

FUCAPE WORKING PAPERS

How much should debtors be punished in case of default?

Aloisio Araujo (EPGE-FGV/RJ and IMPA)

Bruno Funchal (FUCAPE Business School)

No.41 / (Outubro) 2013

HOW MUCH SHOULD DEBTORS BE PUNISHED IN CASE OF DEFAULT?

Aloisio Araujo (IMPA and EPGE-FGV)

Bruno Funchal[¥] (FUCAPE Business School)

Abstract

This study investigates the relationship between debtor punishment and the development of the credit market. We empirically analyze how the level of debtor punishment relates to the credit market expansion. We find evidence that an increase in debtor punishment tends to produce a positive effect on credit markets for states with low level of punishment and a negative effect for states with high level of punishment. Hence, there is an intermediate level of debtor punishment that maximizes the size of the personal credit market. This intermediate level accounts for the need of creditors' protection to reduce moral hazard, to encourage the supply of credit, and for the need to protect borrowers from a bad state of nature.

Keywords: Credit; Bankruptcy; Regulation and Business Law; Personal Bankruptcy Law.

JEL Codes: E51; G33; K2; K35.

1 - Introduction

Each time there is a financial crisis, the debate on the possibility of debt repayment in case of bad state of nature grows. The discussion in the media points to the consequences of bankruptcy due to job losses and the difficulty for consumers to erase their debts and get a fresh-start, mainly after the 2005 Bankruptcy Reform Act.¹

However, in the recent past, the debate hinged on the importance of inducing debt repayment in order to reduce moral hazard. As an example, there was a big discussion on Personal Bankruptcy Reform or the "Bankruptcy Abuse Prevention and Consumer Act of 2005" as it is usually known, whose main goal was to stop consumers from using bankruptcy to walk away from debt they could afford to repay.

In response to the mortgage crisis, reform ideas were discussed in the House of Representatives and Senate.² The main proposal allows debtors to cram-down mortgage claims when the mortgage principal exceeds the current market value of the house, providing them with a better chance to repay their debts and have a fresh-start.^{3,4} This discussion underscores the relevance of having a balance between the opportunity for a fresh-start and their incentive to repay debts.

Several works that formalize theories on private credit show that when lenders can more easily force repayment if they are more willing to extend credit (e.g., Townsend, 1979; Aghion and Bolton, 1992; Hart and Moore, 1994; 1998). Perri (2007) illustrates the effect

¹See for example "Downturn Pushes More Toward Bankruptcy" (*The New York Times*, 04/03/2009).

²See for example "Democrats to Temper Mortgage Relief Bill", (*The Washington Post*, 03/04/2009).

³See "Sen. Durbin Makes the Case for Judicial Mortgage Modification in Chapter 13", *American Bankruptcy Institute Journal*, 2008.

⁴Under this approach, the mortgage holder obtain a new mortgage closer to the market value, with the terms, the interest and other things determined by the bankruptcy judge.

of limited enforcement of contracts. Using a simple model, the author shows that limited enforcement induces enforcement constraints but does not induce default (see Alvarez and Jermann (2000), who capture such constraint assuming that borrowers face constraints on the sales of assets). To induce default, another friction must coexist, such as incomplete markets.

Dubey, Geanakoplos and Shubik (2005) and Zame (1993) analyze this friction using a general equilibrium model. The authors approach the problem through the debtors' side, arguing that the degree of punishment of debtors in case of bankruptcy influences the amount of credit in the market. Dubey, Geanakoplos and Shubik (2005) and Zame (1993) show that in the presence of incomplete markets,⁵ assuming that certain contingencies cannot be written into contracts, the intermediate level of penalty that encourages some amount of bankruptcy provides a higher level of individual credit in the economy. Still in general equilibrium, but with complete contracting, Lilienfeld-Toal, Mookherjee and Visaria (2012) argue that stronger legal enforcement has ambiguous effect on credit, depending on the level of borrowers' wealth. The authors show empirically, using an experiment in India, that after the reform the long term borrowing increased for large borrowers and decreased for the smaller ones. Also, they observed an increase in interest rates for all borrowers.

Using the incomplete contracts setting, Gropp et al. (1997) and Bolton and Rosenthal (2002) introduce the analysis of bankruptcy law design. The first authors examine the effect

⁵The standard debt contract (non-contingent repayment of principal plus interest) that is usually offered to individuals and small businesses makes the market incomplete, since there is no contract that is offered contingent on the successful states of nature.

of bankruptcy exemptions on supply and demand for credit, while the latter authors analyze whether state-contingent moratoria enhance economic efficiency.

The economic development literature has highlighted the relationship between financial development and economic development at the macroeconomic level (e.g., King and Levine, 1993; Levine and Zervos, 1998; Levine, Loayza and Beck, 2000; Greenwood and Jovanovic, 1990; Beck, Demirgüç -Kunt and Levine, 2004). The literature on financial development showed how important the incentive to repay is for this development (e.g., La Porta et al., 1997 and 1998; Djankov et al., 2007; Araujo et al., 2012 and Coelho et al., 2012). However, in credit markets there is a trade-off between the incentive to repay debts to reduce moral hazard and the need to protect borrowers from the bad state of nature, allowing them a fresh start.

In this paper we analyze how the level of punishment of debtors affects the personal credit market development. From a policymaker perspective, it is important to understand how the degree of debtor punishment matters for individuals' debt financing and the overall credit market. To address this topic, we use the personal bankruptcy exemptions to construct a proxy of debtor punishment in case of default and analyze its effect on the personal credit market. By looking at the changes in the degree of debtor punishment (across time and states), we investigate whether and how these changes are linked with the market development.

