Quantifying the Disciplinary Effect of Collateral

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November 14, 2004

Abstract

Previous literature suggests (but does not test) that bankruptcy law affects default hazard. When bankruptcy law diminishes the rights of creditors to seize property, the observed default risk may rise. This effect may operate via two distinct channels: (1) adverse selection: now that borrowers stand to lose less in the event of default, borrowers with riskier projects might apply; and (2) moral hazard: borrowers with the same class of project risk exert less of the effort required to maintain solvency. We construct a model to examine different reactions to higher exemptions of guaranteed borrowers vs. un-guaranteed borrowers. As shown, the response of guaranteed loans to a change in exemptions permits better isolation of the elasticity of demand with respect to bankruptcy law incentives (because the supply function is relatively constant). We empirically examine a pool of Small Business Administration guaranteed loans to estimate the elasticity of default with respect to an increase in exemptions. SBA loans also merit examination because they account for over forty percent of long term lending to small businesses. This paper examines default responses over time and three types of cross sectional identifying restrictions: (1) states–only some states are affected by certain changes in bankruptcy discharge policy; (2) business organization types–only individual proprietorships should respond; and (3) degrees of collateralization–fully collateralized loans should not be as significantly affected by exemption law. In fact, we do observe large and statistically significant within-group increases (by thirteen times) in default hazard. Further, we find strong evidence that this result primarily reflects adverse selection rather than moral hazard. Like collateral, exemptions discipline the borrower through the threat of creditor seizure of property. As such the elasticity of demand to an increase in exemptions also indicates the effect of reducing this disciplinary effect of collateral on default propensity. I conclude that adverse selection problems are real and sizable and that the potential benefits of higher exemptions and guarantees in fostering entrepreneurship should be weighed against potential misallocation of credit and a higher cost to taxpayers.

Keywords: Default probability, Bankruptcy Law, Credit Risk, Loan guarantees, Small Business Credit, Entrepreneurial finance

JEL Classification: G20, G21, G33, H81

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Acknowledgements: The author thanks Professors Charles Calomiris and Mitali Das for advice and guidance on this paper. The author also acknowledges Banclab LLC for data provision and helpful comments.

1 Introduction

Previous literature recognizes that default propensity depends on the costs of bankruptcy. These costs often depend upon a government-specified exemption level. In particular, Chapter 7 of US Bankruptcy Law permits states to set an exemption level, an asset-specific amount that borrowers may shield from creditor seizure in the event of default.[1] The relationship between bankruptcy law and default hazard is likely to affect entrepreneurship insofar as loans are granted to unincorporated businesses.[2] The desired level of exemptions is the subject of controversy. On one hand, higher bankruptcy exemptions limit the potential loss of would-be entrepreneurs and encourage formation of small businesses. On the other hand, higher exemptions may invite a riskier class of borrowers to apply for loans in the first place (adverse selection) or, if effort is costly, they may prevent borrowers, once granted loans, from exerting the effort required to maintain solvency (moral hazard).

Higher exemptions may expose the banking system to increased default risk.[3] To manage this risk, it may be useful to understand whether the added default risk is primarily due to a change in borrower behavior or to a change in the pool of applicants. If the adverse selection problem applies, it may be possible to screen for these riskier borrowers beforehand.

In gauging the effects of the exemption policy it may also be useful to separate the elasticity of demand (with respect to the incentives of exemption law) from the behavior of the supply curve. On the supply side, higher exemptions may lead to innovation in the credit market, such as reliance on home equity loans. This may limit credit access of potential entrepreneurs and might obscure the magnitude of the potential moral hazard and adverse selection effects on the demand side. This paper shows that examining the effects of exemptions on guaranteed loans effectively isolates demand elasticity.[4]

[1] In 1978, Congress adopted a uniform level of federal bankruptcy exemptions that applied to Chapter 7 bankruptcy. Under this program, debtors must surrender all their assets in excess of an asset-specific exemption level for repayment to creditors. In addition, the 1978 legislation also granted individual states leeway in two ways: 1) States have the right to set their own exemption levels and 2) States may stipulate whether bankruptcy filers in their states might choose to claim federal exemptions or if they would be confined to state levels. Several states, (e.g., Pennsylvania and New Jersey) set very low homestead exemptions, but allowed Chapter 7 filers in those states to choose to claim homestead exemptions at federal levels. Other states set unlimited homestead exemption levels.

[2] Because debts of non-corporate firms are personal liabilities of the firms' owners, small business owners may file under Chapter 7 to discharge both business and personal debt (Berkowitz and White, 1999).

[3] The US legislative system repeatedly brings into the agenda proposals to limit the home equity exemptions ("Bankruptcy Abuse and Prevention Act" (HR975)). Across Europe, banks and policy makers are also examining the effects of bankruptcy discharge and other "fresh start" policies on entrepreneurship.(European Commission project: Bankruptcy and a fresh start: stigma of failure and legal consequences of bankruptcy).

[4] The results in this paper are also relevant to the effects of collateral in general. Like collateral, exemptions

In this paper, we consider the effects of higher exemptions on a pool of loans from the SBA 7(a) guarantee program. We analyze this data set for three reasons. First, in a sample of guaranteed loans, adverse selection and moral hazard effects (on the demand side) are more apparent than supply side effects because creditors are largely protected by a guarantee that is invariant to the exemption level. Without guarantees, when exemptions rise, creditors have less access to recoveries in the event of default. As a result, absent any demand curve response, the supply curve may shift, either magnifying or attneuating the observed default response. Lower recovery rates might induce any of three bank responses. First, the bank might raise screening requirements based on lower potential for recovery. If this is the case, then the resulting default response might be artifically small due to a selection bias. Second, the bank might increase the cost of funds resulting in a riskier pool of applicants. The default rate may then rise, not because the added wealth insurance is associated with any adverse effect on borrower behavior but rather because the lower implied recovery (loss-given-default) generates another adverse selection problem. Third, the bank might favor loans/borrowers not protected by higher exemptions. For example, in the consumer credit market, lenders facing higher exemptions chose to make more home equity loans because secured debt is not covered under exemption law. Credit supply responses impede attempts to identify and measure the size of the default probability change driven purely by the borrower response to an exemption change. In the case of guaranteed loans, the bank's recovery in the event of default does not change with the exemption level. We show that this independence implies that supply effects are muted. Observable changes in default rates and loan terms for guaranteed loans stem primarily from borrower incentive effects and banks expectations of such effects. A second reason to examine guaranteed lending is that SBA guaranteed loans account for over forty percent of all long term small business lending in the U.S. and, as such, merit examination in their own right. Finally, the interaction of these two public policies (exemptions and guarantees) may expose the credit market to excessive default risk and innefficient capital allocation. The benefits from promoting entrepreneurship must thus be weighed against these potential inefficiencies and the cost to the taxpayer.

While application of exemption policy has been thought to harm small businesses more than proportionately, the results that follow show that this does not necessarily hold for guaranteed

discipline the borrower through the threat of creditor seizure of property. As such the elasticity of demand to an increase in exemptions also indicates the effect of lowering disciplinary effect of collateral on default propensity.

borrowers. Because this group comprises a large share of all long term lending to small businesses, this finding is critical to any interpretation of the effect of bankruptcy discharge on entrepreneurship. Moreover, if banks face the same budget constraint in disbursing loans to guaranteed and non-guaranteed borrowers, the results suggest a potential crowding out effect, supporting the results of Gale (1988) that subsidized credit market interventions may crowd out non-subsidized borrowers in favor of their subsidized counterparts. [5] Because the default rate of subsidized borrowers is shown to rise markedly with exemptions, capital allocation may be inefficient.

The paper is divided into theoretical and empirical sections. First, a simple model derives the response of optimal default propensity, interest rate and credit market size to a change in exemption level. The work of Adler, Polak and Schwarz (1999) provides a starting point for the model. That model is extended to include a borrower participation constraint. This permits examination of both moral hazard and adverse selection effects and permits analysis of the size of the credit market.[6]. The Adler et. al model is also extended to include the case of guaranteed loans. In so doing, we demonstrate that the response of guaranteed lending to an increase in exemptions captures primarily demand elasticity and mutes the supply response. Higher exemptions are associated with leaner credit access for *unguaranteed* borrowers according to previous theoretical and empirical work. Predictions of the model developed below accord with this finding. In cases of both guaranteed and unguaranteed loans, higher exemptions lead to higher default rates and higher compensating interest rates. For unguaranteed loans, in which both the bank's recovery risk and default risk increase, the interest rate rises enough to negate the insurance benefit of exemptions and entrepreneurship (demand for loans) decreases. Instead, when loans are guaranteed, default risk rises with exemptions but the lender's recovery is bounded (at the exogenous guarantee percentage). The model predicts that interest rates rise, but not enough to dampen the large influx of new entrepreneurs encouraged by lower exemption levels to enter the market. The model implies that, if banks face a budget constraint on total funds lent, higher exemptions may raise the relative share of guaranteed borrowers in the credit market. If guaranteed sectors are less productive than unguaranteed sectors, allocation of capital may be inefficient and overall productivity may suffer.

Previous empirical work on the subject relied on cross-sectional methods based on the widely

[5]The exemption increases under scrutiny constitute an increase in subsidy to guaranteed borrowers because recovery rates fall (or do not respond) while guarantee percentages do not respond (or even rise).

[6]Adler, Polak and Schwarz (1999) consider only a moral hazard effect

varying exemption levels among states. As such, it was ill-suited to deal with unobserved heterogeneity problems. [7] To circumvent these problems, the current work uses a difference-in-differences approach to examine the effect of policy changes. Another charge leveled at cross-sectional work is that it is vulnerable to the possibility of "forum shopping"[8] in which borrowers already burdened by heavy debt choose to relocate to generous-exemption states before declaring bankruptcy, thus artificially magnifying the bankruptcy response to exemptions. Because loans are unlikely to be disbursed to debt-laden applicants, [9] this problem of forum-shopping is unlikely to contaminate the results of this paper's experiment. This paper also adds to previous empirical work on the subject by analyzing default rates. Analysis of default is undertaken with survival analysis, [10] a method that has received very little attention with respect to these questions.

