased costs of borrowing and bankruptcy they may generate. The model generates five main results. First, large increases in uniform exemptions increase bankruptcy rates and the equity held in bankruptcy non-trivially. Second, increases in uniform exemptions increase the cost of obtaining unsecured debt, especially for households with low wealth. Third, consumption smoothing is nearly invariant to exemptions. In other words, the increased use of bankruptcy under high exemptions offsets (and justifies) the higher costs of unsecured borrowing, leaving the equilibrium consumption process nearly unaffected. This leads to the fourth result, which is that welfare changes only minimally with exemptions. The fifth result is that though the welfare gains are small, the optimal exemption level turns out to be quite high.

Existing dynamic equilibrium analysis of exemptions is limited, but is growing quickly. This paper is related to Li and Sarte (2002), who study bankruptcy exemptions in a model with capital and exogenously limited unsecured debt. This paper also follows and extends work originating in the general equilibrium models of bankruptcy of Dubey, Geanakopolos, and Shubik (2001), (henceforth Dubey, et al. [2001]), Zame (1993), Zha (2001), and is related to ongoing work of Chatterjee, Corbae, Nakajima, Rios-Rull (2002) (henceforth Chatterjee et al. [2002]), Lehnert and Maki (2001), Livshits, MacGee and Tertilt (2003) [henceforth Livshits et al. (2003)], and Pavan (2003). Chatterjee et al. (2002) evaluate bankruptcy law in a small open-economy model of unsecured debt, and find a welfare improving role for means-testing of bankruptcy filers. Livshits et al. (2003) contrast bankruptcy codes in the U.S. and Europe in a small open-economy, life-cycle setting, and find a welfare improving role for bankruptcy in the presence of large "expense shocks", such as health crises. A key distinction between the work of Athreya (2002), Chatterjee et al. (2002) and Livshits et al. (2003), and the present work is that I provide, to my knowledge, the first study of exemptions in a quantitative incomplete-markets model where secured and unsecured debt coexist but are treated differently in bankruptcy.[2]

[2]Note that the elimination of exemptions altogether does not in any way prevent bankruptcy, as it only prevents the retaining of wealth by filers.

2. The Model

2.1. Preferences

The environment consists of a continuum of households with CRRA preferences:[3]

$$E_0 \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\alpha} - 1}{1-\alpha} \tag{2.1}$$

2.2. Equity

In this paper, I will focus primarily on the behavior of homeowners. Homes are typically the largest asset held by households, and "Homestead" equity exemptions are almost always the largest exemptions offered to households.[4] Bankruptcy exemptions may therefore affect the decisions of homeowners in important ways.[5] The value of a house is normalized to $|\underline{a}^s|$ units of the single perishable consumption good, and will provide the collateral for the secured debt that households may take on. The labeling of this asset as a "house" is mainly heuristic, and $|\underline{a}^s|$ should therefore be thought of as an aggregate measure of collateralizable wealth. Total household equity, which I denote by "e", is then defined in the standard way, as the difference between the value of all collateralizable wealth and the value of debt held against it. That is:

$$e \equiv |a_s| + a_s \tag{2.2}$$

2.3. Endowments, Financial Intermediaries and Assets

Agents receive random endowments of a single perishable good each period. These endowments are assumed to take on discrete values, $\{y_1, y_2, ..., y_N\}$, where $y_i > y_j$ whenever $i > j$. Household endowments follow a Markov process that is serially dependent over time but independent across agents. There is therefore no aggregate risk. The transition function on endowment realizations is given by $\theta_{ij} \equiv P(y_{t+1} = y_j | y_t = y_i)$, for i,j =1,..., N.

To smooth their stochastic incomes, agents are allowed to borrow as well as save. They may borrow either on the collateralized/secured credit market or the uncollateralized/unsecured

[3] The assumption of infinite lives will not be important for welfare considerations. Beyond the standard arguments (e.g., altruism, absence of annuities etc.), recent work specific to bankruptcy by Gross and Souleles (1998) argues that "risk-composition", a measure which adjusts for, among other things, changing account age distributions, only accounts for a small amount of the observed rapid rise in bankruptcies and its persistently high levels over the past five years.

[4] See Gropp, Scholz, and White (1997).

[5] Conversely, while sometimes large, exemptions seem by themselves extremely unlikely to affect the decision to own a home. Thus, assuming exogenous homeownership is likely to be a useful approximation.

credit market, and can save in a risk free asset. I follow Chatterjee et. al. (2002) and Livshits et al. (2003), and assume that lenders price default risk for unsecured debt by being aware of the overall debt position of a household, including the level of both secured and unsecured debts held at any given time. Lenders are assumed to be unable to observe shocks to household endowments, and so face default risk on the unsecured contracts they enter. However, lenders diversify default risk perfectly by holding a large loan portfolio of unsecured debt contracts. That is, lenders are aware of the proportion of the loans of a given type that will be defaulted on, which in turn allows loan pricing to be set such that profits are zero with probability one. By contrast, secured debt in the model is (by definition) risk-free for the lender, and is therefore invariant to a borrower's net-worth. All intermediation is assumed to be costly, with proportional and differential transactions costs for secured and unsecured intermediation, denoted τ^s, and τ^u respectively.

Secured debt denoted $a^s \leq 0$, is debt that agents cannot default on in a bankruptcy proceeding. Secured debt represents the sum of all mortgage debt and home equity loans held by a household, and is offered at interest rate R^s. Unsecured debt, denoted $a^u \leq 0$, may be wholly discharged in a bankruptcy proceeding, provided that no equity is required to be applied towards it. Unsecured debt represents credit card debt and other non-collateralized loans, and carries an interest rate of $R^u(\nu)$ that depends on the level and composition of a household's secured and unsecured debts, denoted by $\nu = (a^s, a^u)$. Agents may also save in a risk-free asset by choosing $a^u \geq 0$, and will receive interest payments at a gross deposit rate of R^d. By definition, secured debt must be backed by collateral, and therefore households face fixed credit limits in secured debt of $|\underline{a}^s|$.

2.4. Bankruptcy

Bankruptcy is modeled as a decision that removes unsecured debt in exchange for assets above the exemption-mandated threshold. Bankruptcy is also assumed to impose a cost on the household. Therefore, bankruptcy in the model is analogous to the U.S. Chapter 7 "Fresh Start" provision. This form of bankruptcy constitutes over 70% of all filings, and accounts for nearly all debt discharged.

In the model studied here, there are two types of costs associated with bankruptcy. First, and of primary interest here, is the cost of giving up all non-exempt assets. Second, there are explicit costs such as legal fees and time costs of court dates, and implicit costs, of which "stigma" appears to be relevant (see Dubey, et al. [2001]) and Gross and Souleles [2000]).

Bankruptcy provides insurance, but beyond the transfer of assets triggered by exemptions, bankruptcy costs are "deadweight" in nature. The use of such penalties occurs in part because it is often difficult to seize wealth, most obviously because nearly all filers have negative worth. Furthermore, penalties such as wage garnishing allow resource transfers but act as a tax on labor effort, and perhaps because of this have been severely restricted by law in many states (see Baird [2001]).

The penalties for bankruptcy, given their deadweight nature, can most tractably be represented as reducing the utility of a household that files. This is the approach taken in both Zame (1993) and Dubey et al. (2001). Additionally, because the marginal response of consumption, welfare and interest rates to changes in exemptions may vary with the filing rate, I require that the model include all relevant costs of bankruptcy beyond those explicitly related to exemptions. However, the precise composition of these various costs is not necessary for understanding how changes in exemptions affect outcomes. Let λ denote all non exemption related costs of bankruptcy.

I will calibrate λ to match observed bankruptcy filing rates among homeowners under current exemptions. It should be made clear that the notion of costs used here includes all the above penalties for bankruptcies. In particular, as it is true that households do face at least temporary difficulty in borrowing following a bankruptcy, λ implicitly includes the imputed utility cost of being shut out of credit markets.[6] In this way, credit markets effectively keep track of history in a way that does not require credit status to be retained as a state variable.

2.4.1. Exemptions

Exemptions are rules governing the maximum amount of wealth that may be retained by a bankruptcy filer. Any wealth above the exemption must be surrendered and used to satisfy unsecured creditors. Exemptions in this model have two effects on borrowers. First, they may provide risk-sharing benefits by keeping the consumption of agents smooth after bankruptcy. Second, exemptions can damage risk-sharing and consumption smoothing, to the extent that they increase the costs of borrowing on the *unsecured* credit market. The latter effects will occur for two reasons. First, conditional upon default, unsecured lenders may lose more in environments with high exemptions than low exemptions. Second, bankruptcy rates may increase with exemptions, thus increasing losses.