Empirically, we run a two-way fixed effects panel regression to estimate the relationship between debtor punishment and our measure of credit market development. We use equilibrium data of loans (aggregated) and information on bankruptcy exemption in each state over the period from 1992 to 1999. We find that the relationship between debtor

punishment and the size of the credit market is not always increasing. In states with low level of punishment, there is a moral hazard benefit in increasing the punishment, which results in expansion of the credit market. However, in states with high enough levels of punishment, the benefit of moral hazard reduction is outweighed by the cost of the debtor fear to face the bad state of nature, which makes an increase in punishment reduce the volume of credit. Thus, our results suggest that the punishment applied by bankruptcy legislation should be neither so harsh that it inhibits credit demand nor so lenient that it reduces credit supply.

Although personal bankruptcy deals directly with unsecured credit, it can also affect secured credit. For example, in lenient states debtors have incentive to borrow through unsecured loans in order to reduce secured debt, converting the non-dischargeable secured debt into unsecured debt, which is dischargeable in bankruptcy. Our results show that secured debt is related to punishment in the same way as unsecured debt. On the other hand, states with weaker punishment have lower access to credit also, but in this case due to supply-side factors. The limited access to unsecured credit reduces the possibility of using this type of loan to repay secured credit. Thus, we can expect similar results from the relation between debtor punishment and secured credit. The small business credit market presents similar results.

Our paper contributes to the literature that investigates regulation and personal credit. Barth, Gotur, Neela and Yezer (1986) studied the effects of government regulation on personal loans using statewide aggregated and disaggregated data. Hynes and Posner (2002) presented in a survey discussion about the effects of creditor laws on consumer lending. Focusing on restrictions, Villegas (1990) measured the cost and benefits of

restrictions on the actions of creditors. Dick and Lehnert (2010) found that bank deregulation improves the terms of credit and increases the lending productivity. Finally Coelho, De Mello and Funchal (2012) showed that regulation that allows the use of future income as collateral expands the personal credit market. Like these studies, our paper deals with the effects of laws and regulation on personal loans.

Our paper also adds to the literature on personal bankruptcy and credit market development. In the personal bankruptcy literature, Gropp, Scholz and White (1997), using cross-sectional data on bankruptcy exemptions, studied how exemptions affect the demand and supply of credit. Wang and White (2000) theoretically investigated a reform of the U.S. personal bankruptcy law that combines Chapters 7 and 13 and solved a model for optimal bankruptcy exemption. Lin and White (2001) and Berkowitz and Hynes (1999) focused in the effects of bankruptcy exemptions on mortgage loans, finding diffuse results. While the latter authors argued that exemptions help secured creditors by making it easier for debtors to repay secured loans, the former showed that exemptions increase the chance of secured creditors' denying loans. Grant (2010) provided empirical evidence that bankruptcy exemptions act as partial insurance against income fluctuations. Han and Li (2011) studied the changes in the access to credit after bankruptcy filing. They showed that in this case, households have more limited access to unsecured loans and increased access to secured loans. Unlike these studies, in this paper we analyze the effects on demand and supply for credit in equilibrium, since exemptions affect both sides simultaneously. Also, we evidence how exemptions affect the credit market at the macro level.

Finally, concerning the studies on credit market development, La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997, 1998, henceforth LLSV) were the first to stress the important

role of legal protection of creditors in supporting this market. Djankov et al. (2007) added to LLSV by introducing the effect of information on credit markets. Also in this line, Jappelli and Pagano (2000, 2002), Pagano and Jappelli (1993) and Sapienza (2002) showed the relevance of this factor in determining credit availability. Our contributions to this literature are mainly two: first, we bring new results on how punishment to debtors as a type of creditor protection relates to financial development; second, since we do not need to make use of a specific measure of creditor protection, our results are not subject to an arbitrary index that defines the toughness or the weakness of a law.

The remainder of the article is organized as follows: section two describes the personal bankruptcy law and its potential incentives; section three presents the data; in section four we discuss the empirical approach and the results; and section five concludes.

2 - Personal Bankruptcy Law

The US Personal Bankruptcy Law has two separate procedures named Chapter 7 and Chapter 13. If debtors file for bankruptcy, creditors must go to the court to collect using one of these two options chosen by the filed debtor.⁶ Most personal debts are discharged when consumers file for bankruptcy, however mortgage and others secured debts are not discharged in bankruptcy, despite the procedure generally allows debtors to delay creditors from repossessing assets.

The main difference between these two procedures is that Chapter 7 requires assets to repay debt, while Chapter 13 requires future income to repay the debt. When debtors file under Chapter 7 of the U.S. Bankruptcy Code, they receive a discharge from unsecured personal and business debt in return for giving up assets in excess of the relevant state's bankruptcy

⁶The procedure was chose by debtors until the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005.

exemption.⁷ Creditors may not enforce claims against debtors' assets if the assets are covered by Chapter 7 bankruptcy exemption. Under Chapter 13, debtors must present a plan to use some of their future earnings to repay part or their total debt, but all their assets are exempt. Debtors generally have an incentive to choose Chapter 7 rather than Chapter 13 whenever their assets are less than their bankruptcy exemptions, because doing so allows them to avoid repaying debt from either assets or future income. Because many states' exemption levels are high relative to the assets of the typical person who files for bankruptcy, around 70 percent of all bankruptcy filings occur under Chapter 7.⁸ Even when debtors file under Chapter 13, the amount they are willing to repay is strongly affected by Chapter 7 bankruptcy exemptions. Suppose, for example, that a person with assets of \$50,000 living in a state whose exemption level is \$35,000 considers filing for bankruptcy. Because the debtor would have to give up \$15,000 in assets if he filed under Chapter 7, he would be willing to pay no more than \$15,000 (in present value) from future income if he filed under Chapter 13. As a result of this close relationship between both chapters, we ignore the distinction between them.