To test the model's predictions, loan data from SBA 7(a) Loan Guarantee Program for five states [11] during 1988-2000 were examined. This paper attempts to circumvent empirical problems of previous work examining the effects of exemptions on small business loan behavior by considering the effect of a *change in* exemption level. In 1994 federal exemptions increased affecting two states in the six state sample. [12] Two further cross-sectional identifying restrictions are employed. First, because exemption law should impact individuals more than corporations (limited liability) or partnerships (shared penalty in the event of default), business organization type serves as an identifying restriction. That significant results are found for individuals[13] and not for partnerships and corporations strongly indicates that the effect observed is that of exemption law and not another state level effect. Second, the degree of collateralization provides another identifying restriction. The five year loans in the sample are made primarily for working capital and are fully collateralized by receivables, whereas the ten year (primarily fixed capital) and twenty-five year (real estate) loans are not. As a result, the finding that only longer term loans respond to a change in exemption level

[7] In particular, previous work was unable to disentangle effects of exemption policy from other business-friendly policies or norms (research institutes, tax incentives, lower stigma of bankruptcy, easier filing practices etc.)

[8] Elul and Subramanien, 2002

[9] Applicants must still undergo a thorough credit review process.

[10] Cox, 1972

[11] Massachusetts, New Jersey, New York, Pennsylvania and Texas

[12] During the sample period another exemption change took place. In 1993, Minnesota capped previously unlimited exemptions to $200,000. This effect is hypothesized to exert little effect on borrowers in the SBA program because the level of the home equity exemption is unlikely to bind for borrowers in this pool. Tests were conducted and, in fact, little discernable effect is found. Results are available upon request.

[13] Default rates may be as much as thirteen times higher for borrowers with access to more generous exemption levels

accords with the hypothesis that observed changes in default behavior and loan terms result from exemption policy changes.

The results further suggest that the increase in default risk is not driven by a change in individual behavior (moral hazard), but rather that a riskier type of person is induced to apply for loans (adverse selection). Banks seem to charge higher interest rates to individuals (who do default more). Recovery rates fall and guarantee percentages either do not respond or rise for intermediate term loans, indicating that the higher exemptions are also associated with a higher subsidy from government to the population targeted by the guarantee. These results point toward three potential negative effects of exemptions: investment inefficiency, financial burden on taxpayers, and ultimately lower credit access.

The paper is organized as follows. Section 2 presents the highlights of previous research in the area. Section 3 outlines the basic model of Adler, Polack and Schwartz (1999) and extends the model to include a participation constraint and loan guarantees. This section concludes by setting forth the testable hypotheses of the extended model which will be tested in the remaining sections. Section 4 presents the data and relevant summary statistics from the SBA's 7(a) loan guarantee program. Section 5 discusses the estimation procedure. Section 6 presents the results and Section 7 concludes and suggests topics for future work.

2 Related Literature

Previous literature on the effect of exemption law on entrepreneurs recognizes that while one goal of bankruptcy exemptions may be to foster entrepreneurship by providing partial wealth insurance to risk-averse borrowers, it may also have an unintended negative effect on entrepreneurship.

Higher exemptions provide insurance against very poor states thus lowering the cost of bankruptcy for borrowers. Exemptions may therefore encourage entrepreneurs to take risks (*Wealth Insurance Effects*). However, bankruptcy exemptions may increase borrowers' incentive to default or raise the incentive for riskier borrowers to seek loans(*Incentive Effects*). Anticipating this higher default risk in the presence of higher loss given default, lenders may decrease the amount of credit they extend (*Credit Access Effects*). Previous work on each of these effects is examined in this section.

2.1 Increased Wealth Insurance

Fan and White (2001) use family level panel data from Survey of Income and Program Participation to address the insurance effect of exemptions. They estimate the probability of owning a business using a random effects probit model and find that all of the exemption variables are positive and statistically significant for homeowners.

Georgellis and Wall (2002) also examine the effect of exemption level and entrepreneurship. They document a nonlinear relationship between exemption level and entrepreneurship and suggest that this relationship may be S-shaped. Entrepreneurship is increasing in exemption levels for mid-range exemptions, but decreasing on either extreme.

On the personal loan side, Gropp, Scholz and White (1997) find that greater exemptions were associated with greater demand for automobile loans, a result which would tend to support arguments that bankruptcy exemptions increase credit demand by decreasing borrower bankruptcy costs.

2.2 Incentives to Declare Bankruptcy

In the pioneering study of the impact of bankruptcy exemptions, White (1987) examines bankruptcy filing rates by county and shows that counties in higher exemption states exhibit higher filing rates. Fay, Hurst and White (2002) demonstrate that the benefit from filing (which is increasing in exemptions) is positively associated with filing rates.[14]

Fan and White (2001) examine the decision to end a business. They find that high exemption levels are associated with higher rates of business closure, but caution that additional research will be needed to determine whether exemptions produce more business distress. One gap in their research is that they do not employ data on whether this ending stemmed from default/distress or from some other reason (retirement etc). The authors acknowledge this omission and note that this tends to bias the effect of exemption variables downward leaving the direction, but not the size, of their findings robust. With the availability of data on default, the current paper is able to fill this gap and also measure the size of the effect.

One of the theoretical examinations of incentive effects is found in the Adler, Polak and Schwartz

[14] However, a caveat may apply. The benefit from filing is also increasing in the amount of debt carried. Because debt capacity is also a function of exemption levels, a simultaneity problem may have inflated this result's importance.

(1999) who develop a principal agent model in which exemptions partly insure risk-averse borrowers but also increase the borrower's incentive to default. The rudiments of the model described in this paper are most closely related to that work. The first chief departure is that the Adler et. al model does not explicitly consider a borrower participation constraint. That is, they do not allow exemptions to encourage entrepreneurship because their model lacks a channel by which exemptions can improve trade-off of borrowing relative to outside option. The model in this paper explores that extension by adding a participation constraint. The borrower must choose between a safe outside option (salaried work) or a risky entrepreneurial project that could potentially cost him/her wealth above an exogenous exemption level. As exemptions rise, the tradeoff becomes more favorable for the risky entrepreneurial project. The second departure of the model in this paper is that it explores the case of guaranteed loans and shows that, in this case, the demand side effect dominates the supply side effect.

2.3 Credit Access

With respect to small business credit access, Longhofer (1997) presents a model that predicts tighter rationing of small business credit when personal bankruptcy exemptions are higher.

Berkowitz and White (2002) turn their attention to this hypothesis in their study. Their model suggests that a moral hazard effect arises from the partial wealth insurance inherent in personal bankruptcy exemptions. Such insurance may increase the attractiveness to entrepreneurs of filing for bankruptcy. Lenders rationally anticipate this behavior and may restrict the supply of credit. The authors hypothesize that small firms' access to credit is likely to be lower in states with higher bankruptcy exemption levels. They test these predictions using the 1993 National Survey of Small Business Finance. [15] [16] For non-corporate firms, their results associate higher bankruptcy exemptions with a greater probability of being denied credit. Even when credit is granted, they find that the loan size is reduced. This paper shows that their result is undone when guaranteed loans are considered. Thus suggesting that a crowding out effect may be present. The authors also find that for corporate firms, credit availability does not appear to be influenced by bankruptcy

[15] The authors quantify credit rationing by performing a logit regression to explain their dummy variable, "discouraged/denied," which equals one if owners applied for credit but were turned down or if they didn't apply for credit because they thought they would be turned down and zero otherwise.

[16] The authors define exemptions as the sum of exemptions for homestead, personal property, cash, vehicles, and the wildcard exemption (the present work only considers homestead exemptions because they are typically the largest).

exemption size. However, corporate firms located in higher exemption states are found to pay higher interest rates. They conclude that higher exemption levels may harm small businesses more than proportionately. The results that follow show that this result does not hold for guaranteed borrowers who comprise a substantial portion of the small business credit market.

Scott and Smith (1986) argue that the 1978 adoption of the new U.S. Bankruptcy Code increased the cost of financing business loans. Using data on interest rates on small business loans, they find evidence that this cost was passed onto borrowers in the form of higher interest rates on business loans. However, their study examine only the net effect on interest rates of many changes adopted simultaneously as part of the 1978 Code, all of which applied uniformly in the U.S. They do not separate the effect of exemptions but considered the entire policy change.

On the personal bankruptcy side, Gropp, Scholz and White (1997) investigate differences in the effect of state bankruptcy exemption levels on supply of and demand for non-business (automotive) loans. Their results indicate that higher exemption levels are associated with a greater probability of denied credit applications. Additionally, they find that higher bankruptcy exemption levels tend to shift credit from poorer households to wealthier households. The moral hazard model of Adler et. al also implies that a rise in exemptions gradually pressures the poorest households out of the market. As a result, the brunt of the rationing will be borne by lower asset households.

Berkowitz and Hynes (1999) re-examine the effect of bankruptcy exemptions on credit supply and demand in the context of mortgage loans in order to distinguish between secured and unsecured debt. They show that higher homestead exemptions help rather than harm *secured* creditors and therefore increase the supply of mortgage credit. Borrowers cannot hide assets in their homes in bankruptcy proceedings under secured borrowing but can do so for unsecured borrowing. Borrowers who have access to secured credit will want to repay their mortgages when possible because default on the mortgage could lead to foreclosure on homes. The authors contend that financially distressed borrowers can file for bankruptcy, write off their unsecured (non- mortgage debts). With the funds that would have otherwise been forfeited to non-mortgage creditors, bankruptcy filers can repay their mortgages. The higher the exemption, the more of debtors' wealth is protected in bankruptcy, the more funds borrowers will have available to pay off mortgages (thus lower probability of default on mortgages) and the more the secured creditors benefit at the expense of unsecured creditors.

Lin and White (2001) extend the Berkowitz-Hynes model to incorporate the distinction between the two types of loans (secured and unsecured) and the two types of distress proceedings (bankruptcy with exemption and foreclosure). In their model, debtors make two separate decisions: whether to default on unsecured loans (file for bankruptcy) and whether to default on their mortgages. The authors show that if the transactions cost of foreclosure is higher when the debtor files for bankruptcy, (a realistic assumption because the bankruptcy proceeding delays the foreclosure) then a rise in either exemption reduces the supply of mortgage credit. This is because the mortgage lender's return falls when the debtor files for bankruptcy.