Let $\overline{e} > 0$ denote the exemption level, such that any equity above $\overline{e}$, is seized and used

[6] The approach taken here is also similar to Livshits et al. (2002), who employ costs of bankruptcy, and do not explicitly model exclusion from credit markets. Additionally, I find in a related environment (Athreya [2002]), that in order to match the data, penalties that are ex-ante restricted to *only* exclusion from credit markets imply penalty periods in excess of twenty-five years under reasonable parameterizations of preferences, market incompleteness, and idiosyncratic risk. This is not sensible as, among other things, bankruptcy disappears entirely from one's credit record after ten years. This indicates that the other costs above play an important role.

to repay unsecured creditors. Given the pre-bankruptcy equity position of the household, e, and the pre-bankruptcy value of unsecured debt, $|a^u|$, the term $(e - \overline{e})$ is therefore "excess" equity, which must be applied towards paying off unsecured debt in bankruptcy. Equation 2.3 below summarizes the post-bankruptcy equity position $e^b \geq 0$, as a function of pre-bankruptcy asset holdings.

$$e^b = \begin{cases} e \text{ if } e < \overline{e} \\ \max(\overline{e}, e - |a^u|) \text{ if } e > \overline{e} \end{cases} \tag{2.3}$$

Secured debt after bankruptcy, denoted a^{sb} is therefore given as:

$$a^{sb} = \begin{cases} a^s \text{ if } e < \overline{e} \text{ (No Excess Equity)} \\ a^s - (e - \overline{e}) \text{ if } e > \overline{e} \text{ and } (e - \overline{e}) < |a^u| \text{ (Excess Equity} < \text{Unsec. Debt)} \\ a^s - |a^u| \text{ if } e > \overline{e} \text{ and } (e - \overline{e}) \geq |a^u| \text{ (Excess Equity} \geq \text{Unsec. Debt)} \end{cases} \tag{2.4}$$

The first line of 2.4 applies to cases where a debtor has equity below the exemption level and so will not surrender any equity or repay any of his unsecured debts. This is the case where the benefits of Chapter 7 bankruptcy exemptions are maximized. It is precisely this aspect of Chapter 7 that demonstrates how exemptions, all else equal, discourage wealth accumulation and encourage the use of unsecured debt. The second line of 2.4 refers to the case when a debtor has enough equity to transfer some, but not all, of his unsecured debts to secured debts. The unsecured creditor receives the equity in excess of the exemption. Therefore, the household's secured debt after bankruptcy will increase by the amount of excess equity, but his unsecured creditors will not be fully repaid. The third line in 2.4 covers the case where a debtor's equity exceeds the exemption by more than his unsecured debts. In this case, a debtor will be required to transform all his unsecured debt into secured debts, leaving him with secured debts that increase by the amount of his unsecured debt, while his unsecured creditors are fully repaid. Chapter 7 bankruptcy is not useful for households in this category.

Because the payoff to, and hence the likelihood of, bankruptcy depends on the particular portfolio of debts held by a household, the price of unsecured debt will as well. A simple example shows why. Consider an agent with equity of \$18,000, no current unsecured debt and who faces an exemption of \$10,000. Assume that this agent wishes to borrow \$8,000. A total debt level of \$8,000 can be achieved in a variety of ways. For example, obtaining \$8,000 of unsecured debt will leave the agent with equity of \$10,000 following bankruptcy, as the agent would be forced to liquidate the \$8,000 in equity above the exemption and repay unsecured creditors. This implies that the "financial benefit" to bankruptcy is zero. In equilibrium, creditors' beliefs over repayment will internalize this, and such a portfolio will generate an interest rate for unsecured debt that is equal (up to transactions costs) to that on secured debt. Conversely, if the agent above began instead with equity of any amount weakly less than the exemption, the zero-profit interest rate for an unsecured loan of \$8,000 would be higher, as the financial benefit from bankruptcy is \$8,000 in the current period. In other words, holding equity above the exemption allows an agent to reduce the number of income states where bankruptcy is optimal, but of course commits him more strongly to a repayment schedule that may not be appealing ex-post.

2.5. Timing and The Recursive Formulation

Labor income y is received at the end of each period, and is available for consumption at beginning of the following period. Let the total beginning-of-period asset holdings of the agent be defined by $a \equiv (a_s + a_u)$. Given a and y, the agent must choose consumption and a level of savings or borrowing. If he chooses to save, he sets $a'_u > 0$ and earns the risk-free interest rate on savings R^d.[7] If he chooses to borrow, he must choose a portfolio of secured and unsecured debt $\nu' = (a'_s, a'_u)$. The interest rate charged on unsecured debt is denoted $R^u(\nu')$, and reflects default risk that depends on the debt portfolio. The asset choices then residually determine current period consumption c through the budget constraint.

Once the consumption and savings decisions have been made, the income shock y' is realized, and the agent chooses either to remain solvent or file for bankruptcy.[8] The effect of remaining solvent is that the agent's wealth remains unaffected as the next period arrives, with $a' = a'_s + a'_u$. By contrast, the benefit from filing for bankruptcy is that the household has its unsecured debts eliminated, in return for any wealth above the exemption. The other cost for the removal of these debts is the penalty λ. The alteration to wealth from bankruptcy is defined by the map $a^{sb}(.)$ defined in 2.4, and depends on the portfolio ν' and the exemption $\overline{e}$. The period then ends.

The problem above can be expressed in a very compact recursive manner primarily because bankruptcy is modeled as altering only within-period variables. The income shock y' and total wealth a' constitute next period's state vector because they jointly determine the resources available for the agent as well as the expectation of next period's income. Denote by $V(a', y')$ the continuation value for solvent agents from ending a period with state (a', y'). Given the penalty, the value of filing for bankruptcy at the end of the current period is $V(a^{sb\prime}(\nu', \overline{e}), y') - \lambda$. Taking these values as given, the agent chooses portfolio ν'

[7] As I focus on a stationary representation of the agent's problem, I drop time subscripts and use primes to denote all variables one-period ahead.

[8] For notational ease, because the income shock is assumed to be realized *after* the consumption/savings choice is made, we drop primes from current consumption and beginning-of-period income, and instead denote income received at the end of the period by y'.

with consumption determined by 2.6, where the indicator function $I(a'_u < 0)$ determines the applicable interest rate. Therefore, the value function $V(a, y)$ satisfies the following.

$$V(a,y) = \max\{u(c) + \beta E_{\nu'} \max[V(a',y'), V(a^{sb\prime}(\nu',\overline{e}), y') - \lambda]\} \tag{2.5}$$

s.t.

$$c + \frac{a'_s}{R^s} + \frac{a'_u}{R^u(\nu')I(a'_u < 0) + R^d(1 - I(a'_u < 0))} \leq y + a \tag{2.6}$$

where

$$\nu' \equiv (a'_s, a'_u) \tag{2.7}$$

The expectation in 2.5 can be expressed more precisely as follows. For any given portfolio ν', we can define the set $Y^B(\nu')$ to be the set of income values that make bankruptcy preferable to solvency. That is,

$$Y^B(\nu') \equiv \{y' \in Y | V(a^{sb\prime}(\nu',\overline{e}), y') - \lambda > V(a', y')\} \tag{2.8}$$

Given $V(.)$, ν', and $Y^B(.)$, the term $E_{\nu'} \max[V(a',y'), V(a^{sb\prime}(\nu',\overline{e}), y') - \lambda]$ can therefore be easily calculated.

2.6. Equilibrium

I follow the recent work of Chatterjee at al. (2002), Livshits, MacGee and Tertilt (2003), and Athreya and Simpson (2004) and study recursive equilibria where the risk-free rate of interest on savings, R^d, is exogenous. To motivate this assumption, note first that cost of risk-free funds applicable to the intermediaries in the model depends in principle on the aggregate capital stock. However, the U.S. capital stock is overwhelmingly concentrated among a small measure of households (e.g. the top 5% of households own 55% of the wealth). This small group is unlikely to be influenced by presence of personal bankruptcy law. Second, it is well known that standard incomplete market models are typically incapable of matching the concentration of wealth holdings.[9] Therefore, general equilibrium analysis with such a model would be potentially misleading, as it would tend to overstate the role of bankruptcy law for aggregate outcomes, and in turn, to overstate the role of changes in costs of funds in determining the level of borrowing. For these reasons, a better approximation is likely to emerge by abstracting from the determination of the capital stock and implicitly assuming that it is held exogenously by a small measure of households who are *unaffected* by personal

[9] See, for example, the discussion in Castaneda, Diaz-Jimenez, and Rios-Rull (2003).

bankruptcy. Such a set-up is equivalent to the pure-endowment, exogenous cost-of-funds model developed here.

Because households face idiosyncratic risk, and have an incomplete set of assets to insure themselves, heterogeneity along asset holdings and consumption will emerge even if they are ex-ante identical. More precisely, let $Q(x, Z)$ be the transition function determining the probability that, for any household, next period's state lies in a set Z, given that the current state is x. It is assumed that the heterogeneity across agents converges to a stationary distribution, denoted μ. This distribution yields the time-invariant fraction (measure) of households over appropriate subsets of the state space, in our case levels of net asset holdings and current income. By definition, μ is stationary under the transition function $Q(x, Z)$ if it satisfies the condition $\mu(Z) = \int_x Q(x, Z)d\mu$.

Given a stationary distribution, equilibrium requires meeting two further conditions. First, the decisions of agents, taking interest rate functions and bankruptcy law as given, are optimal. Second, the intermediary must make zero profits. The first condition is automatically satisfied when decisions derive from the Bellman equation 2.5. I turn now to zero profits.

2.6.1. Zero Profits

Because it is risk free, secured debt must only differ from the deposit rate by the cost of intermediation τ^s. That is, $R^s = R^d + \tau^s$. Unsecured loans are risky at the individual level, but in the absence of aggregate risk, diversifiable. Credit intermediaries are assumed to be competitive price-takers that hold diversified loan portfolios. As stated earlier, lenders are assumed to observe the amount of both secured and unsecured debt issued by the household in a given period. This leads to the use of loan contracts that follow Livshits et al. (2003), and Chatterjee et al. (2002).

Given a household's debt portfolio $\nu' = (a'_s, a'_u)$, the household obtains unsecured credit in the current period by issuing one-period bonds. These bonds are discounted by the market according to the likelihood of default. Given the interest rate on unsecured loans $R^u(\nu')$, the net interest rate is given by $r^u(\nu') \equiv R^u(\nu') - 1$. Next, define $\pi^{bk}(\nu')$ to be the equilibrium probability of default given debt portfolio ν'. In equilibrium, the zero profit condition then implies that, given a net cost of funds $r^d \equiv R^d - 1$, a default probability $\pi^{bk}(\nu')$ and transactions cost τ^u, the net interest rate on unsecured loans must satisfy the following:

$$r^u(\nu') = \frac{(r^d + \tau^u)}{(1 - \pi^{bk}(\nu'))} \tag{2.9}$$

The timing convention used here allows us to determine the probability of default under a portfolio ν' by simply computing the probability that end-of-period income will fall in the set $Y^B(\nu')$. Because current income is not observable, the probability of bankruptcy is computed by lenders using the unconditional distribution of income f_y^*.

$$\pi^{bk}(\nu') = \sum_{y_j \in Y^B(\nu')} y_j' f_{y_j}^* \tag{2.10}$$

with $Y^B(\nu')$ defined by equation 2.8. In summary, equilibrium is defined as follows.