These features of the bankruptcy law allow debtors to pick the procedure that maximizes their gains. Since most debtors have few non-exempt assets, their gain was generally highest under Chapter 7, and around three-quarters of all bankruptcy filings were under Chapter 7.⁹ Debtors with high assets could also gain from filling under Chapter 7 if they

⁷Most states have several types of exemptions, like residence exemptions (homestead exemptions), personal property exemptions (like equity in cars, furniture, jewelry and cash) and wildcard exemptions (where the debtor chooses anything to be exempted until some fixed value). Usually, the homestead exemption is the largest and other exemptions are small.

⁸See Barron and Staten (1997).

⁹See White (2007).

convert their non-exempt assets to exempt before filing. For example, debtors might borrow on their credit cards or obtain new consumer loans in order to reduce secured credit. These transactions convert non-dischargeable secured debt into unsecured debt that is dischargeable in bankruptcy. Or debtors might sell personal property that is in excess of the personal property exemption and use the proceeds to reduce their mortgage.

Finally, we should also consider that the personal bankruptcy law also apply to small business. The reason of why the personal bankruptcy law applies to small business and not just to individuals is because when a firm is noncorporate, its debts are personal liabilities of the owner, so that lending to the firm is legally equivalent to lending to the owner. If the firm fails, the owner can file for bankruptcy and his business and unsecured personal debts will be discharged. When a firm is a corporation or other limited liability entity, limited liability implies that the owners are not legally responsible for the firm's debts. However, lenders may require, and often do, that the owners guarantee loans with some personal assets (second mortgages for example). Thus, besides personal debts, personal bankruptcy law applies to noncorporate businesses and may also apply to small corporate businesses.

3 – Data Set

Our sample contains state specific data from 1992 to 1999. Comparing states, we have 51 observations for a cross-section analysis. Since several changes happened in the levels of bankruptcy exemptions (which determine the debtors' punishment) during the period 1992-1999,¹⁰ we test the relationship between the degree of punishment and the level of personal and small business loans with a sample of 408 observations. We collected statewide data on loans from the Statistics on Banking, published by the Federal Deposit Insurance

¹⁰See Table B in the Appendix.

Corporation (FDIC).

Despite all changes at the bankruptcy exemption after 1999, our analysis is restricted to the 1992-1999 period. The reason is that FDIC loan data for U.S. States are reported by each bank with the geographic location being the bank's headquarters. Until 1999 there is no problem because the Bank Holding Company Act of 1956 prohibited bank holding companies headquartered in one state from acquiring banks in another state. However, the Gramm-Leach-Bliley Financial Services Modernization Act of November 12, 1999 allowed commercial and investment banks to consolidate, starting a big wave of mergers and acquisitions. This Act rules out the possibility of using loan data broken down by state from 2000 onward.

Our measures of personal credit market used as dependent variables are:

Unsecured Loans = the sum of credit card and personal loans¹¹ given by financial institutions to individuals;

Secured Loans = amount of real estate loans¹² given by financial institutions to individuals;

Small Business Loans less than \$100,000 = amount of loans of \$100,000 or less given by financial institutions to small businesses;

¹¹Other loans to individuals for household, family and other personal expenditures (consumer loans) including single payment, installments and all student loans. Included are loans for such purposes as: (1) purchases of private cars, pickups, household appliances, furniture, trailers, and boats; (2) home repairs or improvements (not secured by the realty); (3) educational expenses, including student loans; (4) medical expenses; (5) personal taxes; (6) vacations; (7) consolidation of personal (nonbusiness) debts; (8) purchases of real estate or mobile homes (not secured by real estate) to be used as a residence by the borrower's family; and (9) other personal expenditures.

¹²Loans secured primarily by real estate (whether originated by the bank or purchased) as evidenced by mortgages, deeds of trust, land contracts, or other instruments.

Small Business Loans between \$100,000 and \$250,000 = amount of loans between \$100,000 and \$250,000 given by financial institutions to small businesses;

Small Business Loans between \$250,000 and \$1 Million = amount of loans between \$250,000 and \$1,000,000 given by financial institutions to small businesses.

We also collected statewide data on bankruptcy exemption. It was handpicked from Elias et al. (1993, 1996, 1999, 2001, 2002, 2004, 2005 and 2006).¹³ Most states have separate exemptions for equity in homesteads, personal property like equity in motor vehicles, some amount of cash, jewels, furniture, clothing etc, and a miscellaneous category (wildcard). Some states allow debtors to choose between the state's exemption and the federal exemption. For the empirical tests we use the bigger one. Also, some states allow married couples who file for bankruptcy to raise (or double) their exemptions. Because we are working with aggregate data, we assume that co-applicants are actually married couples and we double (or otherwise raise) the exemptions in states that allow it.¹⁴ Table B in the appendix lists the homestead and the personal property exemptions in each state in 1992 and their changes until 2005.¹⁵ The table also indicates whether each state allows its residents to use federal exemptions and whether it allows married couples to double the exemption.

Based on the bankruptcy exemption information, we construct a debtor punishment variable.¹⁶ We can define the debtor protection as the sum of homestead and personal

¹³Some data was also provided by Professor Michelle White, whom we thank.

¹⁴As in Lin & White (2001) and Berkowitz & White (2004). Usually, more than 70% of debtors are married (Sullivan (1982)).

¹⁵The personal property exemption includes dollar values of wildcard exemptions, bank deposits and motor vehicles.

¹⁶The option to use this variable instead of bankruptcy exemption was made because the bankruptcy exemption itself does not uniformly affect the population. For example, the majority of the population is highly affected by exemptions from zero to \$5,000, while exemptions above \$200,000 have a marginal effect

property exemptions, that is, how much cannot be taken from the debtor in case of bankruptcy. Notice that this variable is inversely related to the penalty imposed on debtors in their state, because the higher (lower) the debtor exemption, the less (more) the creditor can seize of the debtors' assets. So this variable can be seen as the inverse of the debtor punishment. After normalizing the bankruptcy exemption by the whole period lowest level and calculating its inverse, the variable used as the debtors' penalty is a measure between 0 and 1 and is defined as the following:

$$Debtor\ Punishment = \frac{1}{Normalized\ Exemption}.$$

Table 1 presents each variable description, source and the main descriptive statistics.