2.4 Criticism of Empirical Work on Exemptions

Earlier work was based solely on cross-sectional differences and, as such, remained vulnerable to problems of unobserved heterogeneity. For example, finding that locations with greater exemptions have higher bankruptcy rates implies higher business risk in that location. But if we could observe how a change in exemptions affects risk in that location and how it affects different classes of borrowers, we would be better able to ascertain that this risk is due to higher exemptions and not another business risk factor. Another charge leveled at previous work is that of forum-shopping (Elul and Subramanien, 2003), in which households already burdened by debt relocate to states with generous exemptions and then default. Elul and Subramanien (2003) find that, although small, this effect is significant and suggest that previous results be reinterpreted with this caution in mind. By employing differences in differences (Ashenfelter, 1978) and exploiting within variation as well as across variation, this paper is able to avoid these problems. This paper is able to make use of the rich data set by exploiting three types of identifying restrictions. First, only two states in the five state sample were affected by the 1994 change in exemptions. Second, only businesses organized as individual proprietorships should respond because partnerships may be organized so that the primary partner holds very little home equity and corporations are protected under limited liability. Finally, shorter term loans are made for working capital and are usually fully collateralized by receivables. As such these loans are likely to exhibit very little response to any change in exemption law. [17]

[17] Gale (1988) examines the role of guarantee programs in reallocating credit. He shows that while unsubsidized credit interventions are neutral, credit may be reallocated in favor of the group targeted by the guarantees if some degree of the guarantee program is subsidized (i.e., if some of the risk is borne by the guarantor, rather than actual costs being covered by lender fees). This paper complements Gale's work. Because this study finds that guarantee percentages do not decrease and that recovery rates do decrease (while participation fees did not increase with exemptions), the government is bearing most of the extra risk and in effect increasing the subsidy to the guaranteed

3 Model

The economy is comprised of a competitive lending market and a continuum of prospective borrowers, each defined by marginal cost of effort exertion, $1-\alpha$ with $\alpha \in [0,1]$. Higher α 's index higher types. In period zero, a risk neutral agent who knows the parameter α of his/her marginal cost of effort $C(\alpha, p)$ decides whether to seek a loan for $1 from lender who knows his/her type (α) and agrees to repay R. The entrepreneur optimizes effort level to increase solvency probability p . If the borrower is solvent, the entrepreneur receives y from the project, repays R to lender and retains full ownership of asset A. With probability $1-p$, the project pays off zero and the entrepreneur must forfeit all assets above the exemption level, E, to creditors. The equilibrium number of borrowers is determined by a borrower incentive compatibility constraint which states that the payoff from the venture must be at least as high as the outside option payoff W. This condition and the monotonicity of optimized venture payoff in borrower type, α, determine equilibrium credit.

The entrepreneur may influence the probability of solvency by exerting effort in period zero. This effort is costly, however, and will affect the period zero net benefit. The entrepreneur's cost from exerting effort to acheive success probability, p, is assumed to depend linearly and negatively on the agent's quality α (so that higher quality agents face a lower marginal cost of effort) and quadratically on level of effort $C(p, \alpha) = (1-\alpha)p^2$. Assuming no discounting, the borrower's program may be expressed as follows: $\underset{p}{max}\, p(y-R+A)+(1-p)E-(1-\alpha)\,p^2$.

The resulting first order condition gives the borrower reaction curve $R_b(p)$, is as follows: $R_b = y+A-E-2\,(1-\alpha)\,p$

Further, we assume that borrowers each face the same outside option payoff W representing the payoff in the alternative to entrepreneurship. Because the expected payoff to the entrepreneurial project is monotonic in α, a critical α_b, such that the expected payoff at that α_b is just equal to W, will determine the number of loans in equilibrium. Only agents with $\alpha > \alpha_b$ will find entrepreneurship to be profitable enough to apply for a loan. Therefore the amount of credit will be $1-\alpha_b$. (Figure 1)

[Figure 1 about here.]

programs. In the following, the rise in exemptions is shown to increase credit to guaranteed borrowers. Leveraging off earlier work of Berkowitz and White (2002) in which exemptions tend to lower credit access and loan size of non-guaranteed borrowers, the result of this work suggests that the case of exemption rises (a form of subsidy increase) is consistent with Gale's (1988) crowding out result.

The assumption of a competitive credit market implies that lenders must earn zero profits. Therefore, repayment (R) is set so that the expected value of the bank's payoff is equal to the amount of funds lent, normalized to \$1. If the borrower's enterprise is solvent, the lender receives the amount R. Without guarantees, if the borrower is insolvent the bank receives the amount by which the asset value exceeds the exemption level ($A - E$). With guarantees, if the borrower is insolvent, the bank receives an exogenous fraction g of the original principal.

3.1 Case 1: No Guarantees

Under a system of no guarantees, the bank's zero-profit condition is $1 = pR + (1 - p)(A - E)$. The lender's reaction curve $R_{\ell,ng}$ may be expressed as a function of borrower effort (p): $R_{\ell,ng} = \frac{1-(1-p)(A-E)}{p}$.

To determine equilibrium solvency probability, p and interest rate, R, the lender and borrower reaction curves are set equal to each other and solved.[18] The partial equilibrium situation is depicted (and contrasted with the situation for guaranteed loans) in Figure 2. As shown in the top panel of Figure 2, higher exemptions shift the lender's zero profit reaction curve inward while shifting the borrower reaction curve outward. Each shift has the effect of increasing equilibrium interest rate and decreasing solvency probability. These results are demonstrated analytically in the Appendix.

[Figure 2 about here.]

The appendix also demonstrates that the optimized borrower's payoff on each loan varies monotonically in α. Furthermore, the borrower's optimized payoff π,is *decreasing* in the level of E. Referring to figure 1, this means that the line π shifts downward. As a result, the critical $\alpha_{ng,b}$ shifts leftward with exemption rises. Because only agents with $\alpha > \alpha_{ng,b}$ seek loans, equilibrium credit should fall when exemptions rise. The prediction that the number of non-guaranteed borrowers should fall with exemptions is consistent with previous empirical studies.[19]

Proposition 1 *The Response of Un-Guaranteed Loans to a Rise in Exemptions: When exemptions rise, in an* un-guaranteed *setting, solvency probability* (p)*, interest rates* (R) *and number of borrowers* $N = 1 - \alpha_{ng,b}$ *behave as follows:* $\frac{\partial p}{\partial E} < 0$, $\frac{\partial R}{\partial E} > 0$, $\frac{\partial N}{\partial E} = \frac{\partial(1-\alpha_{ng,b})}{\partial E} < 0$. *The equilibrium*

[18] The model in this section is an extension of Adler et. al, 1999.

[19] Berkowitz and White, 2002.

risk of default rises and the equilibrium interest rate rises to capture this risk. The interest has risen enough to worsen the attractiveness of entrepreneurship (the optimal payoff) relative to the outside option. The number of applicants (and therefore the amount of funds lent) decreases with an increase in exemptions.

3.2 Case 2: Loan Guarantees

In this case, the lender's zero profit condition is expressed as $1 = pR + (1-p)g$. Under this system of fractionally guaranteed principal, the resulting lender reaction function $R_{\ell,g}$ is as follows: $R_{\ell,g} = \frac{1}{p}\left[1-(1-p)g\right]$ As above, to determine solvency probability and interest rate, p_g and R_g, the lender reaction curve for the case of guarantees is set equal to the borrower reaction curve. The lower panel in figure 2 illustrates the equilibrium solvency probability and interest rate for guaranteed lending. Notice that the lender reaction curve does not shift because the lender's recovery is invariant to the change in exemption level. Again, the number of borrowers in equilibrium is determined by the borrower incentive compatibility constraint.

$$p(y-R+A)+(1-p)E-(1-\alpha)p^2 \geq W$$

The optimized borrower payoff on each loan for each agent varies monotonically by agent type: $\frac{\partial \pi(p_g^*)}{\partial \alpha} > 0$.[20] As a result, the borrower's payoff on each loan will vary monotonically in α as shown in figure 1. In the appendix, we demonstrate that optimized borrower payoff under a system of guaranteed loans, rises with exemptions, $(\frac{\partial \pi(p_g^*)}{\partial E} > 0)$. As a result, critical $\alpha_{g,b}$ falls with exemptions and because all agents with $\alpha > \alpha_{g,b}$ choose to borrow, equilibrium credit should rise when exemptions rise.

Proposition 2 *The Response of Guaranteed Loans to a Rise in Exemptions: When exemptions rise, in a* guaranteed *setting, solvency probability* (p)*, interest rates* (R) *and number of borrowers* $N = 1-\alpha_{g,b}$ *behave as follows:* $\frac{\partial p}{\partial E} < 0$, $\frac{\partial R}{\partial E} > 0$, $\frac{\partial N}{\partial E} = \frac{\partial(1-\alpha_{g,b})}{\partial E} > 0$. *The equilibrium risk of default rises and the equilibrium interest rate rises to capture this risk. However, the interest has not risen enough to worsen the attractiveness of entrepreneurship (the optimal payoff) relative to the outside option. The number of applicants (and therefore the amount of funds lent) rises with an increase in exemptions.*

The remainder of the paper tests Proposition 2 to analyze whether the data are consistent with this simple model for loan guarantees. Borrower behavior for guaranteed loans is similar to that for non-guaranteed in that higher exemptions still reduce optimal solvency probability for each α.

[20]See appendix for proof.

Similarly, interest rates rise in response to this increased default risk. However, the interest rate rise for guaranteed loans is not as large as that for non-guaranteed as it only responds to the higher default risk and not to any increased loss given default.[21] As a result the non guaranteed credit market contracts with a rise in exemptions while the guaranteed credit market expands. In the sections that follow, we test whether the predicted rise in equilibrium credit is borne out by the data.

4 Data and Summary Statistics

The data are taken from the guaranteed loan portfolio from SBA's 7(a) Program. Specifically, we track loans originated from 1989-1997 in five states (MA, NJ, NY, PA and TX) for four years into their life ($19,715$ loans). Program restrictions are displayed in Tables 1,2 and 3.