Definition 2.1. *A recursive (partial) equilibrium of the model is a profile* $\{r^d, V^*(a,y), \nu'^*(a,y), Y^{B*}(\nu'^*), r^{u*}(\nu'^*), \pi^{bk*}(\nu'^*), \mu^*(Z)\}$, *whereby:*

1. *The decision rule,* $\nu'^*(a,y)$*, solves 2.5, subject to 2.6, and yields value function* $V^*(a,y)$*.*
2. *The bankruptcy probability satisfies:* $\pi^{bk*}(\nu'^*) = \sum_{y_j \in Y^{B*}(\nu'^*)} y_j' f_{y_j}^*$
3. *The interest rate function satisfies:* $r^{u*}(\nu'^*) = \frac{(r^d + \tau^u)}{(1 - \pi^{bk*}(\nu'^*))}$
4. $\mu^*(Z)$ *is stationary, and therefore satisfies:* $\mu^*(Z) = \int_x Q(x, Z) d\mu^*$

2.7. Welfare

The welfare criterion used here is ex-ante expected utility, is denoted by Λ and is given below.

$$\Lambda = \int V(x) d\mu \tag{2.11}$$

To compare how much better or worse off households are under various exemption policies, I use the measure above to answer the following question. What constant proportional increment/decrement to *benchmark* consumption at each date and state under the benchmark exemption law would yield the same expected lifetime utility as the consumption allocation under a proposed exemption policy? More precisely, let the pair $(\Lambda^B, \{c^B\})$ denote welfare and the consumption process under the benchmark exemption, and let $(\Lambda^p, \{c^p\})$ denote welfare and the consumption process under a proposed exemption policy. Next, let ϕ denote the increment/decrement to consumption at each date that solves the following problem:

$$E_0 \sum_{t=0}^{\infty} \beta^t \frac{(\phi c_t^B)^{1-\alpha} - 1}{1 - \alpha} = E_0 \sum_{t=0}^{\infty} \beta^t \frac{(c_t^p)^{1-\alpha} - 1}{1 - \alpha} \tag{2.12}$$

For $\alpha > 1$, using the definition of Λ^B and Λ^p, it is easily shown that ϕ is given by:

$$\phi = \left(\frac{\Lambda^p + \frac{1}{(1-\alpha)(1-\beta)}}{\Lambda^B + \frac{1}{(1-\alpha)(1-\beta)}} \right)^{\frac{1}{1-\alpha}} \tag{2.13}$$

Therefore, if, for example, $\phi > 1$, households require an augmentation of the benchmark consumption process, implying that a proposed policy improves on the benchmark.

3. Parameterization

The values of risk-aversion and discounting, denoted α and β respectively, are set to values that are standard in the literature. I follow Huggett (1993), Aiyagari (1994), and others to set $\alpha = 3$, and $\beta = 0.96$. The transactions costs parameters, τ^s and τ^u are set such that, in equilibrium, the model matches observed interest rate spreads between secured and unsecured borrowing. Evans and Schmalensee (1999) estimate that among credit card issuers, costs of servicing accounts are roughly 5.3% of total costs, but that these costs are partially offset by interchange revenues of 1.9%, implying a net transactions cost of at least 3.4%. I therefore set τ^s =0.034. However, for unsecured lending, there appear to be other costs involved in intermediation in addition to those faced by secured lenders. In particular, the observed spread between credit card and home equity loans has averaged approximately 8 percentage points, and is much larger than can be justified by default risk alone. For example, the annual fraction of credit card loans that are defaulted on has averaged 4.7% since 1991, while that on all loans secured by residential real state has averaged roughly zero.[10] In order to analyze a benchmark economy where the cost differential between secured and unsecured data approximately accords with the data, I treat the differential, 8%-4.7%$\approx$ 0.03%, that remains after default costs as an additional transactions cost for unsecured lending, and so set $\tau^u = \tau^s + 0.03 = 0.064$.[11]

The exemption level, $\overline{e}$, is the defining statutory restriction on Chapter 7 Bankruptcy filers.[12] The single largest exemption available to filers is nearly always the Homestead

[10] The default rate on secured debt has averaged 0.16% in the same period. See http://www.federalreserve.gov/releases/chargeoff/chg_sm_sa.txt

[11] Additional costs faced by unsecured lenders include the cost of recovering bad debts through court procedures, as well as the frequent need to update information on borrower characteristics to price loans according to risk. Edelberg (2003) carefully documents such risk-based pricing. Also, model outcomes are robust to much lower levels of this cost (e.g. 0.01 units), but the present parameterization produces borrowing at rates consistent with the data. Lastly, while a non-competitive markup might also "explain" the data, the unsecured lending market appears quite competitive (see Evans and Schmalensee (1999)).

[12] The other restrictions involve the number of years for which one cannot re-file (6 years), and how long bankruptcy can remain on one's credit record (10 years). Virtually all other penalties are issued by either credit markets (borrowing restrictions, and high interest rates), or through social sanctions and other "stigma" effects.

Exemption. This provision protects some or all of an individual's home equity from seizure by creditors, even when they have substantial uncollateralized debts. Other exemptions include personal property, equity in automobiles, and exemptions for the "tools-of-trade". While there are federal guidelines governing exemptions, states were initially given the option to opt out of these rules and impose their own. After 1978, when the federal law went into effect, all but eleven states "opted-out" of these federal regulations. However, although almost all states opted out, the exemption provisions they chose varied enormously. For example, the current federal homestead exemption is $16,150, while the state exemption varies from $2,000 dollars in South Carolina, to essentially unlimited in Texas and Florida.[13]

Given the inter-state variation in exemptions documented above, it is more useful to study exemptions in proportion to the population they apply to. In particular, Table 4 shows that the median exemption, in terms of applying to 50% of U.S. households, is $12,500. In 1997, nominal income per person was $19,241 and per-capita nominal household income was $50,411.[14] Normalizing mean household income to unity implies that the baseline exemption $\overline{e}$ be set at approximately 0.25.[15]

For the income process, I set N=3, whereby endowments/income, $\widetilde{y}$, may take on three values. Income is assumed to follow a markov chain with transition probabilities that are set to capture the high level of serial persistence documented in recent empirical work, such as Hubbard et al. (1995), Floden and Linde (2001), as well as Storesletten, Telmer, and Yaron (2001). The benchmark process is given as: $\widetilde{y} \equiv \{y_l,\, y_m,\, y_h\} = \{0.6,\, 0.8,\, 1.22\}$, with the transition matrix defined as:

$$\Theta = \begin{array}{|c|c|c|c|} \hline & y'_l & y'_m & y'_h \\ \hline y_l & 0.700 & 0.175 & 0.125 \\ \hline y_m & 0.015 & 0.920 & 0.065 \\ \hline y_h & 0.000 & 0.070 & 0.930 \\ \hline \end{array} \tag{3.1}$$

This process implies a serial correlation parameter of approximately 0.86 in an AR(1) model, and generates a unconditional coefficient of variation of 0.22, which is in the range explored by Aiyagari (1994), and others. The stationary distribution implied by this transition matrix is given by $f_y^* = [0.0242,\, 0.4836,\, 0.4922]$.

[13] No exemptions are truly unlimited however. In states with unlimited exemptions, there are typically restrictions on who may qualify. In Arkansas, for example, only those with a homestead smaller than 1/4 acre may qualify.

[14] Source: Federal Reserve Board of Governors: http://www.bog.frb.fed.us/releases/h15data.

[15] The Senate's proposal, as it seeks to eliminate "opt-out", and allows a range for state exemptions, does not ultimately produce truly uniform nationwide exemptions. However, to study the effects of uniform exemptions, I study outcomes that obtain from varying the *maximum* allowable state exemption with "no-opt-out".

The final parameter, $\underline{a}^s$, is the credit limit on secured credit. In 1997, the median price of existing housing was approximately $120,000, slightly greater than twice annual mean household income.[16] This imposes a natural limit on secured credit at 2.0 units. The limit on unsecured credit is endogenous, but the benchmark calibration is chosen to be close to the median level of median credit card debt discharged in bankruptcy, which has remained between 30% and 40% of median household income (see Sullivan et al. (2000), and Bermant and Flynn (1999)). All model parameters beyond those governing the income process are listed in Table 1.

With respect to bankruptcy, I target the benchmark filing rate as follows. The shocks hitting households in the model are to be interpreted as income shocks arising from the labor market outcomes of job loss, overtime, displacement etc. I do not explicitly model other shocks affecting households such as catastrophic medical shocks or law suits. The latter are in the nature of "expense shocks", and are studied in some detail by Livshits et al. (2002). Instead, I focus here on debt and equity positions arising from consumption smoothing behavior in the face of non-catastrophic events.

