Does Availability of Consumption Insurance Influence Portfolio Allocation?

A Real Options Approach to Bankruptcy Exemptions

Sandhya Persad

Columbia University

February 20, 2005

Abstract

The availability of consumption insurance may alter an agent's risk appetite. This paper examines bankruptcy exemptions which allow agents with extremely adverse income realizations a consumption floor at the level of the exemption. In particular, a real options model is constructed to examine whether the improved insurance inherent in higher bankruptcy exemptions induces agents to increase the share of risky assets within their financial portfolios. The evidence from US micro level data indicates that exemptions induce agents to weight their portfolios more in favor of risky assets. Moreover, the results are consistent with the conjecture that specific exemption changes will affect the risky asset weighting of agents with asset levels closer to the exemption level more than those of agents with more remote asset levels.

Contact: 205 East 95th St, Apt 29M New York, NY 10128,tel: (347)306-0575, email: stp11@columbia.edu.

1 Introduction

This paper considers the effect of bankruptcy exemptions, a form of consumption insurance, on agents' pentient for risk-taking. Exemption policy specifies the amount and form of assets which may be shielded from creditors in the event of bankruptcy. It is likely that a higher floor on consumption in adverse states would induce agents to assume more risk in their investments. Because they stand to lose less in the event of bankruptcy, agents may be more willing to assume additional risk that raises the probability of bankruptcy. In particular, the paper examines whether the improved insurance causes agents to increase the share of risky assets within their financial portfolios. After setting the question in an option-theoretic framework, this paper provides empirical evidence (based on microeconomic data for US households) to analyze the effect of increased consumption insurance on portfolio composition. Findings indicate that exemptions do, indeed, affect the risk appetite in portfolio composition. That is, when greater insurance becomes available, agents respond by weighting their portfolios more heavily in favor of risky assets. Moreover, the results are consistent with the conjecture that specific exemption changes will affect the risky asset weighting of agents with asset levels closer to the exemption level more than those of agents with more remote asset levels.[1]

The effects of homestead exemption on portfolio allocation have received slight but increasing attention in recent literature. Thus far, the literature has found that agents internalize the additional insurance in making their portfolio allocation decisions along three dimensions: (1) share of debt in portfolio (Carroll, 1992) (2) simultaneous holding of high interest debt and low interest savings instruments, the "borrowing to save" puzzle (Lehnert and Maki, 2002) and (3) housing (exempt asset) vs. *amount* of total financial wealth (generally non-exempt asset) (Repetto, 1998). Excluded from the analysis thus far, is an examination of the agent's appetite for risk *within* the financial wealth portfolio. Specifically, does the share of safe assets in an agent's financial portfolio respond to an increase in bankruptcy exemptions?

[1]Insufficient data were available to provide a thorough analysis of this question. The findings are significant for the relevant quintiles in largest policy experiments under consideration, a $30,000 increase in California in 1990 and a cap of $200,000 on previously unlimited exemptions in Minnesota in 1993.

Investigating this relationship is crucial in determining how one should interpret the finding of previous literature (Repetto, 1998) that housing wealth increases with bankruptcy exemptions. Higher bankruptcy exemptions exert two effects on consumers. First, because these exemptions may be claimed only in the form of pre-specified assets (in the case of the homestead exemption, the relevant asset is the primary home), agents who were previously constrained in insurance markets and who would like to take advantage of the increased insurance should exhibit a preference for exempt assets in their portfolio (the insurance vehicle effect). Second, because exemptions are higher, agents' bad-state payoffs are not as low as before. For this reason, agents may be encouraged to take more risk (risk appetite effect). Insofar as housing is a risky asset, agents may increase their holdings of home equity not from any preference for housing per se, but rather from an increased tolerance for risky assets of which housing is one. For this reason, agents' tolerance for other risky assets merits examination. While a certain amount of financial assets is exempt from creditor seizure, exemption law makes no distinction between safe and risky assets. Therefore, the agent's allocation of financial investment reflects a preference for risk rather than a preference for exemptible assets.

Examining this effect is timely in light of recent legislative predilection for advancing (but stopping just short of passing) the Bankruptcy Abuse and Prevention Act which proposes a uniform nationwide limit on the amount of home equity state law permits bankruptcy filers to shield from creditors (possibly by shifting assets into exempt properties in order to defraud lenders).

The paper is organized as follows: Section 2 sketches a model of the problem in a real-options framework. Section 3 discusses the specification and data used for the empirical analysis. By conducting a difference in differences analysis on data from the Consumer Expenditure Survey, the current study seeks to avoid some of these unobserved heterogeneity problems. Section 4 presents the results and Section 5 offers some concluding remarks.