The 1994 federal exemption increase provided a natural experiment in which to test the hypotheses. Within the sample, only filers in Pennsylvania and New Jersey were permitted to claim federal exemptions. As such, the 1994 federal exemption increase affected these two states while not affecting the other states in the sample. The above model leads to the hypothesis that these states behave differently from their peers at time of policy change. The following table presents the variables included in the sample (Table 4). To demonstrate that the analysis of this set of data, at least with respect to borrower response, is not at odds (in general) with the rest of the credit market, figure 3 compares the one-year default behavior of loans in the sample to one-year performance of various categories of loans.

[Table 1 about here.]

[Table 2 about here.]

[Table 3 about here.]

[Table 4 about here.]

[Figure 3 about here.]

[21] For non-guaranteed loans, loss given default $1 - [A - E]$ rises with exemptions while for guaranteed loans, loss given default $1 - g$ is invariant to exemptions.

5 Methodology

5.1 The Differences in Differences Approach

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 default rate 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 higher exemptions may also have other unobserved determinants (better receptiveness to products from start-ups, tax breaks that ease the cash flow burden of the entrepreneur, research facilities etc.) that promote a lower default rate. Possibly these determinants caused the states to institute the lax exemption policies in the first place. Data availability for this cross-section of states both before and after the policy change presents an opportunity to eliminate this sort of omitted variable bias for fixed effects. The following analysis relies on this fixed effects panel data model known as the difference in differences (DID) approach pioneered by Ashenfelter [1978]. These models estimate the effects of binary treatments on different individual unity by comparing outcomes before and after treatment.

The model yields predictions about an ex ante measure of risk, interest rates, an ex post measure of risk, default rates, and about the size of the credit market (corresponding to R_g, p_g, N_g[22]). The model speaks about probability of solvency. Because the tests are conducted on the default rate, the inverse of the solvency probability, the signs in the proposition are reversed: default rates are predicted to rise with exemptions. In the model we assumed for simplicity that all loans are of the same size and drew conclusions about the size of the credit market by deriving the number of loans N in equilibrium. In the real world, loans are of widely varying sizes. We therefore use loan size as a proxy for the size of the credit market. A hazard model was used (as outlined in the next subsection) to perform the difference in differences analysis. Other variables of interest include guarantee percentage and recovery.

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

$$depvar = \alpha + \beta_1 dstate + \beta_2 dyr + \beta_3 DID + \beta_4 borrower + \epsilon$$

The variable *dstate* is a dummy that indicates that the loan was originated in a treatment

[22] $N_g = 1 - \alpha^*_{g,b}$

state, regardless of whether policy was enacted or not. The variable *dyr* is a dummy that indicates whether the loan was originated after the policy took effect or was originated prior to the policy change but remained alive at the point of the change, regardless of state. The key variable, DID, is a dummy that indicates that the observation is from the treatment state and during the treatment period (the interaction of *dstate* and *dyr*). The term *borrower* represents a vector of borrower-specific attributes and macroeconomic conditions at the time the loan is originated and at the time it exits the sample. The estimated effect of the policy change is captured by the regression coefficient of DID. This effect is decomposed in the following table. Entries in the table refer to their respective coefficients in the regression.

[Table 5 about here.]

5.1.1 Survival Analysis to Model Default Response

Two characteristics of default behavior, seasonality and right censoring, lead us to use survival techniques to analyze the data. First, a seasoning effect appears to be present (Figure 4). This seaonsing effect (Figure 4) refers to the dependence of the performance of a loan portfolio on its age structure. [23] The default rate rises gradually until the second and third year and drops sharply thereafter. As a result, the responses of three year loans and five year loans are not comparable because five year defaults are generally lower than three simply due to the aging pattern of loans and not due to any policy driven effect. One solution to seasonality is to consider each age of default separately by using survival analysis with covariates that depend on the age at default.

[Figure 4 about here.]

Second, the data may be right censored. The data are sampled from 1988 until 2001. Loans originating in 2000 are not observed long enough to gauge the effect on a four year default rate. To correct for this we employ survival analysis while dropping loans that originated less than four years from the end of the observation period. Loans that did not default during the first four years of their origination, were censored and survival time was top-coded at forty eight months.

In survival analysis, the time until an event occurs is modeled as a realization of a random process. A hazard function describes the probability distribution of event times. The hazard

[23] Avery and Gordy (1996) and Jones,Lang and Nigro (2000).

function is defined as the probability of the event occurring in period t+1, given that it did not occur in period t. The Cox Hazard model assumes a parametric form for the effects of the explanatory variables but makes no assumption regarding the distribution of survival times (Cox, 1972). The Cox regression estimates a function of the following form: $\log y_i(\tau) = \lambda_0(\tau) e^{\beta_1 x_{i1}(\tau)+...+\beta_k x_{ik}(\tau)}$. In the case analyzed below the dependent variable is the hazard of default at τ months from origination interacted with the realization of a default event. The problem is solved by maximizing a partial function that constructs, for each unique event time, a term based on the probability of default at that time relative to all cases [remaining alive] at that time.[24] [25]

Within this survival analysis framework, we also include regressors to account for two further problems with default data: cohort effects and poor state realization.

Cohort effects refer to the possibility that loans originated in a given year may be riskier, on average, than others. For example, if credit is readily available in the year of disbursement, creditors may have been less selective. Without taking this into account, the post-policy default behavior may appear to deteriorate for reasons independent of policy effects. Figure 4 shows that earlier cohorts (1988, 1989, 1990) performed particularly poorly. To better measure credit market conditions at the time of loan origination, we employ the quarterly rate of change, measured at time of loan origination, of two variables: (1) net percentage of Senior Loan Officer respondents increasing spreads of small business loan rates (over banks' cost of funds) and (2)bank prime lending rate at time of loan origination. The first variable should capture any tightness in the small business lending market and the second should capture tightness in the credit market in general.

Poor state realization refers to the possibility that macroeconomic conditions are particularly bad in a certain year m years from origination of a certain cohort. In that case, the m year hazard rate for that cohort may appear particularly high even though it is not caused by the policy change. To correct for this, one option is to include the year of default as a regressor. Another option, and one that more closely proxies macroeconomic conditions is to include indicators of macroeconomic

[24] Allison (1995), pp. 141.

[25] The analysis was undertaken with the PHREG procedure in SAS. The partial likelihood function takes the following form:

$$PL = \Pi_{i=1}^{n} \left[\frac{e^{\beta x_i(\tau)}}{\sum_{j=1}^{n} \chi_{ij} e^{\beta x(\tau)}} \right] \delta_i \tag{1}$$

where $\chi_{ij} = 1 if \tau_j \geq \tau_i$ and zero otherwise. In this manner the denominator excludes those individuals who have already expereinced the event and are no longer in the risk set (Allison (1995), pp. 125.)

conditions at time of default. Two such indicators were used in this analysis: (1)the quarterly change in gross state product and (2) the quarterly change in state land values at the time of exit from sample (whether due to loan default or the acheivement of four years without default).

5.1.2 A First Pass: Looking at Averages

As a first pass in evaluating the effect of exemptions on default policy, we consider average changes in default rates before and after policy enactment. Figure 5 depicts the *change in* average default rates by cohort before and after the 1994 policy change. Each set of bars represents the change in average default rate for a given age at default. The change is decomposed for states affected and not affected by policy changes. The light bars indicate the change for the states not affected by the exemption rise (MA, NY, TX). The dark bars indicate the change for states that were affected by the change (NJ and PA). While it is clear that, on the whole, average default behavior improved, the improvement was greater for the control (light) states. To gauge the size of the effects, one may compare the difference between the treatment and control state responses as a percent of the control state response. (the distance between the dark and light bars as a percentage of the light bar). The effect seems largest for the one year default rates. This leads us to suspect that there may be a term structure effect in the default response. That is, earlier defaults may respond more than later defaults. We later test for the presence of these term structure effects and find that they are not statistically significant. However, the results that follow show that the main directional result depicted in this figure stands up to testing: default hazard is higher for loans affected by the policy.[26]

[Figure 5 about here.]

6 Results

Examination of individual effects provides a powerful test that model predictions are upheld by the data for the increase in exemption level in 1994. The relevant regressors are the differences in differences term indicating that the loan was both originated in a state affected by the policy

[26]One potential pitfall of the differences in differences approach is the possible endogeneity of the policy change. In general, however, we find it reasonable to assume that enactment of the federal policy had little to do with a particular state's behavior more than that of other states. The availability of further identifying restrictions (organization type, collateralization) also help disentangle this effect.

change and was originated in a time affected by the policy change and various interactions. The time variable component of the DID term includes two types of loans: those originated after the policy change takes effect and those originated prior to the policy change but remaining in the sample at the time of the policy change (neither maturing, defaulting nor prepaying). Within this sample we can stratify loans in two further directions: (1) Businesses organized as individual proprietorships vs. Partnerships or Corporations. Only the former should exhibit a response to exemption changes because the stipulations of the Chapter 7 bankruptcy law applies only to personal bankruptcy. Individual proprietors are often required to give personal guarantees and, as such, personal bankruptcy law may apply. (2) Collateralization: The maturity of the loans also identifies the purpose of the loan. Five year loans are made primarily for working capital and are fully collateralized by receivables, ten year loans are made for fixed capital (machinery) and twenty-five year loans are made primarily for real estate or building acquisition. Recoveries for short term loans are straightforward and need not require the personal guarantee of the borrower. Because of the lower degree of collateral is required for longer term loans or because that collateral may be less fungible, personal guarantees may be required. We expect, therefore, that the model's predictions will be upheld for loans of ten or twenty five years made to individual proprietorships in the states affected by the policy change in the time period after the policy change takes effect. Another possible explanation for the more emphatic responses of longer maturity loans is that riskier borrowers are more likely to prefer longer term loans, which allow them to avoid renegotiation. As a result, those borrowers more likely to respond to the adverse selection motive are more likely to be among the long term applicants rather than the short term applicants.