Table 1: Data Description and Summary Statistics

Variable	Definition	Data base	Mean	SD
Unsecured Loans	the sum of credit card and personal loans, by state (in millions)	FDIC	14,946	23,338
Secured Loans	amount of real estate loans, by state (in millions)	FDIC	49,280	71,776
S B Loans < \$100,000	amount of loans of \$100,000 or less, by state (in millions)	FDIC	749	658
S B Loans between \$250,000 and \$100,000	amount of loans between \$100,000 and \$250,000, by state (in millions)	FDIC	2,964	2,417
S B Loans > \$250,000 and < \$1M	amount of loans between \$250,000 and \$1M, by state (in millions)	FDIC	1,638	1,559
Debtor Punishment	The inverse of normalized exemption, by state	Elias et al.	0.225	0.223

4 - Empirical Approach

To investigate the relationship between each measure of credit market development and debtor punishment, we regress the logarithm¹⁷ of each measure of private credit market

on a small share of the population. The debtors' punishment variable works to fulfill this feature.

¹⁷Because the distribution of personal and small business loans are right-skewed, we use the natural logarithm

development (personal and small business loans) on the debtor punishment variable.

To test our hypothesis, one possibility is to analyze whether differences in punishment levels across states affect the volume of credit. However, the pooled cross-section results are vulnerable to criticism because the punishment variables may be acting as proxies for non-bankruptcy variables at the state level which are omitted from the regression. The usual response to this problem has been to use panel data rather than single year cross-section data and to introduce both state and year fixed effects. Using panel data with fixed effects, the cross-section fixed effects will capture the effect of variation across states on the punishment levels, while the punishment variables themselves will capture only the effects of changes in the punishment level between 1992 and 1999. To capture the potential non-linearity, first we split our sample into terciles: low, medium and high punishment. Then, we create three dummies that are equal to one if the firm-year observation belongs to the group and zero otherwise (d_L , d_M , and d_H represent the dummy for the group with lower, medium and higher level of punishment respectively). To get the specific effect of punishment for each group we interact the punishment variable and all the controls with each dummy, and using the two-side fixed effects panel regression, we have the following model:

$$\ln(\text{Credit_Market}_{it}) = \alpha_i + \delta \cdot \text{pun}_{it} + \beta_1 \text{pun}_{it} \cdot d_L + \beta_2 \text{pun}_{it} \cdot d_M + \gamma_1 d_L + \gamma_2 d_M + \psi_t + \sum_t \psi_t d_L + \sum_t \psi_t d_M + \varepsilon_{it}, \quad (1)$$

where the differences between groups of the effect of punishment on credit market is directly given by the β estimator, and the total effect of punishment for each group is

of personal loans as the dependent variable in our specification.

given by the sum of parameters δ and β .

As an alternative model for this specification, we also ran a polynomial regression adding a second-order term for the punishment variable, as the following:

$$\ln(\text{Credit_Market}_{it}) = \alpha_i + \psi_t + \theta_1(\text{pun}_{it}) + \theta_2(\text{pun}_{it})^2 + \varepsilon_{it}. \quad (2)$$

As a result, we expected to observe a positive value for θ_1 and a negative value for θ_2 , pointing to a concave relation between the punishment variable and the credit market.

4.1 - Tests for Personal Loans

Table 2 reports the coefficient values from equations (1) and (2), aiming at explaining the relationship between individual unsecured and secured credit markets and debtor punishment. For both types of loans (unsecured and secured loans) and model specifications (model 1 and 2), the point estimator presents a nonlinear relationship between debtor punishment and the credit market development. Model 1 regressions indicate a positive value for the lower levels of punishment ($\delta + \beta_1$ positive and statistically significant) and negative for the higher levels of punishment (δ negative and statistically significant). To exemplify the effect of changes in debtor punishment has on the personal credit market, suppose that all the U.S. states decided to increase their punishment by 1%, through an reduction in the bankruptcy exemption. According to the results of model (1), such change would produce for states with higher levels of punishment a reduction of approximately 6.13% and 1.87% in the unsecured and secured loans respectively, while its effect on states with lower levels of punishment would be a increase of 6.81% and 7.44% in the unsecured and secured loans.

Table 2: The impact of Punishment on Personal Credit

This table presents the results of panel robust regressions of the unsecured credit (credit card plus credit to individuals) and secured credit (mortgage loan plus other real state loans) on Debtors' Punishment variable. P-values are reported below the estimated coefficients.

Dependent Variable:	Unsecured Credit		Secured Credit	
	Model [1]	Model [2]	Model [1]	Model [2]
Punishment*d_L	12.94***		9.31***	
	0.001		0.003	
Punishment*d_M	2.237		3.32**	
	0.369		0.024	
Punishment	-6.13***	5.01***	-1.87***	4.65***
	0.000	0.003	0.001	0.000
Punishment^2		-10.21***		-7.21***
		0.000		0.000
d_L	-2.316***		-1.66***	
	.000		0.000	
d_M	-1.462**		-1.25***	
	0.011		0.002	
$\delta + \beta_1$	6.817**		7.44**	
	0.050		0.014	
$\delta + \beta_2$	-3.893		1.452	
	0.176		0.372	
States Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Group dummies x Time FE	Yes		Yes	
Adj. R-Squared	0.89	0.89	0.93	0.94
Number of Observations	408	408	408	408

Model 2 regressions show that for both types of loans, the first coefficient is positive and the second is negative, pointing to a relationship that specifies a concave form. The optimal level of debtor punishment using the results in Table 2 varies from 0.24 (unsecured loans) to 0.32 (secured loans), in a measure between zero and one. Moreover, since the bankruptcy exemption is a function of debtor punishment, in monetary terms a personal bankruptcy law that exempts debts between \$17,187 and \$22,916 tends to maximize the development of the personal credit market. It is not optimal for the economy for punishment to be either sufficiently harsh or sufficiently lenient.