2 Theoretical Motivation: Option Theoretic Approach to Exemptions

Each agent begins period zero endowed with a level of investible funds, A. The agent's goal is to maximize period one wealth by allocating these funds between two assets; one paying a random return drawn from a distribution with lower mean and lower variance (the safe asset, indexed by s) and the other paying returns drawn from distribution with higher mean and higher variance (the risky asset, indexed by r.) The agent may also incur an exogenous amount of debt (e.g. medical expendiure) M. The proceeds from the agent's investments less the "surprise" expenditure are described by S:

$$S := A[\lambda r_s + (1-\lambda)r_r] - M \tag{1}$$

where λ is the fraction of total funds invested in the safe asset. Recognizing that the uncertainty of asset returns and debt may render the agent insolvent and unable to finance necessary consumption in some states of the world, the law guarantees a minimum level of consumption by enstating a bankruptcy discharge policy. Under this policy, if the agent's debt exceeds investment returns by more than a minimum consumption level, X, the agent's debt is forgiven while assets above that consumption level (the exemption level) are seized. The agent's payoff profile Π is as follows:

$$S \geq X \rightarrow \Pi = S(Solvency) \tag{2}$$

$$S < X \rightarrow \Pi = X(Insolvency) \tag{3}$$

The agent's payoff can therefore be decomposed into two streams: (1) In either case (solvency or insolvency), the agent may be assured of the minimum consumption level/ exemption level. This portion of the payoff may be likened to a simple forward contract with payoff X. (2) The agent's claim on assets above this amount depend on whether the realized state is solvency or insolvency. This payoff profile may be described as a european call option paying the difference between the agent's investment returns less surprise expenditure when the agent is solvent and paying nothing when the agent is insolvent. In the case of solvency ($S \geq X$), the agent's payoff is simply S. In the case of insolvency ($S < X$), the payoff is X. The payoffs may then be expressed as follows:

$$max\{S, X\} + X = max\{S - X, 0\} + X \tag{4}$$

The constant part X of the above expression is the above-mentioned forward contract with payout X. The first component payoffs are those of a European call option written on the underlying process S with strike X.

In this problem, the value of the call option is increasing in volatility of the underlying S. Therefore, the agent's selection of portfolio weights, tantamount to his/her selection of volatility of the underlying, affects the option value of the payoff. To deduce the response of portfolio risk appetite to a change in exemption, we may consider the response to a change in strike (X) of the option price sensitivity to voltility (commonly termed the option's "vega").[2]

A pde with boundary condition as given above in equation ,was shown by Black and Scholes to have an analytical solution of the following functional form:

$$c = SN(d_1) - Xe^{-e(T-t)}N(d_2) \tag{5}$$

where

$$d_1 = \frac{log(\frac{S}{X}) + (r + \frac{1}{2}\sigma^2)(T-t)}{\sigma\sqrt{T-t}} \tag{6}$$

and

$N(.)$ is the cumulative distribution function for the standard normal

The response of payoff to a rise in the strike is given by the following expression, known as the option's "vega".

$$vega_c = \frac{\partial c}{\partial \sigma} = Sn(d_1)\sqrt{T-t} \tag{7}$$

where $n(.)$ is the probability density function for the standard normal distribution (with mean 0 and variance 1). Importantly , $n(.)$, which assumes the shape of the "bell curve", is decreasing for arguments greater than zero. Because d_1 is always greater than zero, this decreasing part of the curve is the relevant part to this analysis.

[2]We are interested in the sign of $\frac{\partial vega}{\partial X}$.

Because vega is always positive, the agent's payoff is increasing in volatility. We therefore expect that the agent who is buffered against extremely low income realizations (one who has access to bankruptcy exemption law), loves volatility. Asking whether the agent will allocate more or less of his/her portfolio to the safe asset when exemptions rise is equivalent to examining how the vega responds to an increase in exemption level X. Vega is always positive, meaning that volatility is always beneficial. Higher sensitivity to volatility (higher vega) means that the agent is more sensitive to the beneficial effects of volatility. If the agent becomes more sensitive to the positive effects of volatility, he/she will rebalance the portfolio in favor of the risky asset (λ will fall).

Clearly a rise in the strike price, the exemption level X, increases vega because d_1 falls causing $n(d_1)$ and overall vega to rise [3].

$$\frac{\partial^2 c}{\partial X \partial \sigma} = \frac{\partial vega}{\partial X} = S\sqrt{T-t}\overbrace{n'(.)}^{(-)}\overbrace{\frac{\partial d_1}{\partial X}}^{(-)} > 0 \tag{8}$$

$$\frac{\partial d_1}{\partial X} = \frac{-1}{X\sigma\sqrt{T-t}} < 0 \tag{9}$$

$$n'(.) = \frac{-Se^{\frac{-S^2}{2}}}{\sqrt{2\pi}} < 0 \tag{10}$$

Proposition 1: Because a rise in exemptions causes agents to be more sensitive to the beneficial effects of volatility, as exemptions rise, agents will rebalance portfolios in favor of risky assets. That is, $\frac{\partial \lambda}{\partial X} < 0$

Further examination yields predictions about which segment of the population will exhibit the strongest response to a rise in exemption levels. Agents who rebalance more are those for whom $\frac{\partial vega}{\partial X}$ is larger than for other agents. It is assumed that the initial asset level A exceeds the exemption level X. To show that agents with asset levels furthest from the exemption level are less motivated to rebalance their portfolios we must show that the sign of

$$\frac{\partial^2 vega}{\partial A \partial X} = S\sqrt{T-t}n''(.)\frac{\partial d_1}{\partial A} \tag{11}$$

[3] To sign this expression we use the result in the preceeding that the decreasing part of the normal pdf is the relevant part for this analysis

is negative.