6.1 Default Hazard

If the additional insurance effects of higher bankruptcy exemptions are fully internalized, we would expect the federal exemption increase to lead to positive coefficients on the differences in differences terms. The main independent variables of interest are the differences in differences estimator and two interactions thereof. As mentioned above, this portfolio of loans exhibits the seasoning pattern exhibited by other types of debt. Worse risks fail before better risks. [27] In accordance with this behavior, one might expect that the lemons (those enterprises that would fail earlier) would

[27] Hence the banker's adage "Lemons mature faster than pearls".

exhibit a more pronounced response to exemption rises. Akin to the "liability of newness" [28]idea in the management literature which states that newer organizations are more prone to failure and as business age they become more resistant to failure, a lower cost of bankruptcy might be expected to exert differential pressure along different ages of debt. For this reason, the differences in differences estimator is interacted with the age of the loan at time of exit from the sample. Note that the reason for exit is accommodated by the Cox hazard model by incorporating an indicator variable for whether the event of default has occurred. The second interaction seeks to gauge whether the change in default behavior is primarily due to borrower moral hazard or to borrower adverse selection. If the policy change is known at the time of loan origination, any effect can be attributed to adverse selection. If, instead, a moral hazard effect is in operation, a change in borrower behavior will be observed for loans originated before the policy change is known, but remaining alive at time of policy change. This behavior should be different both with respect to default behavior prior to the change and default behavior for loans originating after the change.

Tables 6 - 9 display the results from a Cox proportional hazard model to analyze the federal exemption increase on all business organization types (table 6), individual proprietorships (table 7), partnerships (table 8) and corporations (table 9). For comparison purposes, the average default rate for each group within the first four years of life is displayed in the row entitled "% Default Events." Coefficient estimates are presented only for the independent variables of primary interest to this study: (1) DID: the differences in differences estimator, (2) DID $*\tau$: the interaction of the difference in differences estimator with age at time of exit from sample (to measure term structure effects), and (3) DID*MH: the interaction of the difference in differences estimator with a dummy indicating that the loan was originated prior to the change in policy but remained alive at the time the change took place. The MH variable is thus more likely to capture moral hazard effects than loans originated after the policy change took place.

The results in Table 6 indicate that for ten and twenty five year maturity loans to individual proprietorships, the hypothesis of higher default rates is upheld for the exemption increase. For 25 year loans, in the first column of table 6, we see that the DID estimator is associated with a coefficient of 2.57, with a standard error of 1.60 and a p-value of 10%. This coefficient estimate may be converted into a hazard ratio that measures relative propensity to default by exponentiation

[28]Stinchcombe, 1965

($e^{2.57} = 13.11$). Loans affected by the policy change are, other things equal, thirteen times more likely to default than their counterparts. To measure to term structure effects, we consider the $DID * \tau$ term, where τ measures the age of the loan at the time it exits the sample. If older loans become less likely to default, we can conclude that there is a term structure/ liability of newness effect in operation. For twenty five year loans, the $DID * \tau$ term has a coefficient of -1.30 with a standard error of 1.92 and a p-value of 50%. The negative sign indicates that the increase in default somewhat attenuates the positive sign on the DID coefficient. The default hazard increases more for earlier defaults and less for defaults made later in the life of the loan. However, that significance is low (50%). In interpreting the response of default, we may therefore safely ignore any term structure complications. Interaction of the differences in differences term with the moral hazard indicator (third row in table 6), yields a coefficient estimate of -18.02 and a large standard error of $1,811$. The MH indicator assumes a value of 1 if the policy change took effect strictly after the loan was originated but before the loan exits the sample. Because this result is so insignificant, we can conclude that most of the change in default behavior is driven by loans for which the policy change was already known at time of origination. It is therefore more likely that default risk increases as a result of an adverse selection effect rather than a moral hazard effect. This adverse selection effect is entirely borrower driven in the sense that it is not caused by higher interest rates resulting from banks' fear that lower recovery rates are imminent. Instead it shows that a riskier class of borrowers is encouraged to enter entrepreneurship.

For ten year loans to individuals (the second column in table 7), the results are similar. The DID variable is associated with a coefficient of 1.36 with a standard error of 0.71 and a p-value of 5%. The implied hazard ($e^{1.36} =$)3.92 means that, other things equal, loans affected by the policy are 3.92 times more likely to default than others. The $DID * \tau$ term that measures the presence of a term structure effect is associated with a negative coefficient (-0.48), but the significance is again low (standard error of 0.79 and p-value of 54%). Again, we conclude that term structure effects may be ignored. Finally the $DID * MH$ variable is associated with a statistically insignificant coefficient (-15.28 with a p-value of 99%) implying that most of the risk comes from adverse selection effects.

Estimates for the same independent variables for five-year loans to individuals are associated with very little statistical significance. The DID coefficient estimate is 0.13 but is associated with a p-value of (91%). The pvalues for the $DID * \tau$ and $DID * MH$ are likewise insignificant (with p-values of 79% and 97% respectively). The insignificance of the results for five year loans accords with our predictions that fully collateralized loans are less responsive to changes in exemptions.

Tables 8 and 9 show that no response is evident for businesses organized as partnerships or corporations. These (lack of) findings support the conclusion that the results are, in fact, due to exemption policy changes rather than a more general business climate effect.

[Table 6 about here.]

[Table 7 about here.]

[Table 8 about here.]

[Table 9 about here.]

[Figure 6 about here.]

6.2 Credit Access

Table 10 provides a context for the size of the credit market before and after the policy change. On average across all states, loan sizes seem to have fallen for each business organization type for five and ten year loans and to have risen for twenty-five year loans. Figure 6 displays the distribution of loan sizes before and after the 1994 policy change. The histograms confirm the general pattern of shrinking loan size for ten and five year loans and the expansion in loan size for twenty five year loans.

[Table 10 about here.]

The model above predicts that for borrowers affected by the exemption policy (10 and 25 year loans to individuals in New Jersey and Pennsylvania), the credit market should expand. We test this hypothesis by performing a difference in differences regression on the size of the loan (in thousands of dollars).

Table 11 presents the estimated response of credit access (proxied by loan size) to an increase in exemption level. Regression coefficients are reported for three independent variables: (1) the difference-in-differences estimator, (2) the interaction between the difference-in-differences estimator and a dummy for individual proprietorships and, (3) the interaction between the difference-in-differences estimator and a dummy for corporations.

The middle column of table 11 reports results for ten year loans. The interaction of the difference-in-differences coefficient with the dummy for individual proprietorships is associated with a positive coefficient (432), with a standard error of 31 and a p-value of < 0.0001. This implies that within the class of ten-year loans, loans to individual proprietorships are likely to be (432-279=) 153 thousand dollars larger than loans to others. We conclude that credit access rises for this group. Because earlier work [29] found that the size of loans to non-guaranteed borrowers decreased with exemptions, this result suggests that the share of this guaranteed population rises when exemptions rise (which is later shown to be an increase in government subsidy)[30] This is consistent with Gale (1988).

[Table 11 about here.]

6.3 Interest Rate

Table 12 presents the results for examination of the effects of exemptions on the interest rate. In order to strip away general credit market effects, the dependent variable used is the spread over bank prime lending rate. The program specifies a maturity-specific ceiling on the spread that may be charged, with higher maturities permitting higher spreads.[31] The model predicts that, because lenders anticipate that borrowers will increase their default rate in response to higher exemptions, they will increase interest rates to maintain the zero-profit condition.

As table 12 indicates, the exemption increase is associated with higher interest charges for individuals as accords with the default response. For 25 year loans, the first column in table 12, the interaction of the DID term with an individual proprietorship indicator (second row) is associated with a coefficient of 0.1872, a standard error of 0.1031 and a p-value of 7%. That the coefficient is positive indicates that higher exemptions are associated with higher interest rates. To gauge the economic importance of this effect, the average interest rate for the entire sample is also reported at the top of the table. For twenty five year loans, which have an average interest rate of 2.06%, an individual proprietorship affected by the exemption policy faces an interest rate that is 19 basis points above that of its counterparts (other things equal).

[29] Berkowitz and White, 1999.

[30] Guarantee percentages do not fall, while recovery rates do. This implies that the government is facing a higher risk of default, a lower recovery and yet the percentage to be paid does not change. Therefore, a higher exemption is equivalent to a higher subsidy.

[31] See Table 1.

The second column in table 12 displays the results for ten year loans. These loans have an average interest rate of 2.12%. The interaction between the DID term and the individual dummy (that should capture the effect of the policy change on individual proprietorships) is associated with an estimate of 0.5494, a standard error of 0.1521 and a p-value of $< 1\%$. That the estimate is positive indicates that on average an individual proprietorship impacted by the exemption increase faces an interest rate 54 basis points higher than otherwise.

The last column in table 12 shows that for five year loans, the interest rate charged individual proprietorships responds in a statistically insignificant manner to the increase in exemptions. The parameter estimate of 0.0168 is associated with a standard error of 0.1281 and a p-value of 90%. Again, the longer term loans which are less than fully collateralized, seem to respond more strongly than the fully collateralized shorter term loans, as predicted.

[Table 12 about here.]

6.4 Recovery Rates

Table 13 displays the responses of recovery rates, which are calculated as present value (discounted to time of default) of amount recovered as a percentage of outstanding principal and interest at time of default. For defaulted loans to individual proprietorships, recovery rates fell, as expected, with the exemption increase. The first column of table 13 gives the results for twenty five year loans. For this group, the average recovery percentage for the entire sample is approximately 51%. The regression results suggest that (other things equal) loans to individuals yield recoveries that are 25% less (additively) than other loans affected by the policy change and $(.21 - .25 =) - 4\%$ less than other loans. These results have a standard error of (0.12) and are significant at the 5% level. Results for ten year loans are displayed in the second column of table 13. The effect of increasing exemptions on the recovery rates for loans to individual proprietorships (as gauged by the term DID*Individual) has a coefficient of -0.17. This implies that banks recover 17% *less* on their loans to individual proprietorships affected by the policy change than to other loans affected by the policy change. Further, using the pure DID effect (row 1), we see that the estimated effect of individual proprietorships affected by the policy to all other loans (and not just those affected by policy) is even larger: recoveries are $(-0.08 - 0.17 =) - 25\%$ less than recovery rates to all other loans. Five year loan recovery rates do not respond in a significant fashion. The coefficient for the

DID*Individual term that should capture the effect of the policy on individual proprietorships is 0.16 and has a p-value of 46%. This accords with the above discussion. If these loans are fully collateralized, no incentive change applies to borrowers. As a result, banks find an increase in interest rates unnecessary.