Chakravarty and Rhee (1999) find that approximately 33% of total filings occur amongst households who have recently experienced catastrophic health events and/or lawsuits, while Sullivan et al. (2000) find that 19% of filings are associated with major health shocks.[17] I therefore compromise, and assume that one-fourth of all bankruptcy are associated with "expense" shocks. According the Administrative Office of the U.S. Courts, the overall filing rate among U.S. households has averaged 1.3% for the ten-year period 1994-2003, of which 70% have consistently been Chapter 7 filings. However the distinction between Chapter 7 and Chapter 13 bankruptcies is not always clear in practice, for two reasons. First, households are allowed to choose between them, and given that Chapter 7 yields a complete discharge of unsecured debt, the debt rescheduling implicit in a Chapter 13 cannot be too strict. Secondly, a Chapter 13 bankruptcy can always be converted to a Chapter 7 filing. Therefore, the target filing rate for must lie between approximately 0.7% (if all Chapter 13 filings are ignored) and 0.97% (if all Chapter 13 filings are included). For concreteness, I err on the side of making a distinction between Chapters 7 and 13, and therefore set the target value for bankruptcy at 0.80% (and implicitly allow for approximately 10% filings to be Chapter 13 bankruptcies where debt is repaid). However, homeowners, are a subset of the population, at approximately two-thirds. This implies that the relevant target for the benchmark model is Π=0.80%.[18] I measure all rates from the first quarter of 1994 through the fourth quarter

[16] U.S. Dept.of Housing and Urban Development at: http://www.huduser.org/periodicals/ushmc/spring97/histdata.html

[17] See also Domowitz and Sartain (1999).

[18] That is, the target filing rate is: 1.3%x67%x90%≈0.8%. The results are robust to the bankruptcy

of 2003.

4. Results

A first result is that exemptions appear to influence filing rates non-trivially, consistent with the claims of NBRC dissenters. In Table 2, we see that in the benchmark case, filing rates rise from 0.66% under zero exemptions and nearly double to 1.24% under maximal exemptions. What is striking is that this occurs despite the increased costs of borrowing associated with more generous exemptions. Given that the price of debt and the probability of bankruptcy are invertible maps of each other, as given in 2.9, I focus on the latter, as it provides more direct intuition for the behavior of prices. We see from Figure 2 that for a given level of unsecured debt, default likelihoods grow systematically with equity as exemptions rise. For example, under maximal exemptions, the probability of default is substantial for even fairly wealthy households, as defined by nontrivial equity holdings. In other words, exemptions make unsecured credit costlier to obtain, affecting most those with low or moderate equity levels. This is consistent with the finding of Gropp, Scholz, and White (1997) that exemptions shift relatively cheap credit away from low-wealth households towards those with higher costs of bankruptcy, namely, high wealth households.

From a welfare perspective, changes in consumer welfare arise in this model from changes in the volatility of consumption. However, these changes are relatively minor. To evaluate consumption volatility, I define consumption "smoothing" to be the ratio of the coefficient of variation of consumption relative to the coefficient of variation of income. Measured in this way, Table 2 shows that consumption smoothing improves very slightly, but monotonically, with exemptions. As exemptions rise from zero to the entire value of the collateral asset, this ratio falls from 0.793 to 0.783. Therefore, again in Table 2, we see that welfare rises monotonically with exemptions as well, from a welfare loss of $11.40 when exemptions are eliminated, to a gain of $28.24, under a full exemption.

As stated above, the price of obtaining a given level of unsecured debt rises monotonically with exemptions. However, as seen in Table 2 (in the column denoted "Avg. Uns. Debt"), the willingness of households to borrow does not increase monotonically with exemptions, but is rather an "inverted-U". Namely, initially, as exemptions become more generous but are still low in absolute size, households on average borrow less on the unsecured market, choosing to save more to avoid bankruptcy. Subsequently, for more generous exemptions, household unsecured debt rises with exemptions, as bankruptcy becomes less painful to avoid. However the changes are minor, as most households do not hold unsecured debt at all, leading average debt to change from -0.01636 to -0.01756 units, less than $50 annually.

target.

Nonetheless, despite the behavior of average unsecured debt, *maximal* unsecured debt does increase monotonically with exemptions. Figure 3 and Table 2 (in the column denoted "Max. Uns. Debt"), both document maximal unsecured debt held by agents across experiments. This behavior shows that low exemptions systematically discourage large individual debt accumulation. It is striking that the value of maximal debt essentially doubles from -0.19 units to -0.38 units as exemptions are raised from zero to the maximum. This change is equivalent to an increase of $7,000.

Along with an increased willingness to hold unsecured debt under generous exemptions is the increased willingness to simultaneously retain equity. First, note that while per-capita unsecured debt is higher under maximal exemptions than it is under an exemption of zero, per-capita equity holdings still *rise*. The column denoted "Avg. Equity" reveals the small increase in average equity holdings in the population, which rises by approximately $1,200 on average, as exemptions go from zero to $120,000.

The behavior of per-capita values is suggestive, but more intuition for the results can be gained from combining the information from Figure 3 with data on specific subsets of the distribution of "net-worth" (the sum of debts and savings), given in Figure 4. It can been seen here that under low exemptions (e.g. $\overline{e}$=0.0, and $\overline{e}$=0.05), there is more mass at very low levels of net worth, than there is under both moderate and high exemption levels. Combining this with the fact that maximal unsecured debt rises systematically with exemptions accounts for why the equity held in bankruptcy rises with exemptions. In other words, for high exemptions, households with deeply negative net worth typically choose more unsecured debt and less secured debt (i.e. more equity) than they would under low exemptions. This illustrates the shift in financing away from secured debt and toward unsecured debt in financing used by households to smooth consumption. Exemptions generate exactly these incentives, with the only offsetting factor being the increased cost of unsecured debt.

A summary of the results so far, and intuition for them, is as follows. While the cost of bankruptcy is fixed in the model by λ, higher exemptions steadily increase the benefits of filing. In turn, as seen in both Figures 2 and 6, unsecured loan interest rates must rise for an increasingly large set of unsecured debt and equity levels to satisfy the zero-profit condition 2.9. Despite this, Figure 3 shows that maximal equilibrium unsecured borrowing still increases monotonically with exemptions. Therefore, even though most households do not change their behavior substantially with exemptions (see Figure 4), the proportion of households who find bankruptcy optimal grows and leads to higher bankruptcy rates. In other words, what matters for bankruptcy rates is the behavior of maximal unsecured debt, not average debt, and the former is strongly influenced by exemptions. Moreover, consumption, and consequently welfare, improve marginally as exemptions are increased. This shows that households find that ex-ante, high exemptions are worth their price in terms of more expensive unsecured credit. I turn now to the question posed at the outset. Namely, does bankruptcy provides an "excessive" advantage to households that use it?

4.1. Head Start or Fresh Start?

There are two tangible dimensions along which to answer the question of whether bankruptcy provides a "Fresh Start" or a "Head Start". First, will many households "...escape their contractual obligations while maintaining levels of wealth that the vast majority of Americans do not enjoy", as suggested by the NBRC dissenters? Second, for a given wealth position, do households benefit merely by increasing their holdings of unsecured debt, even when they are unlikely to repay? The answer to the first question turns out to be a qualified "yes", while the answer to the second is "no".

While exemptions do not affect average welfare much, they do appear to encourage bankruptcy and, ex-post, provide high-debt households with a "head start" by allowing them to retain wealth in bankruptcy. Evidence for this is seen in the sequence of histograms in Figure 1. These panels document the equity held by households at the time of a bankruptcy filing. As exemptions rise, there are increasing numbers of cases in which a bankruptcy filer retains equity, with the amount increasing in exemptions. Figure 1 documents that under the maximal exemption, for example, beyond the fact that the bankruptcy is nearly double the rate under zero exemptions is the fact that there is significant mass on very high levels of equity, at up to 1.5 units, or $90,000! This finding also receives some empirical support. In the data used by Berkowitz and Hynes (1999), filers who did have assets were nearly always from Texas, a state with a (nearly) unlimited homestead exemption.[19]

Another feature of the results is that the effect of exemptions on the equity held at the time of a bankruptcy filing is strong for low exemptions, but weak for high exemptions. For example, Figure 1 shows that when exemptions are raised from 0.0 to 0.57 (a value that is one-half of the inter-state average of 1.14 or $68,000), maximal equity held in bankruptcy grows substantially, while when exemptions are raised from 1.5 units to their maximal value of 2.0 (in each case an increase equivalent to approximately $30,000), the equity held by filers increases only slightly.

[19] The model developed here is meant to capture the effects of uniform, nationwide exemptions, and is calibrated to match country-level data for the U.S. Thereore, a inter-state interpretation of the model is not without pitfalls. States differ not just by their exemptions, but also in many other ways such as: the income processes of their inhabitants, the generosity of social insurance such as unemployment, welfare, housing support etc, the rules placed on credit supply, such as interest rate ceilings, and by the differential effects of aggregate shocks. Many of these factors vary substantially. Additionally, households may even move to exploit these differences, i.e. "Forum Shop". Future work applying this model carefully to account for interstate variation seems useful.

A natural way to address the second question above of whether increased unsecured debt makes households better off, is to check if the value function of the household is increasing in debt. Figure 5 displays the value function $V(.)$ under benchmark exemptions. As is easily seen, this function is strictly decreasing in debt. In fact, the function is most sharply decreasing for low income households, who constitute the majority of bankruptcy filers. Secondly, while households are free to acquire unsecured debt regardless of their equity position, the limit on secured debt is -2.0 units. In the area to the left of the dashed line all reduction in net worth must therefore come from increases in unsecured debt alone. It is clear from Figure 5 that such increases in unsecured debt reduce indirect utility monotonically, and do so for all three values of the income shock. This turns out to be true for all exemptions levels studied here, but for brevity, I do not present all cases. A second fact that suggests that lax exemptions do not provide a "head start" is to see that from a welfare perspective, the ex-ante consumption smoothing benefits of being able to discharge unsecured debt and retain wealth ex-post appear to be nearly offset by the costs arising from increased use of bankruptcy.