Note that as we claim, there is an intermediate level of debtors' punishment that maximizes

the level of personal credit in the economy. For higher levels of punishment (lower exemptions), the demand for credit is inhibited, since debtors fear the consequences of bankruptcy, producing an underdeveloped personal credit market. As the punishment declines, the demand for credit is encouraged due to the availability of a "new assets" with the option of no-repayment at a lower cost (bankruptcy cost), and although the terms offered by the lenders tend to worsen, the equilibrium level of credit will increase. As the punishment approaches zero, debtors' higher incentive to file for bankruptcy strategically and the lower expected recovery of creditors reduce (or even kill) the supply of credit. Therefore, there is an intermediate level that is optimal for credit market development.

4.2 - Tests for Small Business Loans

The personal bankruptcy law may also apply to small businesses instead of just to individuals. The debts of unincorporated firms are personal liabilities of the owners, so that lending to the firm is legally equivalent to lending to the owner. In such case, if the firm fails, the owner can file for bankruptcy and his unsecured business and personal debts will be discharged. Thus, we can expect the same incentive structure behind this credit market and the same relationship with the debtor punishment variable.

Table 3 shows the impact of debtor punishment on small business credit, following equations (1) and (2). As in the results for personal credit, we have a non-linear relationship between debtor punishment and the credit market development, always being positive for the lower levels of punishment ($\delta + \beta_1$ statistically significant and positive) and negative for the higher levels of punishment (δ negative and statistically significant).

To exemplify the effect that changes in debtor punishment has on the small business credit market, suppose again an increase of 1% in the level of punishment. According to the

results of model (1), such change tends to reduce the amount of all three types of loans (-4.74%, -1.87% and -3.19% for loans less than \$100,000, between \$100,000 and \$250,000 and between \$250,000 and \$1MM respectively) for states with higher levels of punishment, while the opposite effect is observed for states with lower levels of punishment (7.57%, 12.86% and 12.75% for loans in the same categories).

Table 3: The impact of Punishment on Credit to Small Business

This table presents the results of panel robust regressions of the small business credit (up to \$100,000, between \$100,000 and \$250,000 and between \$250,000 and \$1 million) on Debtors' Punishment variable. P-values are reported below the estimated coefficients.

Dependent Variable:	Loans		Loans		Loans	
	Less than 100,000		From 100,000 to 250,000		Between 250,000 and 1 Million	
	Model [1]	Model [2]	Model [1]	Model [2]	Model [1]	Model [2]
		Low		Low		Low
Punishment*d_L	12.31***		15.28***		15.94***	
	0.000		0.000		0.000	
Punishment*d_M	5.97**		0.43		-1.993	
	0.021		0.858		0.485	
Punishment	-4.74***	5.56***	-1.87***	4.07***	-3.19***	4.45***
	0.000	0.000	0.000	0.001	0.001	0.004
Punishment^2		-11.06***		-6.23***		-6.40***
		0.000		0.001		0.004
d_L	-2.29***		-1.87***		-2.05***	
	0.000		0.000		0.000	
d_M	-1.90***		-0.68*		-0.471	
	0.000		0.081		0.324	
$\delta + \beta_1$	7.57**		12.86***		12.75***	
	0.012		0.000		0.000	
$\delta + \beta_2$	1.240		-1.980		-5.180	
	0.669		0.513		0.148	
States Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Group dummies x Time FE	Yes		Yes		Yes	
Adj. R-Squared	0.95	0.96	0.95	0.95	0.94	0.95
Number of Observations	357	357	357	357	357	357

Results from Model 2 point to the same direction. For all regressions the first coefficient is positive and the second is negative, pointing to a relationship that specifies a concave form, as in personal loans case. The optimal level of debtor punishment using the results from model 2 in Table 3 varies from 0.25 (loans less than \$100,00) to 0.35 (loans between \$250,000 and \$1MM), in a measure between zero and one.

4.3 - Robustness

An important econometric question still remain: should the exemption levels be endogenous? The U.S. Congress enacted a new Bankruptcy Code in 1978, which specified uniform federal bankruptcy exemptions that were applicable all over the United States, but also allowed the states to opt out of the federal exemptions by adopting their own bankruptcy exemptions. Since the early 80s, the pattern has been that only a few states have changed their exemption levels each year, mainly to correct nominal exemption levels for inflation. From 1992 to 1999, states changed their homestead exemptions 13 times and changed their personal property exemptions 14 times. In addition, the federal bankruptcy exemption was raised in 1994 and 1998 and this effectively raised the exemption levels in six states that allow their residents to use the federal exemptions. Posner, Hynes and Malani (2001) found that the only significant correlate explaining state exemption levels in the 1990s was the state's exemption level in the 1920s. Therefore, exemption levels do not appear to be correlated with state loan market or demographic characteristics.

To be more convincing about this endogeneity, we followed the literature on endogenous policy evaluation and estimated a log-normal duration model to study whether the timing of changes in exemptions was systematically associated with observables. We ran a tobit regression of the log number of years until the first exemption change, such as real state GDP, unemployment rate, population, median income, house price index and the number of banks (all in logs). We also used the year fixed effect. The data are upper-censored at the number of years until the end of the sample. Table 4 shows that the time of exemption change was not systematically related to states' characteristics.¹⁸

¹⁸For technical details on the implementation of the duration model, see Kiefer (1988).