[Table 13 about here.]

6.5 Guarantee Percentage

The model used above to motivate the empirical section of the paper assumes guarantee percentage to be exogenous. The SBA 7(a) lending program constrains the guarantee percentage to be a within a given range according to the loan size. The specific bands are displayed in table 3. It may be interesting to examine whether the guarantor is taking the increased default risk into account. In that case, for loans affected by higher exemptions, the guarantee percentage would fall.

Table 14 examines the response of guarantee percentages to detect whether the guarantor is taking the additional default and loss given default risk into account. The purpose of this regression is primarily to analyse whether the increased risk is subsidized by the government. Default risk rises and recovery falls with exemptions for long term loans to individual proprietorships. If the guarantee percentage falls, then the government is forcing the bank to hold some of this increased risk. If the guarantee percentage rises or does not respond, the guarantor is bearing all of the increased risk.

Table 14 shows that the 1994 exemption increase was associated with statistically significant changes in guarantee percentages overall and for individuals. For twenty five year maturities (first column) guarantee percentages rise slightly for the pure DID term. The coefficient for the pure DID effect is 0.22 with a standard error of 0.013 and a p-value of 9%. The response of the guarantee percentage, however, is negative for loans to individuals. The interaction between the dummy for individual proprietorships and DID yields a coefficient of -0.25 with a standard error of 0.013 and a p-value of 6%. This means that on 25 year loans to individuals, the guarantee percentage is likely to be very slightly lower $(0.022 - 0.025 =) - 0.003$ or 0.3% lower than other loans. The guarantor is thus absorbing most of the increase in risk but causing the bank to hold 0.3% more of the losses. The change in this guarantee percentage is very small, however, and unlikely to offset either the lower recoveries or the higher default risk.

For ten year loans, however, the guarantee percentage rises in a highly statistically significant fashion. The coefficinet on the DID*Individual term is 0.097 with a standard error of 0.017 and a p-value of $< .0001$. This means that individual loans affected by the policy have a guarantee percentage that is 9.7% higher than other loans affected by the policy. In comparison to all other loans (and not just those affected by the policy change), individual loans carry a ($-0.024+0.097 = 0.073$) 7.3% higher guarantee percentage. Higher default risk and lower recoveries absent a higher guarantee percentage imply that the government is bearing some of the burden of the increased exemption. These results suggest that both the government loss the and subsidy to this guarantee program increased. The latter result allows the question to fit into Gale's (1988) framework, in which he analytically derives a crowding out effect of non-targeted borrowers when intervention into credit markets targets and subsidizes a particular class of borrowers. This paper finds that higher exemptions are associated with both a higher (implicit) subsidy to guarantee program participants affected by exemption policy and with an expansion in credit with those very recipients. Earlier work [32] found that non-corporate borrowers face smaller loan sizes in states with higher exemptions(a decrease in their share of the credit market). Together with the Berkowitz and White (2002) result, the findings of this paper may suggest (but not prove) that some crowding out effect is taking place.

[Table 14 about here.]

7 Conclusions and Further Questions

This paper reopens the issue of the effects of exemptions on default. It does so in the context of loan guarantees for two main reasons: 1)Loan guarantees from the Small Business Administration's 7(a) program alone account for forty percent of all long term lending to small businesses in the U.S. Any study of the question must account for this kind of program and 2) Using loan guarantees permits isolation of demand elasticity from supply curve shifts.

The two main empirical contributions are that (1) this is the first work to examine default behavior directly, and (2) the analysis gauges effect of a *change* in homestead exemption level rather than cross-sectional differences. In this manner, the results will not be contaminated by other business-friendly norms in a state (such as research culture, lower bankruptcy stigma, smaller

[32]Berkowitz and White, 2002

tax obligations, easier filing procedures, etc.). The paper also employs business organization type and degree of collateralization as further identifying restrictions. The chief theoretical contribution of the paper is the suggestion of a crowding out effect of exemption increases in favor of guaranteed borrowers.

The paper tests the effects of exemptions on a pool of guaranteed loans. The analysis finds that exemptions and default rate are generally positively related (for the exemption increase). The empirical results indicate that lenders will face a marked rise in the default rate arising solely from the borrower response to higher exemptions. Importantly, the muting of the credit supply effects of exemptions permitted by the examination of guaranteed loans allows a clearer picture of the size of the borrower response to bankruptcy exemptions. The results attribute most of the borrower response to an adverse selection rather than a moral hazard effect.

This paper also raises two policy questions. First, if most of the increased risk is due to an adverse selection effect, is there a way to use observable characteristics of the borrowers to screen for this effect? That is, at the time of origination, were observable borrower characteristics available that could predict the change in default behavior. Does the guarantee diminish the incentives of banks to screen? Do guarantees disincentivize borrowers from signalling their quality to solve this adverse selection problem? Second, it suggests that the benefits of promoting entreprenuership should be weighed against the potential costs of inefficiency in capital allocation, increased taxpayer subsidies to the guaranteed sectors and higher default risk.

APPENDIX

The economy is comprised of a competitive lending market and a continuum of prospective borrowers, each defined by marginal cost of effort exertion, $1-\alpha$ with $\alpha \in [0,1]$. Higher α 's index higher types. In period zero, a risk neutral agent who knows the parameter α of his/her marginal cost of effort $C(\alpha,p)$ decides whether to seek a loan for \$1 from lender who knows his/her type (α) and agrees to repay R. The entrepreneur optimizes effort level to increase solvency probability p . If the borrower is solvent, the entrepreneur receives y from the project, repays R to lender and retains full ownership of asset A. With probability $1-p$, the project pays off zero and the entrepreneur must forfeit all assets above the exemption level, E, to creditors. The equilibrium number of borrowers is determined by a borrower incentive compatibility constraint which states that the payoff from the venture must be at least as high as the outside option payoff W. This condition and the monotonicity of optimized venture payoff in borrower type, α, determine equilibrium credit.

The entrepreneur may influence the probability of solvency by exerting effort in period zero. This effort is costly, however, and will affect the period zero net benefit. The entrepreneur's cost from exerting effort to acheive succes probability $C(p,\alpha) = (1-\alpha)p^2$ is assumed to depend linearly and negatively on the agent's quality α (so that higher quality agents face a lower marginal cost of effort) and quadratically on level of effort. Assuming no discounting, the borrower's program may be expressed as follows:

$$\underset{p}{max}\, p(y-R+A)+(1-p)E-(1-\alpha)\,p^2$$

Further, we assume that borrowers each face the same outside option payoff W representing the payoff in the alternative to entrepreneurship. Because the expected payoff to the entrepreneurial project is monotonic in α, a critical α_b, such that the expected payoff at that α_b is just equal to W, will determine the number of loans in equilibrium. Only agents with $\alpha > \alpha_b$ will find entrepreneurship to be profitable enough to apply for a loan. Therefore the amount of credit will be $1-\alpha_b$. (Figure 1)

For both guaranteed and unguaranteed loans the borrower's problem is the same: select solvency probability to maximize the expected payoff from the entrepreneurial project subject to the incentive compatibility constraint that the project is at least as profitable (in risk-neutral expected terms) as the outside option, which pays W. Assumptions made for tractability are:

1. The potential good state payoff to the project, y, is large.

   (a) $y > 2(1-\alpha)$

   (b) $y > 2\sqrt{(1-\alpha)(p^4(1-\alpha)+2(1-g)} + g$

2. The outside option payoff, W, lies between the best and worst optimized project payoff.

3. $g < 1 < R < y$;$E < A < 1 < R < y$ ensuring that the borrower has a reason to borrow in the first place (A¿1), that the repayment is greater than the principal of the loan, that the repayment is less than the good-state payoff of the project (borrower Individual Rationality constraint), that the guarantee percentage is less than the full loan amount, and that the exemption is less than the entire asset value. With respect to the last remark, we need only assume that the quantity the lender gains in the bad state under a system of no guarantees $(A-E)$ is not negative.

$$\underset{p}{max}\; p(y-R+A)+(1-p)E-(1-\alpha)p^2 \tag{A-1}$$

s.t.

$$p(y-R+A)+(1-p)E-(1-\alpha)p^2 \geq W \tag{A-2}$$

The resulting borrower first order condition is

$$R_b = y + A - E - 2(1-\alpha)p \tag{A-3}$$

The number of borrowers N_{ng} is set by the borrower's participation constraint $(A-2)$. First we show that the payoff to the project alone, π, is monotonically increasing in α. That is,

$$\frac{\partial \pi}{\partial \alpha} > 0$$

where

$$\pi = p(y-R+A)+(1-p)E-(1-\alpha)p^2$$

Substituting the borrower first order condition into the expression for π gives:

$$\pi = (1-\alpha)p^2 + E \tag{A-4}$$

Taking derivatives, we find that the following condition is necessary and sufficient for π to be monotonically increasing in α

$$(1-\alpha)\frac{\partial p}{\partial \alpha} > p \tag{A-5}$$

Equation (A-5) holds for both guaranteed and unguaranteed settings and will be demonstrated to hold in the sections below. Once it has been established that payoff π is monotonically increasing in α, then there exists a critical α_b^* such that borrowers with $\alpha > \alpha_b^*$ find borrowing profitable while the remainder of the population finds the outside option preferable. [33]. Since the outside option is invariant to exemption policy changes, the response of the critical α_b^* depends entirely upon the response of π to a change in exemption policy. If the payoff to the entreprenurial project, π, decreases with higher exemptions (meaning that the interest rate effect has negated all insurance benefit of exemptions), then α_b^* will shift right and fewer agents $(1-\alpha_b^*)$ will choose to borrow. If, on the other hand, π increases with exemptions (meaning that the insurance effect dominates), then α_b^* shifts left and the number of borrowers rises with exemptions.