In particular,the sign is negative (implying decreasing sensitivity of vega to exemption level increases) when $d_1 > 1$. A sufficient condition for this to be true is that $S > Xe$ [4]. Because we have assumed that $E[M] = 0$ and taking r_r and r_s as given, from the agent's point of view, S/X is largest when initial asset level A is much larger than the exemption level X. For A sufficently larger than X, (i.e., within the class of agents not likely to declare bankruptcy–those whose asset endowment is sufficient to preclude insolvency) sensitivity of vega to changes in exemption levels declines and we should expect to see smaller rebalancing effects as asset level grows farther away from exemption levels. This result also implies that, even for households unlikely to declare bankruptcy, the change in bankruptcy exemptions still encourages agents to hold riskier portfolios but does so most forcefully for agents with asset levels closest to the exemption level.

Proposition 2: Within the class of agents unlikely to declare bankruptcy (S sufficiently larger than X), the rebalancing effect is largest (given M, r_r, and r_s) for agents with initial asset levels closest to the exemption level.

The sections below will test for the presence of this portfolio re-allocation effect of exemptions.

3 Specification and Data

To analyze the change in behavior, if any, before and after the policy change took place, a first approach might to be run a simple regression of expenditure against exemption level. However, it is plausible to suspect that there is a positive omitted variable bias to these results. This is because states with a higher exemptions may also have other unobserved determinants that promote the portfolio composition shift. Data availability for a pooled cross-section of states both before and after several policy changes presents an opportunity to eliminate this sort of omitted variable bias for fixed effects.

Data are taken from the Consumer Expenditure Survey conducted by the Bureau of Labor Statistics . This survey samples a revolving panel of households for five consecutive quarters each.

[4] where e refers to the natural exponential function

The market value of safe wealth was calculated as sum of market value of US bonds, amount in checking accounts and amount in savings accounts as of the last day of the month immediately preceeding the interview. Total financial wealth (for the same period) was constructed from total value in savings and checking accounts plus estimated market value of stocks, bonds and mutual funds and other such securities. To gauge the share of financial portfolio invested in safe assets, market value of safe wealth was normalized by total financial wealth. In order to measure equity in primary home, used to capture A in the preceding analysis, the principal outstanding on primary home mortgages was subtracted from the reported market value of the primary home. The data were divided into quintiles using this primary home equity variable in order to examine the verity of proposition 2.

The following analysis relies on this fixed effects panel data model known as the differences in differences (DID) approach [5]. These models estimate the effects of binary treatments on different individual units by comparing outcomes before and after treatment.

According to the DID procedure, each dependent variables was regressed against an intercept, three independent dummy variables and a vector of demographic characteristics.

$$\bar{p} = Intercept + B_1 dstate + B_2 dyr + B_3 dyrstate + G demographic + \epsilon_{i,t}$$

- $dstate_s$ is a dummy that indicates that the household is from a treatment state, regardless of whether policy was enacted or not.
- dyr_t is a dummy that indicates whether the household was interviewed after the policy took effect, regardless of state.
- $dyrstatevector$ includes a dummy that indicates that the observation is from the treatment state and during the treatment period and the interaction of this dummy with several important bankruptcy predictors and demographic variables.
- $demographic$ is a vector of bankruptcy predictors and demographic variables. These included after tax income, age, education level, home equity, debt to income ratio, number of persons

[5] Ashenfelter, 1978

younger than 18 in household, persons older than 64 in household, number of earners in household, gender and marital status.

The estimated effect of the policy change is captured by the regression coefficient of $dyrstate$.

4 Results

The results would seem to suggest support for Proposition 1, that the share of safe assets increases in response to better consumption insurance. For each exemption change two analyses are performed. The first table presents the results decomposed by quintiles of primary home equity holdings in order to comment on Proposition 2. Some small amount of support is found for Proposition 2, that agents with primary home equity closest to exemption levels should exhibit the strongest response. This support was found for the largest exemption changes, the 1990 California exemption increase and the 1993 Minnesota exemption cap. However, a larger sample would be necessary to provide an thorough test of proposition 2. In addition, the second table in each group, presents the analysis when the quintiles are constructed by debt to asset ratio. [6] The purpose of this decomposition is to see whether higher debt households, those more likely to declare bankruptcy, internalize the higher consumption floor in their appetite for investment portfolio risk. No statistically significant support is found for this third conjecture.