Table 4: Tobit Predictive Regression

This table presents the results of panel robust regressions of the unsecured credit (credit card plus credit to individuals) and secured credit (mortgage loan plus other real state loans) on Debtors' Punishment variable. P-values are reported below the estimated coefficients.

Model	Predictive Regression
Dependent Variable	Duration
Real GSP (in logs)	-0.104 0.210
Median Income (in logs)	-0.030 0.830
Population (in logs)	0.080 0.307
Unemployment (in logs)	-0.130 0.111
House Price Index	-0.002 0.830
Number of Banks (in logs)	0.042 0.11
Time Fixed Effects	yes
F-statistic	0.000
Pseudo R-Squared	0.870
Number of Observations	408

We also tested the equality of pre-treatment trends following a procedure proposed by Banerjee et al. (2002). In this procedure, we looked at whether the trend of credit variables is statistically different between the group of states that changed their exemption versus states that did not change exemptions. We ran regressions only for unsecured loans and secured loans (the personal loans is the sum of both secured and unsecured loans), using data from 1990 to 1993 (pre-treatment period), since we have no data for small business loans. The equality of pre-treatment secular trends would be rejected if the coefficient was significantly different from 0. Table 5 shows that we cannot reject the zero-null hypothesis

in any case.

Table 5: Difference Control Test

This table presents the results of pre-trend regressions of the unsecured credit, secured credit and personal credit (sum of unsecured and secured credit) on a dummy that indicates the state that changed the exemption in 1993. P-values are reported below the estimated coefficients.

Model Dependent Variable	Pre-trend Regression		
	Personal	Unsecured	Secured
Dummy_change	-0.003 0.927	-0.02 0.459	0.006 0.988
Time Fixed Effects	yes	yes	yes
F-statistic	0.000	0.000	0.000
R-Square	0.21	0.198	0.122
Number of Observations	104	156	104

5 - Conclusion

The recent debate stresses the relevancy of striking a balance between giving a fresh start when debtors default due to bad fortune and the incentives for them to repay debts.

The early literature on credit market development showed how important the incentive to repay is for this development. However, when dealing with credit markets, consideration must go to the trade-off between the incentive to repay the debt to reduce moral hazard and the need to protect borrowers from the bad state of nature, to allow a fresh-start.

To analyze this issue, we investigated empirically the effect of debtor punishment on the personal and small business credit market. We found a non-monotonic relationship between debtor punishment and credit market development. Moreover, there is an intermediate level of debtor punishment that maximizes the private credit for personal loans (unsecured and secured) and small business loans. This means that lower levels of debtor punishment (poorer creditor protection) provide an incentive for bankruptcy, which produces a negative effect on the supply of credit, since lenders' expected repayment is lower. On the other

hand, higher levels of debtor punishment (higher creditor protection) impose very harsh penalties on debtors in case of bankruptcy, inhibiting their demand for credit due to the fear of bad states of nature. Therefore, the optimal punishment level is one that allows a fresh start for debtors and a significant recovery for lenders in case of bankruptcy.

References

- Aghion, Philippe, and Bolton, P., 1992. An Incomplete Contracts Approach to Corporate Bankruptcy. *Review of Economic Studies* 59, 473-490.
- Alvarez, F. and Jermann, U., 2000. Efficiency, equilibrium, and asset pricing with risk of default. *Econometrica* 68, 775--97.
- Araujo, A., Ferreira, R. and Funchal, B., 2012. The Brazilian Bankruptcy Law Experience. *Journal of Corporate Finance*, 18(4):994-1004.
- Banerjee, A., Gertler, P. and Ghatak, M., 2002. Empowerment and Efficiency: Tenancy Reform in West Bengal, *Journal of Political Economy* 110:2, 239--280.
- Barron, J. M. and Staten, M. E., 1998. Personal Bankruptcy: A Report on Petitioners' Ability-to-Pay. Credit Research Center, Georgetown University School of Business, Unpublished working paper.
- Barth, J., Gotur, P., Neela, M. and Yezer, A. The Effect of Government Regulations of Personal Loans Markets: A Tobit Estimation on Microeconomic Model, *Journal of Finance*, 38(4): 1233-1251, 1983.
- Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine. 2004. Finance, Inequality, and Poverty: Cross-Country Evidence. University of Minnesota, Carlson School of Management. Mimeographed.

- Berkowitz, J. and Hynes, R., 1999. Bankruptcy Exemptions and the Market for Mortgage Loans. *Journal of Law and Economics*, 42(2): 809-830.
- Berkowitz, J. and White, M., 2004. Bankruptcy and Small Firms' Access to Credit, *RAND J. of Economics*, 35(1), pp. 69-84.
- Bierens, Herman J., 2002. Normal Kernel Density Estimation. Unpublished working paper.
- Bolton, P. and Rosenthal, H., 2002. Political Intervention in Debt Contracts. *Journal of Political Economy*, 110(5): 1103-1134
- Coelho, Christiano, De Mello, J. and Funchal, B., 2012. The Brazilian Payroll Lending Experiment. *The Review of Economics and Statistics*, 94(4):925-934, 2012.
- Dick, Astrid and Lehnert, A., 2010. Personal Bankruptcy and Credit Market Competition. *The Journal of Finance*, 65(2): 655-686.
- Djankov, S., Shleifer, A., McLiesh, C., 2007. Private Credit in 129 Countries", *Journal of Financial Economics*, 84(2): 299-329.
- Dubey, P., Geanakoplos, J., Shubik, M., 2005. Default and Punishment in a General Equilibrium. *Econometrica* 73, n° 1, 1-38.
- Elias, S., Renauer, A., Leonard, R., 1993. How to Declare Personal Bankruptcy. Nolo Press, 4th edition.
- Elias, S., Renauer, A., Leonard, R., 1999. How to file for Chapter 7 Bankruptcy. Nolo Press, 8th edition.
- Elias, S., Renauer, A., Leonard, R., Michon, K., 2001. How to file for Chapter 7 Bankruptcy. Nolo Press, 9th edition.
- Elias, S., Renauer, A., Leonard, R., Michon, K., 2002. How to file for Chapter 7 Bankruptcy. Nolo Press, 10th edition.