A-1 Unguaranteed Loans

The assumption of a competitive credit market implies that lenders must earn zero profits. Therefore, repayment (R) is set so that the expected value of the bank's payoff is equal to the amount of funds lent, normalized to \$1. If the borrower's enterprise is solvent, the lender receives the amount R. If no loan guarantees are in place, if the borrower's enterprise fails and the borrower defaults, the bank receives the amount by which asset value exceeds exemption level $(A-E)$. For the case of unguaranteed loans, the lender's zero profit condition may be written as follows:

$$1 = pR + (1-p)(A-E) \tag{A-6}$$

The resulting lender reaction function is:

$$R_{\ell,ng} = \frac{1-(1-p)(A-E)}{p} \tag{A-7}$$

Equilibrium is found at the intersection of the reaction curves, $R_b = R_{\ell,ng}$

[33] we assume that W, the outside option is strictly between the lowest and highest optimized project payoffs, so that some and only some agents will choose to borrow

$$y + A - E - 2(1-\alpha)p = \frac{1 - (1-p)(A-E)}{p}$$

$$0 = 2(1-\alpha)p^2 - yp + 1 - A + E$$

Solving this quadratic equation for p and assuming that the borrower offers the contract with the higher payoff which the lender accepts because either yields a zero payoff, gives the following solution for p_{ng}:

$$p_{ng} = \frac{y + \sqrt{y^2 - 8(1-\alpha)(1-A+E)}}{4(1-\alpha)} \tag{A-8}$$

Substituting into the borrower reaction curve gives the equilibrium interest rate under a system of no guarantees:

$$R_{ng} = A - E + \frac{y - \sqrt{y^2 - 8(1-\alpha)(1-A+E)}}{2} \tag{A-9}$$

The partial equilibrium situation is depicted (and contrasted with the situation for guaranteed loans) in Figure 2. Mathematically, two solutions for p arise. However, the borrower offers only the higher solution because his payoff is better and lender is indifferent (zero profit).

A-1.1 Monotonicity of Payoff in Borrower Quality

From equation (A-5), and substituting the equilibrium p_{ng}, we calculate the left hand side as follows:

$$(1-\alpha)\frac{\partial p}{\partial \alpha} = \frac{(1-\alpha) + \frac{1-A+E}{\sqrt{y^2-8(1-\alpha)(1-A+E)}}}{4(1-\alpha)} + p \tag{A-10}$$

Because the first term is surely positive, the entire expression is surely greater than p and condition (A-5) ensuring monotonicity of π in α is satisfied.

A-1.2 Comparative Statics

As shown in the figure 2, higher exemptions shift the lender's zero profit reaction curve inward while shifting the borrower reaction curve outward. Each shift has the effect of increasing equilibrium interest rate and decreasing solvency probability. That is, $\frac{\partial p_{ng}}{\partial E} < 0$ and $\frac{\partial R_{ng}}{\partial E} > 0$.

The response of equilibrium solvency probability, for a given borrower type α, to an increase in exemption level is shown to be negative as follows:

$$\frac{\partial p_{ng}}{\partial E} = \frac{-1}{\sqrt{y^2 - 8(1-\alpha)(1-A+E)}} < 0 \tag{A-11}$$

Examination of the interest rate response is

$$\frac{\partial R_{ng}}{\partial E} = \frac{2(1-\alpha)}{\sqrt{y^2 - 8(1-\alpha)(1-A+E)}} - 1 \tag{A-12}$$

Because $p_n g \leq 1$, we know that

$$\sqrt{y^2 - 8(1-\alpha)(1-A+E)} < 4(1-\alpha) - y < 2(1-\alpha)$$

where the last inequality follows from assumption 1a. As a result

$$\frac{\partial R_{ng}}{\partial E} > 0 \tag{A-13}$$

The borrower's optimized payoff π, defined by

$$\pi = p_{ng}(y - R + A) + (1 - p_{ng})E - (1-\alpha)p_{ng}^2$$

is *decreasing* in the level of E. Referring to figure 1, this means that the line π shifts downward. As a result, the critical $\alpha_{ng,b}$ shifts leftward with exemption rises. Because only agents with $\alpha > \alpha_{ng,b}$ seek loans, equilibrium credit should fall when exemptions rise. The prediction that the number of non-guaranteed borrowers should fall with exemptions is consistent with previous empirical studies.[34]

To find the response of equilibrium number of borrowers to a rise in exemptions, we consider the response of π to a rise in E.

$$\frac{\partial \pi_{ng}}{\partial E} = \frac{1}{2}p\frac{-4(1-\alpha)}{\sqrt{y^2 - 8(1-\alpha)(1-A+E)}} + 1 \tag{A-14}$$

To prove that this expression is negative, assume the contrary and show that a contradiction is implied.

$$1 - \frac{p}{2}\frac{4(1-\alpha)}{\sqrt{y^2 - 8(1-\alpha)(1-A+E)}} \geq 0$$

$$2 \geq \frac{4p(1-\alpha)}{\sqrt{y^2 - 8(1-\alpha)(1-A+E)}}$$

$$\sqrt{y^2 - 8(1-\alpha)(1-A+E)} \geq 2p(1-\alpha)$$

Substituting for $p_n g$,

$$\sqrt{y^2 - 8(1-\alpha)(1-A+E)} \geq y + \sqrt{y^2 - 8(1-\alpha)(1-A+E)}$$

[34]Berkowitz and White, 2002.

This is a contradiction since $y > 0$ by assumption

Therefore $\frac{\partial \pi_{ng}}{\partial E} < 0$ and α_b^* will shift rightward with a rise in exemptions, decreasing the equilibrium number of borrowers.

Proposition 1: When exemptions rise, in a *non-guaranteed* setting, solvency probability (p), interest rates (R) and number of borrowers $N = 1 - \alpha_{ng,b}$ behave as follows: $\frac{\partial p}{\partial E} < 0$, $\frac{\partial R}{\partial E} > 0$, $\frac{\partial N}{\partial E} = \frac{\partial(1-\alpha_{ng,b})}{\partial E} < 0$.

A-2 Guaranteed Loans

Under a system of loan guarantees, fashioned after the SBA 7(a) program, in the event of default the lender receives a pre-set fraction g of the original principal, \$1. In this case, the lender's zero profit condition assumes the following form:

$$1 = pR + (1-p)g.$$

Under this system of fractionally guaranteed principal, the resulting lender reaction function $R_{\ell,g}$ is as follows:

$$R_{\ell,g} = \frac{1-(1-p)g}{p} \tag{A-15}$$

Equlibrium is found at the intersection of the reaction curves, $R_b = R_{\ell,g}$

$$y + A - E - 2(1-\alpha)p = \frac{1-(1-p)g}{p}$$

$$0 = 2(1-\alpha)p^2 - (y - g + A - E)p + 1 - g$$

Solving this quadratic equation for p and assuming that the borrower offers the contract with the higher payoff which the lender accepts because either yields a zero payoff, gives the following solution for p_g:

$$p_g = \frac{(y - g + A - E) + \sqrt{(y - g + A_E)^2 - 8(1-\alpha)(1-g)}}{4(1-\alpha)} \tag{A-16}$$

Mathematically, two solutions for p_g arise. Again, the borrower offers only the higher solution because his payoff is better and lender is indifferent (zero profit).

Substituting into the borrower reaction curve gives the equilibrium interest rate under a system of guarantees:

$$R_g = \frac{y + g + A - E - \sqrt{(y - g + A - E)^2 - 8(1 - \alpha)(1 - g)}}{2} \tag{A-17}$$

A-2.1 Monotonicity of Payoff in Borrower Quality

From equation (A-5), and substituting the equilibrium p_g, we calculate the left hand side as follows:

$$(1 - \alpha)\frac{\partial p}{\partial \alpha} = \frac{(1 - \alpha) + \frac{1-g}{\sqrt{(y-g+A-E)^2-8(1-\alpha)(1-g)}}}{4(1 - \alpha)} + p \tag{A-18}$$

Because the first term is surely positive, the entire expression is surely greater than p and condition (A-5) ensuring monotonicity of π in α is satisfied for the case of guaranteed loans.

A-2.2 Comparative Statics

These equilibrium values behave as follows with an increase in the level of exemptions: $\frac{\partial p_g}{\partial E} < 0, \frac{\partial R_{\ell,g}}{\partial E} > 0$

The response of equilibrium solvency probability, for a given borrower type α, to an increase in exemption level is shown to be negative as follows:

$$\frac{\partial p_g}{\partial E} = \frac{-\sqrt{(y - g + A - E)^2 - 8(1 - \alpha)(1 - g)} - (y - g + A - E)}{4(1 - \alpha)\sqrt{(y - g + A - E)^2 - 8(1 - \alpha)(1 - g)}} < 0 \tag{A-19}$$

Examination of the interest rate response is

$$\frac{\partial R_g}{\partial E} = \frac{2(y - g + A - E) - \sqrt{(y - g + A - E)^2 - 8(1 - \alpha)(1 - g)}}{2\sqrt{(y - g + A - E)^2 - 8(1 - \alpha)(1 - g)}} \tag{A-20}$$

The numerator of this expression is surely greater than the discarded solution for p_g. This equilibrium was ruled out because we assumed that borrowers could offer only the higher p, R contract. However, the lower p_g solution must still be greater than 0 as it represents a probability. Therefore the numerator of $\frac{\partial R_g}{\partial E}$ must also exceed 0.

As a result

$$\frac{\partial R_g}{\partial E} > 0 \tag{A-21}$$

The number of borrowers in equilibrium is determined by the borrower incentive compatibility constraint.

$$p(y - R + A) + (1 - p)E - (1 - \alpha)p^2 \geq W$$

The optimized borrower payoff on each loan for each agent varies monotonically by agent type: $\frac{\partial\pi(p_g^*)}{\partial\alpha} > 0$.