4.1 1990 California Exemption Rise from $45,000 to $75,000

The California Exemption rise affected those households in Quintiles 1 and 2. However, insufficient data were available to analyze quintile 2 response. For quintiles 1 ($36,500 to $65,000) and 3 ($93,145 to $150,000), we find strong evidence that assets were allocated into riskier instruments following the policy change. The wealthiest households ($152,348 to $805,169) seemed to allo-

[6] In analyzing the effects of the exemption change by debt/asset ratio, several observations were dropped because of missing values for debt or assets. It was unclear whether these reflected zero-debt(asset) households or whether the household did not report. In addition observations with debt/asset ratio larger than 5 were omitted. Dropping high debt/asset ratios reduced sample size by 30 observations.

cate more resources toward safer assets. This is strongly statistically significant but the sign is inconsistent with the simple model presented above. Note that total financial wealth fell for those households in the quintile just above the new exemption level ($93,145 to $150,000), while it rose for those in quintile containing the old level ($36,500 to $65,000).

When analysis is undertaken based on debt/asset ratios, there is evidence that households in the next-to-lowest debt/asset ratio[7] responded to the exemption increase by shifting into riskier assets.

4.2 1994 Federal Exemption Change from $7,500 to $15,000

The federal exemption hike only affected a few states in the sample. This is because exemption law is structured so that states may choose their own exemption levels and may stipulate whether or not filers in their states may choose to claim either federal or state exemptions. As such, a change in federal exemptions will affect a state if the state permits claiming of exemptions at federal levels and the state's exemption levels are lower than federal levels. Of the states in the sample, New Jersey, Pennsylvania and Michigan were affected. However, the survey included only partial reporting of Michigan households in the early years. Tests considering Pennsylvania and New Jersey together yielded little statistical significance. Neither did those considering New Jersey alone (dropping Pennsylvania and Michigan observations). The table reports the results for Pennsylvania (dropping New Jersey and Michigan observations).

While analysis of all observations showed little significance, the results for the relevant exemption change (Quintile 0 with primary home equity ranging from $500 to $35,000) show that the allocation of savings to safe assets rose! The direction of this result is not intuitive, nor is it explained by the simple model above. The middle quintile (with primary home equity values ranging from $67,000 to $92,023) however, yielded statistically significant results in the predicted direction.

In the analysis in Table 4, based on debt/asset ratio, we would expect that the higher debt/asset households (those closest to bankruptcy) would respond more to an increase in bankruptcy exemptions. For the highest quartile, the portfolio share result is not statistically significant. The next

[7] insufficient observations were available to analyze the lowest quintile

highest quartile held insufficient data to perform a test. The middle quintile did exhibit a tendency to allocate less savings to safe assets.

4.3 1991 Colorado Exemption Rise from $40,000 to $60,000

The Colorado Exemption rise was not associated with any statistically significant portfolio allocation results in the analysis based on quintiles of primary home equity. Note, however that total financial wealth rose for those households in the quintile just above the new exemption level ($67,000 to $92,023), while it fell for those in quintile containing the old level ($36,500 to $65,000).

When quintiles are drawn based on debt/asset ratios, we find strong statistical evidence supporting a shift into riskier assets in response to an increase in consumption insurance.

4.4 1993 Minnesota Exemption Change from unlimited to $200,000

For the Minnesota exemption cap, the sample contained too few observations in high debt/asset categories and in mid level primary home equity categories to perform a full analysis. In Table 7, the results for the entire sample grouped together indicate a marginally statistically significant (p-value = 10.77%) *positive* response of safe asset share to a cap in exemptions. This accords with intuition and the simple model above. Lower consumption insurance induces agents to save in less risky instruments. The exemption changed from unlimited to $200,000 and should have had the largest impact on the highest quintile of home equity. Unfortunately, insufficient data were available for this test. The next highest quintile (primary home equity ranging from $93,145 to $150,000) yields promising results. With high statistical significance, agents seem to have shifted into safer portfolios.

Too few minnesota observations after the exemption changes were available to perform the analysis on higher debt/asset quintiles. The safest debt/asset quintile (predictably) exhibited no statistically significant response for portfolio allocation.[8]

[8]Financial wealth however, seems to have decreased markedly.

5 Conclusions

The paper examines whether the improved insurance causes agents to increase the share of risky assets within their financial portfolios. Drawing upon Black-Scholes option theory, the paper develops and tests two predictions concerning the effects of exemptions on the risk weighting of agent's financial portfolios. First, it predicts that higher exemptions will increase the beneficial effects of risk-taking and will therefore cause agents to increase the share of risky assets in their portfolios. Second, it predicts that this rebalancing effect will be stronger for agents with asset levels closer to the exemption level. Tests employing Consumer Expenditure Survey data lend the predictions moderate support.

These findings contribute to the literature on social insurance by concluding that exemptions do indeed affect individuals' savings behavior. It augments findings of earlier work on exemptions and savings decisions by showing that the response of financial investment to exemption changes reflects a preference for risk and not merely a preference for exemptible assets.