Therefore, bankruptcy is chosen by those with large debts, relatively low equity, and low income. Furthermore, even large exemptions, while encouraging filing and the retention of wealth in filing, do not appear to give debtors a "head start" along the dimensions of household welfare. In particular, welfare increases with exemptions even though ex-post, high exemptions will result in households filing for bankruptcy while retaining wealth.[20]

4.2. Risk-Aversion and Risk-Sharing

The primary conflict generated by exemptions is between the benefits of better risk-sharing through the retention of wealth after bankruptcy and the impediment to risk-sharing created by higher unsecured interest rates. Therefore, the measured gains or losses will be influenced most directly by the assumed level of risk-aversion. For robustness, in Table 3 I study outcomes when risk aversion is lowered to 2, from the benchmark value of 3. By and large, the results from the benchmark go through unchanged. Namely, that a high exemption is (marginally) welfare improving relative to low exemptions. Second, and not surprisingly, the optimal exemption is lower than under benchmark risk aversion. In other words, because the benefits from smoothing are lower, the willingness of households to endure more restricted borrowing is also lower. Thirdly, the "supply-side" response, as measured by the how interest rate functions change with exemptions, is monotone, as before. In Figure 6, the set of debt levels for which interest rates contain a default premium grows monotonically. Fourth, again as before, equity holdings are increasing in exemptions, and increase by roughly the same

[20] This feature is robust to the exemption level.

absolute amount (though a greater amount, proportionally) as in the benchmark.

There are also some differences, though they result in only minor changes in the welfare implications of exemptions. First, as in the benchmark, consumption smoothing improves in general as exemptions are increased. However, the improvement is not strictly monotone as in the benchmark. Moreover, unlike the benchmark case, the bankruptcy rate is no longer monotone in exemptions. The intuition is as follows. In economies with very low exemptions, fewer agents accumulate large, unsecured debts. This occurs despite the fact that relative to settings with higher exemptions, unsecured credit is much cheaper to obtain. To see this, compare the histogram of unsecured debt holdings in Figure 7, with its benchmark analog, Figure 3. As exemptions are increased from zero to the full value of the collateral asset. Both average unsecured debt and maximal unsecured debt incurred increase dramatically. In fact, maximal unsecured debt nearly doubles relative to the benchmark case. Therefore, bankruptcy rates are lower under very low exemptions than under very high ones. As exemptions are increased from zero, this changes, and while average debt falls, maximal debt and bankruptcy rates increase. However, for exemptions near the benchmark level, per-capita unsecured debt falls sufficiently to cause filing rates to fall once again. Lastly, as exemptions are increased substantially beyond the benchmark, the effects of credit supply dominate, and once again lead to increased borrowing and bankruptcy. This is seen in Figure 7. The tension between incentives provided by exemptions to acquire unsecured debt and the disincentives coming from high unsecured interest rates is resolved in favor of more debt in the benchmark. Under lower risk aversion, the trade-off varies more non-trivially. However, as made clear earlier, the net welfare implications in favor of high exemptions remain unchanged. Sensitivity analysis was also conducted with a lower-persistence income process, transactions costs, and also with higher targets for the benchmark bankruptcy rate. None of these alternative parameterizations changed the results substantively, and for brevity are not reported here.

4.3. Related Work

Before concluding, it is useful to compare the results above with existing equilibrium approaches to bankruptcy. The finding here that welfare improves with higher exemptions is consistent with the single-asset model of Zha (2001). By contrast, in a rich model of bankruptcy that includes labor supply, chapter choice and capital accumulation, Li and Sarte (2003), find that welfare improves with lower exemptions. In their model, these gains come in part for reasons other than pure risk-sharing, and arise instead from supply-side effects. Lower exemptions encourage labor supply and discourage the rescheduling of debt in "Chapter 13" bankruptcy, which in turn increases labor supply, capital accumulation, output, and consumption. While the adjustment of capital to bankruptcy may be overstated in Li and Sarte's framework, the response of labor supply still moves in the direction of increased output and consumption. Conversely, because I allow loan prices to be conditioned on debt and equity holdings, higher exemptions do not lead to uniformly higher loan prices, as they do in Li and Sarte (2003). Therefore, the cost imposed on borrowers does not imply worsened consumption smoothing for all households, but rather only for those with low wealth. This acts to offset the welfare costs associated with high exemptions found in Li and Sarte (2003).

5. Conclusions

In this paper, I evaluate uniform exemption policy primarily within the context of the recent congressional proposal H.R. 975. I develop an incomplete markets equilibrium model where secured and unsecured assets coexist and are treated differentially in a bankruptcy proceeding. I find that exemptions are associated positively with filing rates, equity holdings in bankruptcy, and welfare. I find however that exemptions are strongly negatively associated with the availability of unsecured credit. Additionally, I find that the welfare benefits of high exemptions, while positive, are small, at roughly $28 per household annually. The results are robust, and show that, from an ex-ante welfare perspective, increases in bankruptcy exemptions beyond current state averages are largely a matter of indifference, and do not merit the heated debate they have generated.

6. Bibliography

Aiyagari, S.R., "Uninsured Idiosyncratic Risk and Aggregate Saving", Quarterly Journal of Economics, v109, 1994, 659-684.

Athreya, K.B., 2002, "Welfare Implications of the Bankruptcy Reform Act of 1999", Journal of Monetary Economics, v49, 2002, 1567-1595

Athreya, K.B., and Simpson, N., "Personal Bankruptcy or Public Insurance?", Working Paper, March 2004, Colgate University.

Baird, D. G. "Elements of Bankruptcy", 3rd Ed. , Foundation Press, 2001.

Bankruptcy Reform Act of 1998: Hearing Before the Subcommittee on Commercial and Administrative Law of the Committee on the Judiciary, House of Representatives, One-Hundred and Fifth Congress, second session.June 1998. Washington D.C., U.S. G.P.O. Congressional Sales Office, 1999. Superintendent of Documents.

Berkowitz, J., and Richard Hynes "Bankruptcy Exemptions and the Market for Mortgage Loans", Journal of Law and Economics, v42, 1999

Bermant, Gordon, and Flynn, Ed, "Incomes, Debts, and Repayment Capacities of Recently Discharged Chapter 7 Debtors" Executive Office for United States Trustees, January, 1999

Castaneda, A, J. Diaz-Jimenez, J.V. Rios-Rull, "Accounting for Earnings and Wealth Inequality", Journal of Political Economy, v111, 2003, 818-857.

Congressional Budget Office (CBO), "Personal Bankruptcy: A Literature Review", CBO paper, September 2000.Second and D streets, Washington D.C., S.W. 20515.

Chatterjee, S., D. Corbae, M. Nakajima, J. V. Rios-Rull, "A Quantitative Theory of Unsecured Consumer Credit with Risk of Default", 2002, Working Paper 02-6, Federal Reserve Bank of Philadelphia.

Domowitz, I. and Sartain, R.L., "Determinants of the Consumer Bankruptcy Decision", Journal of Finance, v54, 1999, 403-420.

Dubey, Pradeep, Geanakoplos, J, and Shubik M, "Default in a General Equilibrium Model with Incomplete Markets", 2000, Cowles Foundation Discussion Paper.

Edelberg, W., "Testing for Adverse Selection and Moral Hazard in Consumer Loan Markets", 2003, Finance and Economics Discussion Series, Federal Reserve Board.

Evans, D. and Schmalensee, R. Paying With Plastic: The Digital Revolution in Buying and Borrowing, 1999, MIT Press, Cambridge, MA.

Floden, M., and Linde, J.,"Idiosyncratic Risk in the United States and Sweden: Is There a Role for Government Insurance?", Review of Economic Dynamics, v4, 2001.

Gropp, Reint, Scholz, J. K., and White M.J. "Personal Bankruptcy and Credit Supply and Demand", Quarterly Journal of Economics, v112, 1997, 217-251.

Gross, David B. and Nicholas Souleles: "Explaining the Increase in Bankruptcy and Delinquency: Stigma vs. Risk Composition." Wharton Financial Institutions Center, 98-28-B. University of Pennsylvania.

Hubbard, G., Skinner, J., and Zeldes, S., "The Importance of Precautionary Motives for Explaining Individual and Aggregate Saving", Carnegie-Rochester Conference Series on Public Policy, v40, 1994, 59-126.

Huggett M., "The Risk-Free Rate in Heterogeneous-Agent Incomplete-Insurance Economies", Journal of Economic Dynamics and Control, v17, 1993, 953-969.

Jackson, T. H. "The Logic and Limits of Bankruptcy Law" 2001, Beard Books.

Jones, Edith, and James I. Shepard, National Bankruptcy Review Commission, "Recommendations for Reform of Consumer Bankruptcy Law by Four Dissenting Commissioners", 1997, http://nbrc.gov/report/24commvi06.html

Lehnert, A,. and Maki, D. "The Great American Debtor: A Model of Household Consumption, Portfolio Choice, and Bankruptcy", 2001, mimeo, Federal Reserve Board..

Li, W., and Sarte, P.-D. G. "Macroeconomic Implications of U.S. Consumer Bankruptcy Choice: Chapter 7 or Chapter 13?, 2002, Working Paper 02-1, Federal Reserve Bank of Richmond.

Livshits, Igor, MacGee, James, and Tertilt, Michele, "Consumer Bankruptcy: A Fresh Start", 2003, Working Paper 617, Federal Reserve Bank of Minneapolis.

Pavan, M., "Consumer Durables and Risky Borrowing: the Effects of Bankruptcy Protection", 2003, mimeo, Boston College.

Repetto, A., "Personal Bankruptcies and Individual Wealth Accumulation", 1998, mimeo, MIT

Storesletten K., Telmer, C., and Yaron, A., "Asset Pricing with Idiosyncratic Risk and Overlapping Generations", 2000, CPER Working Paper.

Sullivan, T, Warren, E, and Westbrook, J. As We Forgive Our Debtors: Bankruptcy and Consumer Credit in America, 1989, Oxford University Press, New York.

______, The Fragile Middle Class, Americans in Debt, 2000, Yale University Press, New Haven.

"Memorandum Re: Expanded Proposal on Uniform Exemptions", 1997,
http://www.abiworld.org/legis/review/proposals/97exempt.html

WEFA Group, The Financial Costs of Personal Bankruptcy (Feb.98) GAO B-279802 GAO/GGD-98-116R.