- Elias, S., Renauer, A., Leonard, R., 2005. How to file for Chapter 7 Bankruptcy. Nolo Press, 12th edition.
- Elias, S., Renauer, A., Leonard, R., 2006. How to file for Chapter 7 Bankruptcy. Nolo Press, 13th edition.
- Grant, C., 2010. Evidence on the insurance effect of bankruptcy exemptions. *Journal of Banking and Finance*, 34: 2247-2254.
- Greenwood, Jeremy, and Boyan Jovanovic. 1990. Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy*, 98(5): 1076--107.
- Gropp, R., Scholz, J. and White, M., 1997. Personal Bankruptcy and Credit Supply and Demand. *The Quarterly Journal of Economics*, 112(1): 217-251.
- Han, S. and Li, G., 2011. Household Borrowing after Personal Bankruptcy. *Journal of Money, Credit and Banking*, 43(2-3): 491--517.
- Hart, Oliver, and Moore, J., 1994. A Theory of Debt Based on the Inalienability of Human Capital. *Quarterly Journal of Economics* 109, 841-879.
- Hart, Oliver, and Moore, J., 1998. Default and Renegotiation: A Dynamic Model of Debt. *Quarterly Journal of Economics* 113, 1-42.
- Hynes, Richard and Posner, E., 2002. The Law and Economics of Consumer Finance. *American Law and Economics Review*, 4 (1): 168-207.
- Jappelli, Tullio, and Marco Pagano, 2002. Information Sharing, Lending, and Defaults: Cross-country Evidence. *Journal of Banking and Finance* 26, 2017-2045.
- Jappelli, T. and Pagano, M., 2000. Information sharing in credit markets: the European experience. Unpublished Working Paper 35. University of Salerno, Italy.

- King, Robert G., and Ross Levine. 1993. Finance, Entrepreneurship, and Growth: Theory and Evidence. *Journal of Monetary Economics* 32(3): 513--42.
- Kiefer, N., 1988. Economic Duration Data and Hazard Functions, *Journal of Economic Literature* 26, 646--679.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, Robert W., 1998. Law and Finance. *Journal of Political Economy* 106, pp. 1113-1155.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, Robert W., 1997. Legal Determinants of External Finance. *Journal of Finance* 52, pp. 1131-1150.
- Levine, Ross, Norman Loayza, and Thorsten Beck. 2000. Financial Intermediation and Growth: Causality and Causes. *Journal of Monetary Economics* 46(1): 31--77.
- Levine, Ross and Sara Zervos. Stock markets, banks, and economic growth. *The American Economic Review*, 88(3): 537-558.
- Lilienfeld-Toal, U. V., Mookherjee, D. and Visaria, S., 2012. The Distributive Impact of Reforms in Credit Enforcement: Evidence from Indian Debt Recovery Tribunals, *Econometrica* 80(2): 497-558.
- Lin, E. Y., White, M., 2001. Bankruptcy and the Market Mortgage and Home Improvement Loans. *Journal of Urban Economics* 50, pp. 138-162.
- Orzechowski, S. and Sepielli, P., 2003. Net Worth and Asset Ownership of Households: 1998 and 2000. Household Economic Studies, U.S. Census Bureau.
- Pagano, M. and Jappelli, T., 1993. Information sharing in credit markets. *Journal of Finance* 43, 1693--1718.
- Perri, F., 2008. Default and Enforcement Constraints, *The New Palgrave Dictionary of Economics*, 2nd edition, Palgrave Macmillan.

- Posner, E., Hynes, R., and Malani, A., 2001. The Political Economy of Property Exemption Laws. Working paper, University of Chicago, 2001.
- Sapienza, P., 2002. The effects of banking mergers on loan contracts. *Journal of Finance* 57: 329--368.
- Townsend, R., 1979. Optimal Contracts and Competitive Markets with Costly State Verification. *Journal of Economic Theory* 21, 1-29.
- Villegas, D., 1990. Regulation of Creditor Practices: An Evaluation of the FTC's Credit Practice Rule. *Journal of Business Economics*, 42:51-67.
- Wang, H. and White, M., 2000. An optimal personal bankruptcy procedure and proposed reforms. *Journal of Legal Studies*, 29:255-286.
- Zame, W., 1993. Efficiency and the role of default when securities markets are incomplete. *American Economic Review* 83, 1142--64.