Table 1

Effects of 1991 California Homestead Exemption Rise from $45,000 to $75,000
By Quintiles of Equity in Primary Home

		Entire Sample	Quintile 0	Quintile 1	Quintile 2	Quintile 3	Quintile 4
Summary Stats	Min Primary Home Eq. in qtle	500	500	36500	67000	93145	152348
	Max Primary Home Eq. in qtle	806169	35000	65000	92023	150000	806169
	Avg. Primary Home Equity in qtle	97737	19183	51687	79539	118551	219725
	Std. Dev. Primary Home Eq. in qtle		9941	8568	6985	19113	69043
	Number of Obsns. in qtle	849	180	171	160	177	161
Market Value of Financial Wealth	DID Coefficient (dyrstate)	37003	insuff CA obsns	440716 ***	insuff CA obsns	-7508.4014	-107032 *
	Std. Error	26226		30228		85028	56270
	p-value	15.86%		<.0001		93.0%	5.92%
	% Control State Response (dyrstate/dyr)	2163%		2252%		-92%	-6074.11%
	% Intercept (dyrstate/int)	120%		3067%		8%	92.08%
Share of Safe Wealth in Financial Portfolio++	DID Coefficient (dyrstate)	-0.0212	insuff CA obsns	-0.64747 *	insuff CA obsns	-1.24189 ***	0.40608 **
	Std. Error	0.12237		0.37765		0.32627	0.18266
	p-value	86%		8.85%		0.02%	2.78%
	% Control State Response (dyrstate/dyr)	16%		153%		-621%	-269%
	% Intercept (dyrstate/int)	-3%		-64%		-371%	70%

+ Market Value of safe wealth calculated as sum of Market Value of us bonds, amount checking accounts and amount in savings accounts
++ Share of safe assets in financial portfolio is found by normalizing market value of safe wealth by mkt value of financial assets
+++ Equity in Primary home was calculated as Market Value of Primary home - Primary home Mortgage Principal outstanding
++++ Other Regressors included: After tax income, age, education level, home equity, debt/asset ratio, persons younger than 18 in household, persons older than 64 in household, family size, number of earners, gender, marital status.
Data from Consumer Expenditure Survey, Interview Files, 1988 to 1996

Table 2

Effects of 1991 California Homestead Exemption Rise from $45,000 to $75,000
By Quintiles of Debt to Asset Ratio

		Entire Sample	Quintile 0	Quintile 1	Quintile 2	Quintile 3	Quintile 4
Summary Stats	Min Debt/Asset in qtle	0	0	0.000075254	0.0049593	0.1242035	0.539088
	Max Debt/Asset in qtle	2.0528736	0	0.0047619	0.121573	0.5352615	2.0528736
	Avg. Debt/Asset in qtle	0.28490882	0	0.0017035	0.0424858	0.2923485	1.0880063
	Std. Dev. Debt/Asset in qtle		0	0.0013226	0.033067	0.1297895	0.3955982
	Number of Obsns. in qtle	740	203	92	149	148	148
Market Value of Financial Wealth	DID Coefficient (dyrstate)	37577	insuff CA data	-18466	-15626	-127172 *	89501 ***
	Std. Error	29433		43687	42627	72940	33936
	p-value	20%		67%	71%	8%	1%
	% Control State Response (dyrstate/dyr)	1525%		-111%	-125%	368%	2282.04%
	% Intercept (dyrstate/int)	114%		240%	-23%	-1100%	-516.15%
Share of Safe Wealth in Financial Portfolio++	DID Coefficient (dyrstate)	-0.00805	insuff CA data	-0.68323 *	-0.16915	0.09471	-0.12667
	Std. Error	0.1293		0.41533	0.46863	0.20127	0.25531
	p-value	95%		10%	72%	64%	62%
	% Control State Response (dyrstate/dyr)	6%		-1203%	224%	-46%	45%
	% Intercept (dyrstate/int)	-1%		-92%	-31%	12%	-9%

+ Market Value of safe wealth calculated as sum of Market Value of us bonds, amount checking accounts and amount in savings accounts
++ Share of safe assets in financial portfolio is found by normalizing market value of safe wealth by mkt value of financial assets
+++ Equity in Primary home was calculated as Market Value of Primary home - Primary home Mortgage Principal outstanding
++++ Other Regressors included: After tax income, age, education level, home equity, debt/asset ratio, persons younger than 18 in household, persons older than 64 in household, family size, number of earners, gender, marital status.
Data from Consumer Expenditure Survey, Interview Files, 1988 to 1996

Table 3

Effects of 1990 Federal Homestead Exemption Rise from $7,500 to $15,000
By Quintiles of Equity in Primary Home