Zame, William, R."Efficiency and the Role of Default when Security Markets are Incomplete", American Economic Review, v83, 1993, 1142-1164.

Zha, Tao, "Bankruptcy Law, Capital Allocation, and Aggregate Effects: A Dynamic Heterogenous Agent Model with Incomplete Markets", Annals of Economics and Finance*, v2, 2001.*

Table 1: Parameters

Parameter	Benchmark Values
α	3
β	0.96
τ^s, τ^u	0.034,0.064
λ	0.5208
$\overline{e}$	0.25 (\$15,000)
$\lvert\underline{a}^s\rvert$	2.00 (\$120,000)

Table 2: Benchmark Model							
Exemption	Smoothing	Bankruptcy Rate	Welfare	Max. Uns. Debt	Avg. Uns. Debt	Avg. Equity	Avg. Savings
0	0.79317	0.66%	-$11.40	-0.19091	-0.016356	1.2437	0.21115
0.05	0.79219	0.71%	-$8.66	-0.20909	-0.016317	1.24249	0.21054
0.15	0.79164	0.73%	-$8.81	-0.20909	-0.016378	1.24261	0.20981
0.25 (Pop. Weighted Avg.)	0.79121	0.80%	$0.00	-0.22727	-0.014591	1.24281	0.21216
0.57	0.78843	0.94%	$5.70	-0.26364	-0.01486	1.24993	0.2136
1.14 (Interstate Average)	0.78624	1.06%	$12.30	-0.3	-0.016537	1.25288	0.21137
1.5	0.78502	1.16%	$18.75	-0.35455	-0.017272	1.25858	0.21164
2	0.78376	1.24%	$28.24	-0.37273	-0.017555	1.26322	0.21189

Table 3: Lower Risk Aversion							
Exemption	Smoothing	Bankruptcy Rate	Welfare	Max. Uns. Debt	Avg. Uns. Debt	Avg. Equity	Avg. Savings
0	0.81236	0.78%	-$9.93	-0.26364	-0.02479	1.09529	0.12578
0.05	0.81218	0.86%	-$6.93	-0.28182	-0.024747	1.09476	0.12547
0.15	0.8146	0.96%	$1.00	-0.3	-0.023374	1.09756	0.12691
0.25 (Pop. Weighted Avg.)	0.81246	0.72%	$0.00	-0.3	-0.02375	1.09698	0.12652
0.57	0.80993	0.98%	$19.65	-0.35455	-0.022511	1.10738	0.12881
1.14 (Interstate Average)	0.80638	1.10%	$26.35	-0.39091	-0.022972	1.11296	0.12889
1.5	0.80636	1.10%	$26.58	-0.40909	-0.023075	1.1131	0.1288
2	0.80631	1.11%	$25.43	-0.40909	-0.023082	1.11285	0.12878

Table 4: Exemptions by State and Population

State	Population	Percent of Total Population	Cumulative Percent of Population	Homestead exemption limit
Maryland	5,508,909	1.89%	1.89%	0
New Jersey	8,638,396	2.97%	4.86%	0
Pennsylvania	12,365,455	4.25%	9.12%	0
Rhode Island	1,076,164	0.37%	9.49%	0
Massachusetts	6,433,422	2.21%	11.70%	$3,500
Michigan	10,079,985	3.47%	15.17%	$3,500
Alabama	4,500,752	1.55%	16.71%	$5,000
Georgia	8,684,715	2.99%	19.70%	$5,000
Kentucky	4,117,827	1.42%	21.12%	$5,000
Ohio	11,435,798	3.93%	25.05%	$5,000
South Carolina	4,147,152	1.43%	26.47%	$5,000
Tennessee	5,841,748	2.01%	28.48%	$5,000
Virginia	7,386,330	2.54%	31.02%	$5,000
Illinois	12,653,544	4.35%	35.37%	$7,500
Indiana	6,195,643	2.13%	37.50%	$7,500
Missouri	5,704,484	1.96%	39.47%	$8,000
Utah	2,351,467	0.81%	40.27%	$8,000
New York	19,190,115	6.60%	46.87%	$10,000
North Carolina	8,407,248	2.89%	49.76%	$10,000
Wyoming	501,242	0.17%	49.94%	$10,000
Maine	1,305,728	0.45%	**50.39%**	**$12,500**
Nebraska	1,739,291	0.60%	50.98%	$12,500
Louisiana	4,496,334	1.55%	52.53%	$15,000
Oregon	3,559,596	1.22%	53.75%	$25,000
West Virginia	1,810,354	0.62%	54.38%	$25,000
Colorado	4,550,688	1.56%	55.94%	$30,000
Hawaii	1,257,608	0.43%	56.37%	$30,000
New Mexico	1,874,614	0.64%	57.02%	$30,000
Washington	6,131,445	2.11%	59.13%	$30,000
Wisconsin	5,472,299	1.88%	61.01%	$40,000
California	35,484,453	12.20%	73.21%	$50,000
Idaho	1,366,332	0.47%	73.68%	$50,000
New Hampshire	1,287,687	0.44%	74.12%	$50,000
Alaska	648,818	0.22%	74.35%	$54,000
Connecticut	3,483,372	1.20%	75.54%	$75,000
Mississippi	2,881,281	0.99%	76.53%	$75,000
Vermont	619,107	0.21%	76.75%	$75,000
North Dakota	633,837	0.22%	76.97%	$80,000
Arizona	5,580,811	1.92%	78.88%	$100,000
Montana	917,621	0.32%	79.20%	$100,000
Arkansas	2,725,714	0.94%	80.14%	$125,000
Delaware	817,491	0.28%	80.42%	$125,000
Florida	17,019,068	5.85%	86.27%	$125,000
Iowa	2,944,062	1.01%	87.28%	$125,000
Kansas	2,723,507	0.94%	88.22%	$125,000
Oklahoma	3,511,532	1.21%	89.43%	$125,000
South Dakota	764,309	0.26%	89.69%	$125,000
Texas	22,118,509	7.61%	97.30%	$125,000
Nevada	2,241,154	0.77%	98.07%	$125,000
Minnesota	5,059,375	1.74%	99.81%	$200,000

Note: Unlimited Exemptions are set to $125,000, and Washington D.C. (0.17% of pop.) has no well-defined Homestead exemption, but has other types of exemptions.