Appendix

Table B1: Bankruptcy Exemptions, 1992

<i>State</i>	<i>Homestead</i>	<i>Personal Property</i>	<i>Federal Exemptions Allowed?</i>
Alabama	5000*	3000*	no
Alaska	54000	3000	no
Arizona	100000	1650*	no
Arkansas	unlimited	1700	yes
California	75000	2500	no
Colorado	30000*	1000	no
Connecticut	0	1900	yes
Delaware	5000*	500	no
District of Columbia	0	500	yes
Florida	unlimited	1000	no
Georgia	5000*	1400	no
Hawaii	20000*	1000	no
Idaho	50000	1500	no
Illinois	7500*	3200	no
Indiana	7500*	4000*	no
Iowa	unlimited	5100	no
Kansas	unlimited	20000	no
Kentucky	5000	3500	no
Louisiana	15000	0	no
Maine	7500*	1600*	no
Maryland	0	5500	no
Massachusetts	100000	1125	yes
Michigan	3500	1000	yes
Minnesota	unlimited	3000	yes
Mississippi	75000	10000	no
Missouri	8000	1750	no
Montana	40000	1200	no
Nebraska	10000	0	no
Nevada	95000	1500	no
New Hampshire	30000	1000	no
New Jersey	0	0	yes
New Mexico	20000*	4500	yes
New York	10000*	4900	no
North Carolina	10000*	2000	no
North Dakota	80000	1200	no
Ohio	5000	1800	no
Oklahoma	unlimited	3000	no
Oregon	15000	9400	no
Pennsylvania	0	300	yes
Rhode Island	0	0	yes
South Carolina	5,000*	1200	yes
South Dakota	unlimited	4000	no
Tennessee	7500	4000	no
Texas	unlimited	30000*	yes
Utah	8000	1500	no
Vermont	30000*	10600	yes
Virginia	5000*	2000	no
Washington	30000	2600	yes
West Virginia	7500*	2400	no
Wisconsin	40000	2200	yes
Wyoming	10000*	2000	no
Federal	7500*	1600*	

* Allows married couples to double (or increase) the exemption

Table B2: Bankruptcy Exemptions, changes after 1992

Changes in 1993	State
Homestead Exemptions	Connecticut: from 7,500 to 75,000 (joint owners may double) New México: from 20,000 to 30,000 Oregon: from 15,000 to 25,000
Personal Property exemptions	Minnesota: from 3,000 to 3,200 Missouri: from 1,750 to 2,250 Oregon: from 9,400 to 9,900
Changes in 1994	State
Homestead Exemptions	All States with federal exemptions from 7,500 to 15,000
Personal Property exemptions	from 1,600 to 3,200
Changes in 1995	State
Homestead Exemptions	Maine: from 7,500 to 12,500 Vermont: from 30,000 to 75,000
Personal Property exemptions	Maine: from 1,600 to 2,900
Changes in 1996	State
Homestead Exemptions	Minnesota: from unlimited to 200,000
Personal Property exemptions	California: from 2,500 to 4,900
Changes in 1997	State
Homestead Exemptions	Montana: from 40,000 to 60,000 Nebraska: from 10,000 to 12,500 Nevada: from 95,000 to 125,000 Utah: from 8,000 to 10,000 West Virginia: from 7,500 to 15,000
Personal Property exemptions	Nevada: from 1,500 to 4,500 Utah: from 1,500 to 2,500 West Virginia: from 2,400 to 4,000 Wyoming: from 2,000 to 2,400
Changes in 1998	State
Homestead Exemptions	All States with federal exemptions from 15,000 to 16,150 Alaska: from 54,000 to 62,000 Utah: joint owners may double
Personal Property exemptions	All States with federal exemptions from 3,200 to 3,450 Alaska: from 3,000 to 3,450 Florida: from 1,000 to 2,000 New Hampshire: from 1,000 to 5,000 South Dakota: from 4,000 to 6,000 Washington: from 2,600 to 3,500
Changes in 2000	State
Homestead Exemptions	All States with federal exemptions from 16,150 to 17,425 Alaska: from 62,000 to 250,000 Louisiana: from 15,000 to 25,000 Rhode Island: from 0 to 100,000 Utah: from 10,000 to 20,000 Washington: from 30,000 to 40,000
Personal Property exemptions	All States with federal exemptions from 3,450 to 3,700 Alaska: from 3,450 to 11,425 Colorado: from 1,000 to 3,000 Hawaii: from 1,000 to 2,575 Idaho: from 1,500 to 3,800 Minnesota: from 3,400 to 3,600 Montana: from 1,200 to 2,500 New York: from 4,900 to 7,300

Table B2: Bankruptcy Exemptions, changes after 1992 (Cont.)

Changes in 2001	State
Homestead Exemptions	Alaska: from 250,000 to 64,800 Colorado: from 30,000 to 45,000 Georgia: from 5,000 to 10,000 Massachusetts: from 100,000 to 300,000 Rhode Island: from 100,000 to 150,000 Utah: from 10,000 to 20,000 Washington: from 30,000 to 40,000 West Virginia: from 15,000 to 25,000
Personal Property exemptions	Alaska: from 11,425 to 5,280 Arizona: from 1,650 to 5,150 Georgia: from 1,400 to 3,500 (joint owners may double) plus 600 (wildcard) Rhode Island: from 0 to 10,000 Washington: from 3,500 to 4,500
Changes in 2003	State
Homestead Exemptions	All States with federal exemptions from 17,425 to 18,450 Maine: from 25,000 to 35,000 Missouri: from 8,000 to 15,000 Montana: from 60,000 to 100,000 Nevada: from 125,000 to 200,000 New Hampshire: from 30,000 to 100,000
Personal Property exemptions	All States with federal exemptions from 3,700 to 3,925 California: from 4,900 to 5,950
Changes in 2004	State
Homestead Exemptions	Alaska: from 64,800 to 67,500 Arizona: from 100,000 to 150,000 Maryland: from 5,500 to 11,000 Massachusetts: from 300,000 to 500,000 Rhode Island: from 150,000 to 200,000
Personal Property exemptions	Alaska: from 5,280 to 5,500 Missouri: from 2,250 to 4,250
Changes in 2005	State
Homestead Exemptions	Delaware: from 5,000 to 25,000 Illinois: from 7,500 to 15,000 Nevada: from 200,000 to 350,000 New York: from 10,000 to 50,000 (joint owners may not double) North Carolina: from 10,000 to 18,500 (joint owners may not double) Oregon: from 33,000 to 39,600
Personal Property exemptions	Illinois: from 3,200 to 6,400 Indiana: from 4,000 to 8,000 North Carolina: from 2,000 to 4,000 (joint owners may not double) Oregon: from 9,600 to 10,050