		Entire Sample	Quintile 0	Quintile 1	Quintile 2	Quintile 3	Quintile 4
Summary Stats	Min Primary Home Eq. in qtle	500	500	36500	67000	93145	152348
	Max Primary Home Eq. in qtle	806169	35000	65000	92023	150000	806169
	Avg. Primary Home Equity in qtle	97736.926	19183.32	51686.76	79538.64	118550.85	219725.06
	Std. Dev. Primary Home Eq. in qtle		9940.55	8568.42	6984.84	19113.12	69043.34
	Number of Obsns. in qtle	849	180	171	160	177	161
Market Value of Financial Wealth	DID Coefficient (dyrstate)	-11867	-34684 **	-38156	80881 **	-3102.0585	-160842
	Std. Error	18437	14994	25121	38629	26009	111891
	p-value	52%	2%	13%	4%	91%	15%
	% Control State Response (dyrstate/dyr)	-55%	-153%	100%	807%	-11%	-1218.87%
	% Intercept (dyrstate/int)	-122%	294%	47%	-102%	-11%	239.51%
Share of Safe Wealth in Financial Portfolio++	DID Coefficient (dyrstate)	-0.04614	0.6377 **	0.26006	-0.87857 **	-0.30481	-0.24539
	Std. Error	0.11175	0.28109	0.21684	0.44857	0.25916	0.35823
	p-value	68%	2.47%	23%	5%	24%	49%
	% Control State Response (dyrstate/dyr)	-37%	-115%	-85%	-1642%	2307%	224%
	% Intercept (dyrstate/int)	-7%	37%	43%	-57%	188%	-38%

+ Market Value of safe wealth calculated as sum of Market Value of us bonds, amount checking accounts and amount in savings accounts
++ Share of safe assets in financial portfolio is found by normalizing market value of safe wealth by mkt value of financial assets
+++ Equity in Primary home was calculated as Market Value of Primary home - Primary home Mortgage Principal outstanding
++++ Other Regressors included: After tax income, age, education level, home equity, debt/asset ratio, persons younger than 18 in household, persons older than 64 in household, family size, number of earners, gender, marital status.
Data from Consumer Expenditure Survey, Interview Files, 1988 to 1996

Table 4

Effects of 1990 Federal Homestead Exemption Rise from $7,500 to $15,000
By Quintiles of Debt to Asset Ratio

		Entire Sample	Quintile 0	Quintile 1	Quintile 2	Quintile 3	Quintile 4
Summary Stats	Min Debt/Asset in qtle	0	0	0.000075254	0.0049593	0.1242035	0.539088
	Max Debt/Asset in qtle	2.0528736	0	0.0047619	0.121573	0.5352615	2.0528736
	Avg. Debt/Asset in qtle	0.28490882	0	0.0017035	0.0424858	0.2923485	1.0880063
	Std. Dev. Debt/Asset in qtle		0	0.0013226	0.033067	0.1297895	0.3955982
	Number of Obsns. in qtle	740	203	92	149	148	148
Market Value of Financial Wealth	DID Coefficient (dyrstate)	-6818.11066	19187	-28893	52681 *	insuff PA data	-43781
	Std. Error	20644	48039	42733	31968		45967
	p-value	74%	69%	50%	10.19%		34%
	% Control State Response (dyrstate/dyr)	-30%	68%	-123%	272%		-99.48%
	% Intercept (dyrstate/int)	130%	47%	-663%	54%		52.89%
Share of Safe Wealth in Financial Portfolio++	DID Coefficient (dyrstate)	-0.17704	-0.30768	0.09622	-0.77123 **	insuff PA data	-0.0432
	Std. Error	0.11735	0.20442	0.40819	0.34784		0.3247
	p-value	13.19%	13.41%	0.8143	2.84%		89.44%
	% Control State Response (dyrstate/dyr)	159%	286%	-213%	1106%		31%
	% Intercept (dyrstate/int)	-22%	-37%	10%	-203%		-3%

+ Market Value of safe wealth calculated as sum of Market Value of us bonds, amount checking accounts and amount in savings accounts
++ Share of safe assets in financial portfolio is found by normalizing market value of safe wealth by mkt value of financial assets
+++ Equity in Primary home was calculated as Market Value of Primary home - Primary home Mortgage Principal outstanding
++++ Other Regressors included: After tax income, age, education level, home equity, debt/asset ratio, persons younger than 18 in household, persons older than 64 in household, family size, number of earners, gender, marital status.
Data from Consumer Expenditure Survey, Interview Files, 1988 to 1996

Table 5

Effects of 1990 Colorado Homestead Exemption Rise from $40,000 to $60,000
By Quintiles of Equity in Primary Home

		Entire Sample	Quintile 0	Quintile 1	Quintile 2	Quintile 3	Quintile 4
Summary Stats	Min Primary Home Eq. in qtle	500	500	36500	67000	93145	152348
	Max Primary Home Eq. in qtle	806169	35000	65000	92023	150000	806169
	Avg. Primary Home Equity in qtle	97736.926	19183.32	51686.76	79538.64	118550.85	219725.06
	Std. Dev. Primary Home Eq. in qtle		9940.55	8568.42	6984.84	19113.12	69043.34
	Number of Obsns. in qtle	849	180	171	160	177	161
Market Value of Financial Wealth	DID Coefficient (dyrstate)	21730	insuff CO data	-150866 ***	78129 ***	insuff CO data	insuff CO data
	Std. Error	38884		50854	24918		
	p-value	58%		0.35%	0.21%		
	% Control State Response (dyrstate/dyr)	364%		-632%	1528%		
	% Intercept (dyrstate/int)	76%		251%	-177%		
Share of Safe Wealth in Financial Portfolio++	DID Coefficient (dyrstate)	0.13583	insuff CO data	0.20583	-0.20353	insuff CO data	insuff CO data
	Std. Error	0.18154		0.4116	0.29462		
	p-value	45%		62%	49%		
	% Control State Response (dyrstate/dyr)	-126%		-79%	187%		
	% Intercept (dyrstate/int)	22%		47%	-21%		