Figure 1: Equity in Bankruptcy

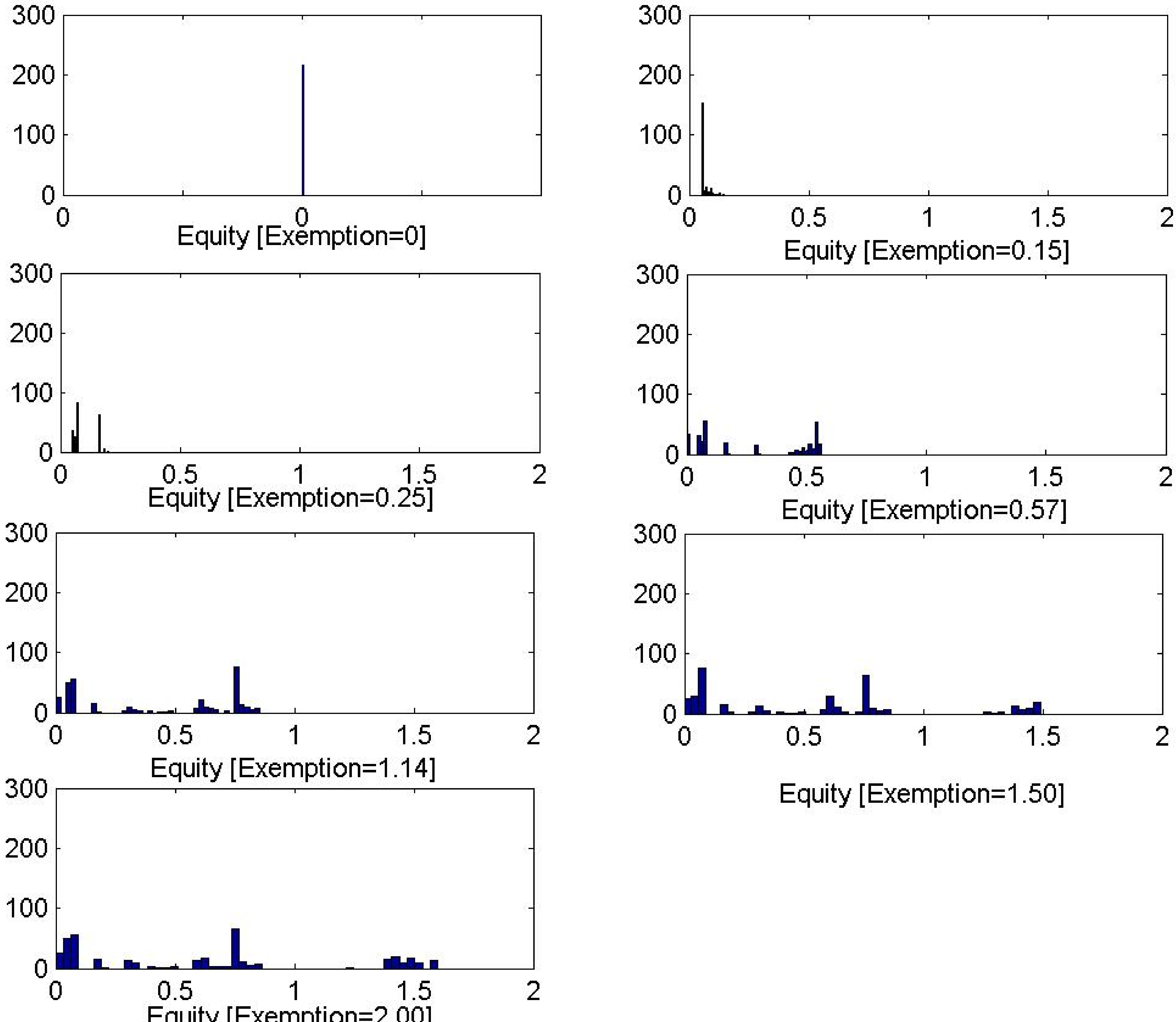

Figure 2: The Probability of Bankruptcy

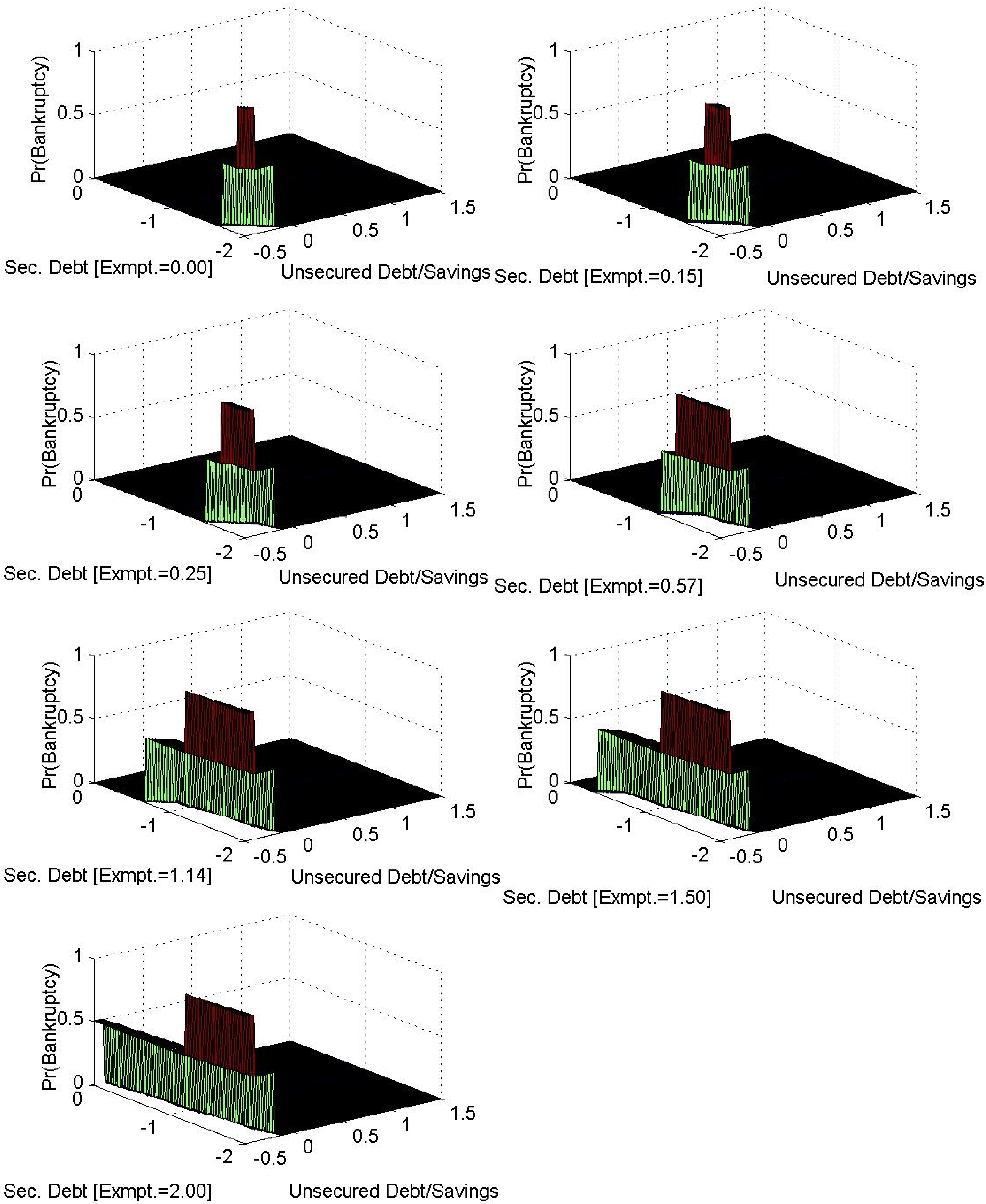

Figure 3: The Distribution of Unsecured Debt

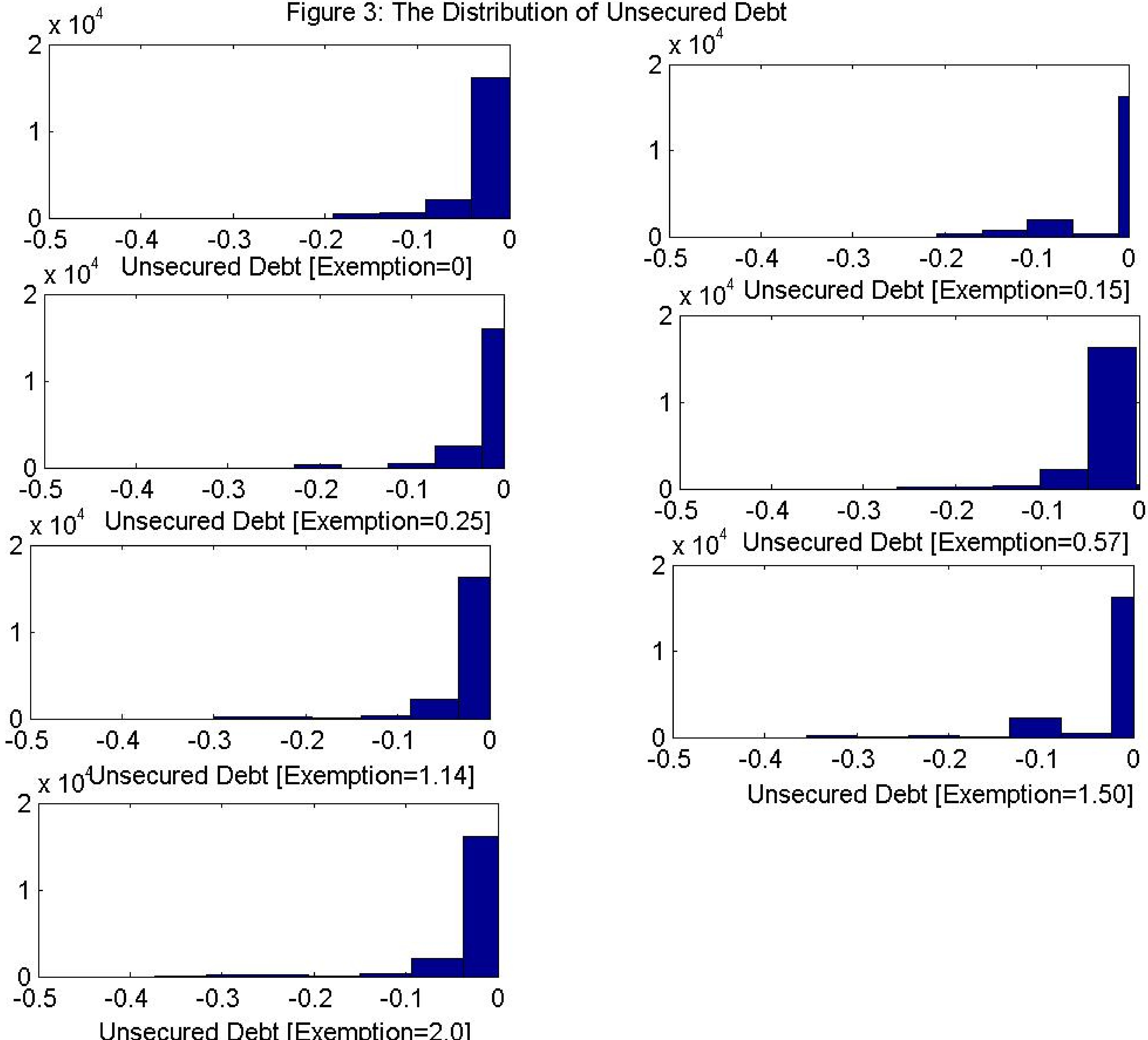

Figure 4: Net Worth [Left Tail]