+ Market Value of safe wealth calculated as sum of Market Value of us bonds, amount checking accounts and amount in savings accounts
++ Share of safe assets in financial portfolio is found by normalizing market value of safe wealth by mkt value of financial assets
+++ Equity in Primary home was calculated as Market Value of Primary home - Primary home Mortgage Principal outstanding
++++ Other Regressors included: After tax income, age, education level, home equity, debt/asset ratio, persons younger than 18 in household, persons older than 64 in household, family size, number of earners, gender, marital status.
Data from Consumer Expenditure Survey, Interview Files, 1988 to 1996

Table 6

Effects of 1990 Colorado Homestead Exemption Rise from $40,000 to $60,000
By Quintiles of Debt to Asset Ratio

		Entire Sample	Quintile 0	Quintile 1	Quintile 2	Quintile 3	Quintile 4
Summary Stats	Min Debt/Asset in qtle	0	0	0.000075254	0.0049593	0.1242035	0.539088
	Max Debt/Asset in qtle	2.0528736	0	0.0047619	0.121573	0.5352615	2.0528736
	Avg. Debt/Asset in qtle	0.28490882	0	0.0017035	0.0424858	0.2923485	1.0880063
	Std. Dev. Debt/Asset in qtle		0	0.0013226	0.033067	0.1297895	0.3955982
	Number of Obsns. in qtle	740	203	92	149	148	148
Market Value of Financial Wealth	DID Coefficient (dyrstate)	91357 *	insuff CO data	insuff CO data	19742	insuff CO data	insuff CO data
	Std. Error	55233			37161		
	p-value	10%			59.61%		
	% Control State Response (dyrstate/dyr)	1404%			177.84%		
	% Intercept (dyrstate/int)	379%			26.47%		
Share of Safe Wealth in Financial Portfolio++	DID Coefficient (dyrstate)	-0.64934 ***	insuff CO data	insuff CO data	-0.95087 **	insuff CO data	insuff CO data
	Std. Error	0.24186			0.39243		
	p-value	1%			2%		
	% Control State Response (dyrstate/dyr)	815%			-2664%		
	% Intercept (dyrstate/int)	-86%			-202%		

+ Market Value of safe wealth calculated as sum of Market Value of us bonds, amount checking accounts and amount in savings accounts
++ Share of safe assets in financial portfolio is found by normalizing market value of safe wealth by mkt value of financial assets
+++ Equity in Primary home was calculated as Market Value of Primary home - Primary home Mortgage Principal outstanding
++++ Other Regressors included: After tax income, age, education level, home equity, debt/asset ratio, persons younger than 18 in household, persons older than 64 in household, family size, number of earners, gender, marital status.
Data from Consumer Expenditure Survey, Interview Files, 1988 to 1996

Table 7

Effects of 1990 Minnesota Homestead Exemption Cap from unlimited to $200,000
By Quintiles of Equity in Primary Home

		Entire Sample	Quintile 0	Quintile 1	Quintile 2	Quintile 3	Quintile 4
Summary Stats	Min Primary Home Eq. in qtle	500	500	36500	67000	93145	152348
	Max Primary Home Eq. in qtle	806169	35000	65000	92023	150000	806169
	Avg. Primary Home Equity in qtle	97736.926	19183.32	51686.76	79538.64	118550.85	219725.06
	Std. Dev. Primary Home Eq. in qtle		9940.55	8568.42	6984.84	19113.12	69043.34
	Number of Obsns. in qtle	849	180	171	160	177	161
Market Value of Financial Wealth	DID Coefficient (dyrstate)	257622 ***	insuff MN data	insuff MN data	insuff MN data	166260 **	insuff MN data
	Std. Error	36756				65807	
	p-value	<.0001				1.25%	
	% Control State Response (dyrstate/dyr)	2137%				355%	
	% Intercept (dyrstate/int)	1640%				98%	
Share of Safe Wealth in Financial Portfolio++	DID Coefficient (dyrstate)	0.29029	insuff MN data	insuff MN data	insuff MN data	0.55887 **	insuff MN data
	Std. Error	0.18027				0.28147	
	p-value	10.77%				4.88%	
	% Control State Response (dyrstate/dyr)	-252%				-929%	
	% Intercept (dyrstate/int)	45%				467%	

+ Market Value of safe wealth calculated as sum of Market Value of us bonds, amount checking accounts and amount in savings accounts
++ Share of safe assets in financial portfolio is found by normalizing market value of safe wealth by mkt value of financial assets
+++ Equity in Primary home was calculated as Market Value of Primary home - Primary home Mortgage Principal outstanding
++++ Other Regressors included: After tax income, age, education level, home equity, debt/asset ratio, persons younger than 18 in household, persons older than 64 in household, family size, number of earners, gender, marital status.
Data from Consumer Expenditure Survey, Interview Files, 1988 to 1996

Table 8

Effects of 1990 Minnesota Homestead Exemption Cap from unlimited to $200,000
By Quintiles of Debt to Asset Ratio

		Entire Sample	Quintile 0	Quintile 1	Quintile 2	Quintile 3	Quintile 4
Summary Stats	Min Debt/Asset in qtle	0	0	0.000075254	0.0049593	0.1242035	0.539088
	Max Debt/Asset in qtle	2.0528736	0	0.0047619	0.121573	0.5352615	2.0528736
	Avg. Debt/Asset in qtle	0.28490882	0	0.0017035	0.0424858	0.2923485	1.0880063
	Std. Dev. Debt/Asset in qtle		0	0.0013226	0.033067	0.1297895	0.3955982
	Number of Obsns. in qtle	740	203	92	149	148	148
Market Value of Financial Wealth	DID Coefficient (dyrstate)	260222	-101033	insuff MN data	insuff MN data	insuff MN data	insuff MN data
	Std. Error	40525	91570				
	p-value	<.0001	0.2713				
	% Control State Response (dyrstate/dyr)	1787%	-10.28711339				
	% Intercept (dyrstate/int)	-4165%	-1.990758803				
Share of Safe Wealth in Financial Portfolio++	DID Coefficient (dyrstate)	0.2203	0.11414	insuff MN data	insuff MN data	insuff MN data	insuff MN data
	Std. Error	0.18801	0.39345				
	p-value	0.2417	0.7721				
	% Control State Response (dyrstate/dyr)	-200%	-3.843097643				
	% Intercept (dyrstate/int)	28%	0.166239441				

+ Market Value of safe wealth calculated as sum of Market Value of us bonds, amount checking accounts and amount in savings accounts
++ Share of safe assets in financial portfolio is found by normalizing market value of safe wealth by mkt value of financial assets
+++ Equity in Primary home was calculated as Market Value of Primary home - Primary home Mortgage Principal outstanding
++++ Other Regressors included: After tax income, age, education level, home equity, debt/asset ratio, persons younger than 18 in household, persons older than 64 in household, family size, number of earners, gender, marital status.
Data from Consumer Expenditure Survey, Interview Files, 1988 to 1996

References

[1] Baird, D. G. and E. R. Morrison (2001) "Bankruptcy decision Making," University of Chicago: John M. Olin Law and Economics Working Paper, No. 126.

[2] Carroll, Christoper D. (1992), "The Buffer Stock Theory of Saving: Some Macroeconomic Evidence," Brookings Papers on Economic Activity, 2: 1992, 61-156.

[3] Carroll, Christoper D. (1997) "Buffer Stock Saving and the Life Cycle/Permanent Income Hypothesis," Quarterly Journal of Economics, Vol. 112, No. 1, pp. 1-57.

[4] Elul, R. and N. Subramanian (1999) "Forum-shopping and personal bankruptcy," Brown University Working Paper, No. 99-1.

[5] Hubbard, R. G., J. Skinner and S. P. Zeldes (1994) "Expanding the Lifecycle Model: Precautionary Saving and Public Policy," *American Economic Review* Vol. 84, No. 2, pp. 174-179.

[6] Lehnert, A. and D. Maki (2002), "Consumption, Debt and Portfolio Choice: Testing the Effect of Bankruptcy Law," Federal Reserve Working Paper.

[7] Parks, R.W. (1967), "Efficient Estimation of a System of Regression Equations when Disturbances are both Serially and Contemporaneously Correlated," *Journal of the American Statistical Association*, 62, 500-509.

[8] Pavan, Marina (2003), "Consumer Durables and Risky Borrowing: the Effects of Bankruptcy Protection," *Boston College Working Papers in Economics*, No. 573.

[9] Scott J.A. and T.C. Smith (1986), "The Effect of the Bankruptcy Reform Act of 1978 on Small Business Loan Pricing," *Journal of Financial Economics*, Vol. 16, pp. 119-140.

[10] Souleles, N. (1999) "The Response of Household Consumption to Income Tax Refunds," *American Economic Review*, Vol. 89, No. 4, pp. 947-958.

[11] White, Michelle J. (1998a) "Why It Pays to File for Bankruptcy: A Critical Look at Incentives under U.S. Bankruptcy Laws and A Proposal for Change," *University of Chicago Law Review*, 65, pp. 685-732.

[12] — (1998b) "Why Don't More Households File for Bankruptcy?," *Journal of Law, Economics and Organization* Vol. 14, Iss. 2, pp. 205-231.

[13] — (2003) "Bankruptcy and Consumer Credit in the US," UCSD Working Paper.