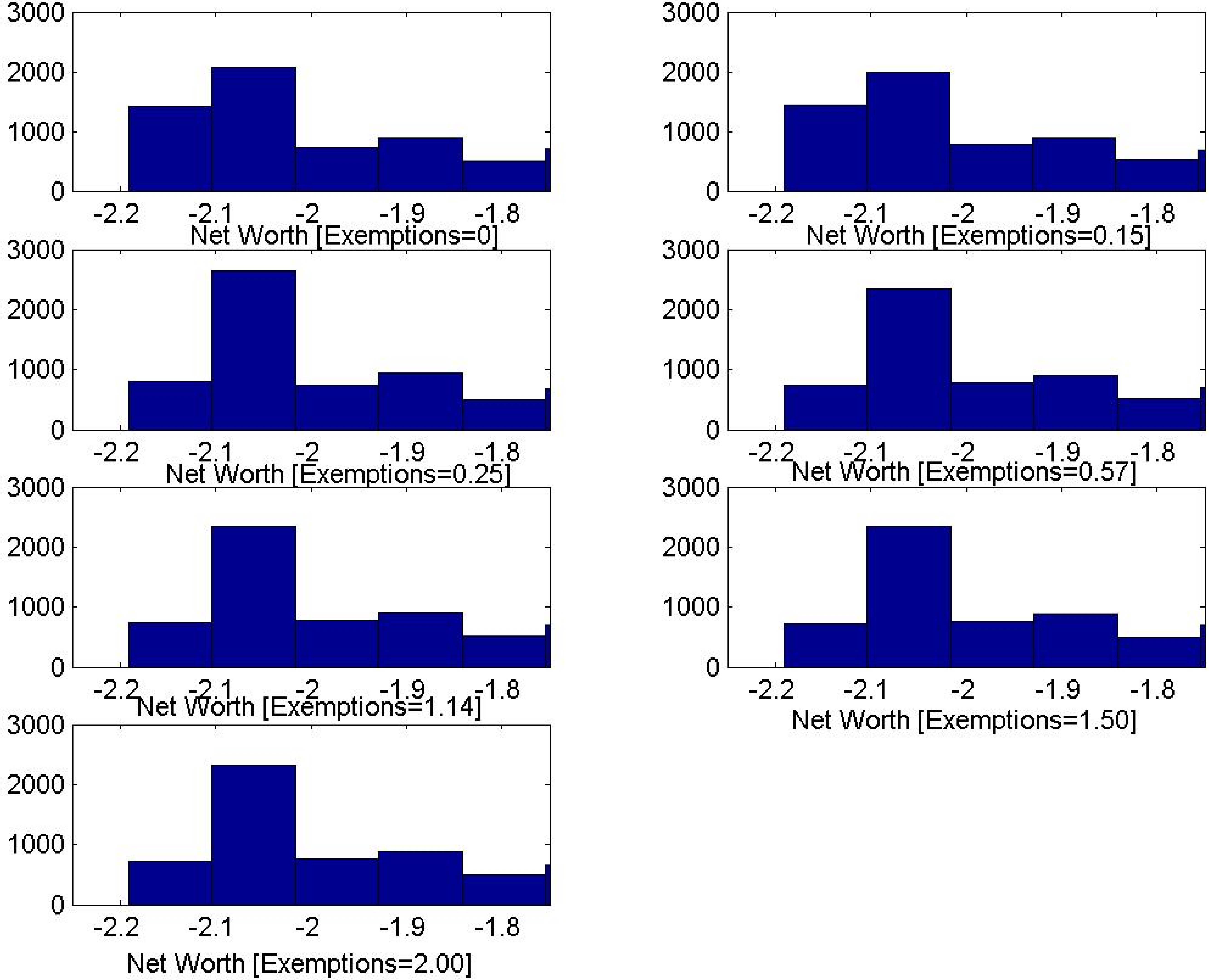

Figure 5: Value Functions

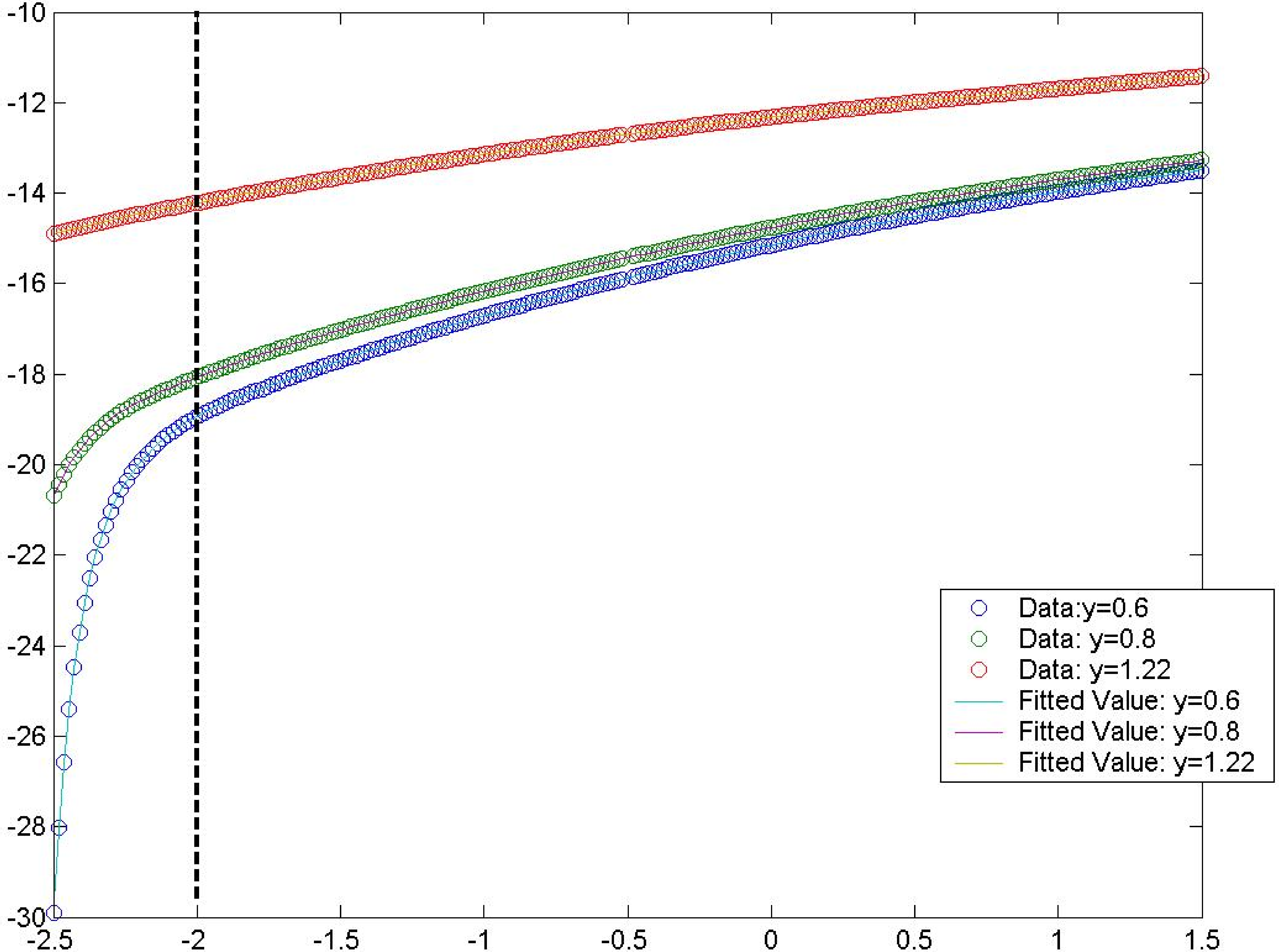

Figure 6: The Probability of Bankruptcy (Low Risk Aversion)

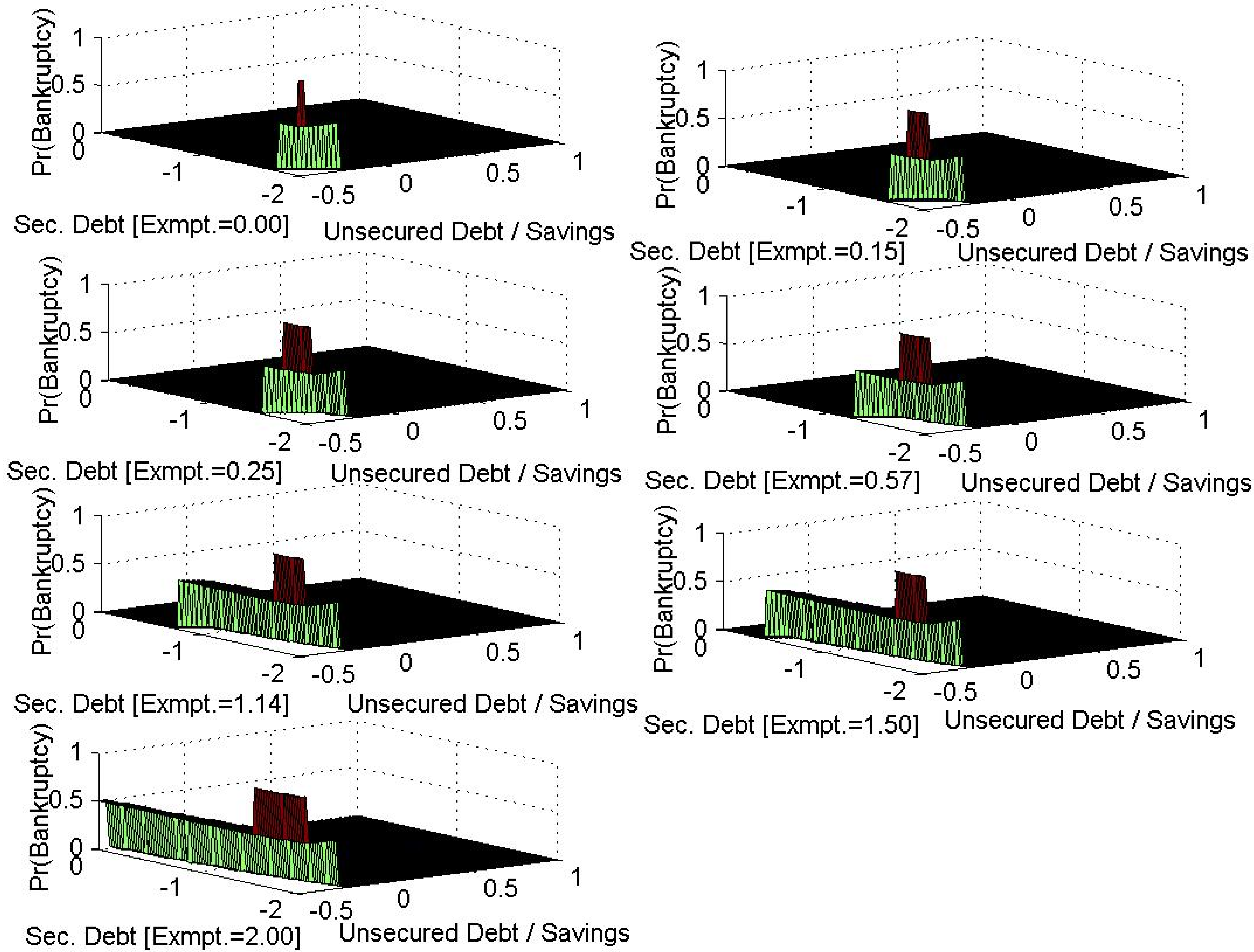

Figure 7: The Distribution of Unsecured Debt (Low Risk Aversion)