As a result, the borrower's payoff on each loan will vary monotonically in α as shown in figure 1. The optimized borrower payoff under a system of guaranteed loans, rises with exemptions, $(\frac{\partial\pi(p_g^*)}{\partial E} > 0)$.

$$\frac{\partial\pi_g}{\partial E} = -\frac{1}{2}\left(1 + \frac{y - g + A - E}{\sqrt{(y - g + A - E)^2 - 8(1-\alpha)(1-g)}}\right) + 1 \tag{A-22}$$

To prove that this expression is positive, assume the contrary and show that a contradiction is implied.

$$-\frac{1}{2}\left(1 + \frac{y - g + A - E}{\sqrt{(y - g + A - E)^2 - 8(1-\alpha)(1-g)}}\right) + 1 \leq 0$$

$$2 \leq p\left(1 + \frac{y - g + A - E}{\sqrt{(y - g + A - E)^2 - 8(1-\alpha)(1-g)}}\right)$$

$$2 \leq p\left(1 + \frac{y - g + A - E}{4(1-\alpha)p - (y - g + A - E)}\right)$$

$$2 \leq \frac{p^2}{p - \frac{y-g+A-E}{4(1-\alpha)}}$$

$$2 \leq \frac{p^2}{\frac{\sqrt{(y-g+A-E)^2-8(1-\alpha)(1-g)}}{4(1-\alpha)}}$$

$$\sqrt{(y - g + A - E)^2 - 8(1-\alpha)(1-g)} \leq 2p^2(1-\alpha)$$

$$(y - g + A - E)^2 - 8(1-\alpha)(1-g) \leq (2p^2(1-\alpha))^2$$

Because we have assumed y to be very large, (in particular see assumption 1b), the last line is a contradiction.

Therefore $\frac{\partial\pi_g}{\partial E} > 0$ and α_b^* will shift leftward with a rise in exemptions, increasing the equilibrium number of borrowers.

As a result, critical $\alpha_{g,b}$ falls with exemptions and because all agents with $\alpha > \alpha_{g,b}$ choose to borrow, equilibrium credit should rise when exemptions rise.

Proposition 2: When exemptions rise, in a *guaranteed* setting, solvency probability (p), interest rates (R) and number of borrowers $N = 1 - \alpha_{g,b}$ behave as follows: $\frac{\partial p}{\partial E} < 0$, $\frac{\partial R}{\partial E} > 0$, $\frac{\partial N}{\partial E} = \frac{\partial(1-\alpha_{g,b})}{\partial E} > 0$.

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List of Figures

Figure 1

Determination of Number of Borrowers

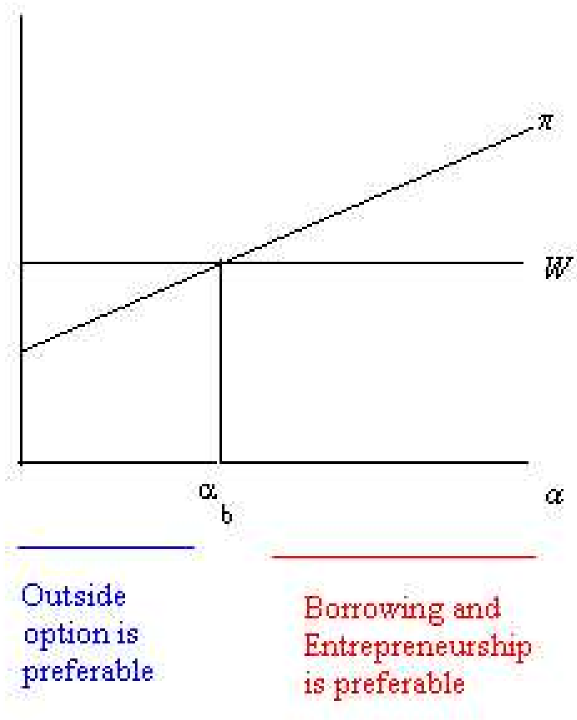
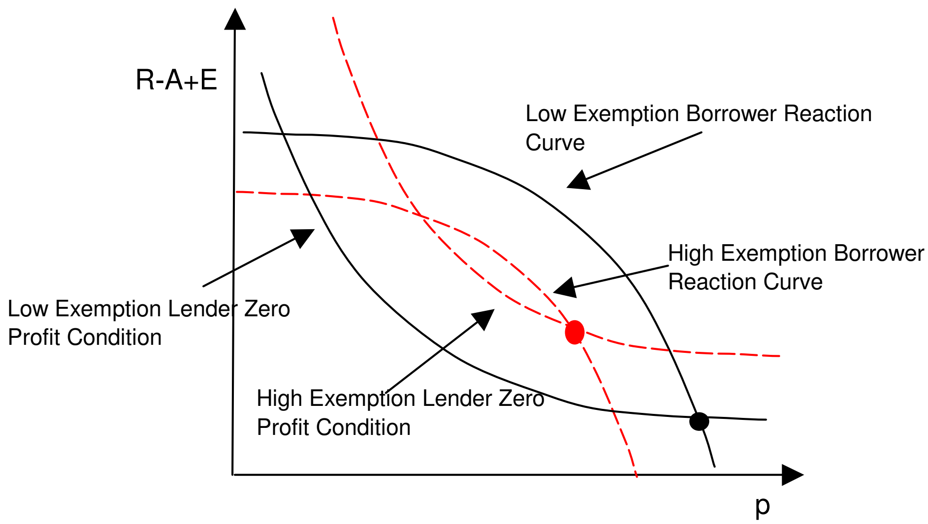
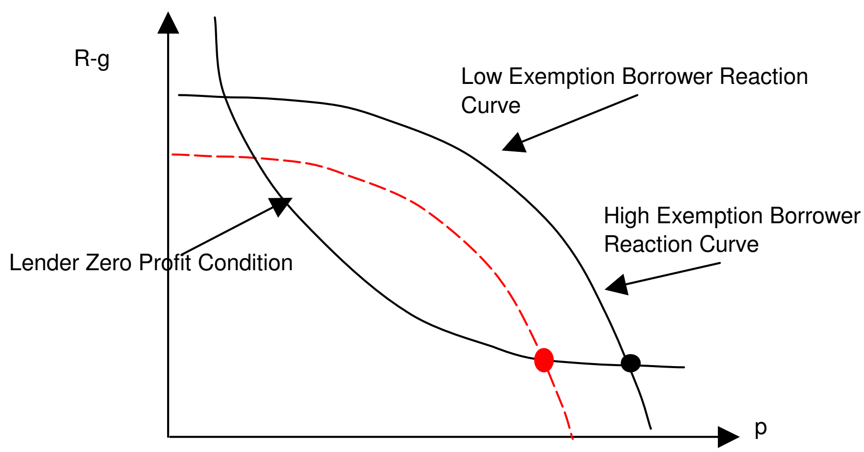


FIGURE 2: Partial Equilibrium



An Increase in Exemptions for non-guaranteed loans (Adler, et al)



An Increase in Exemptions for guaranteed loans

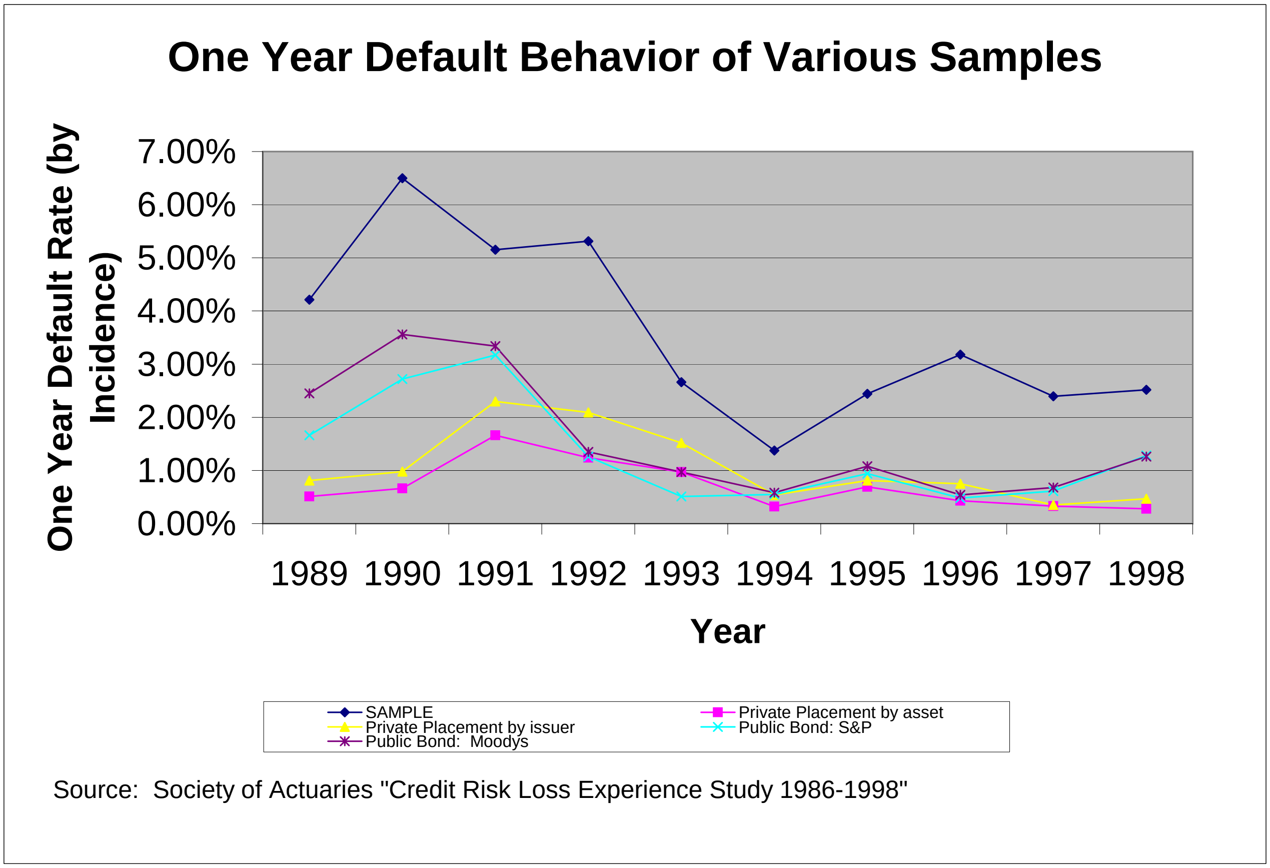


Figure 3: A comparison of 1 year default rates

Figure 4: Seasoning and Cohort Effects

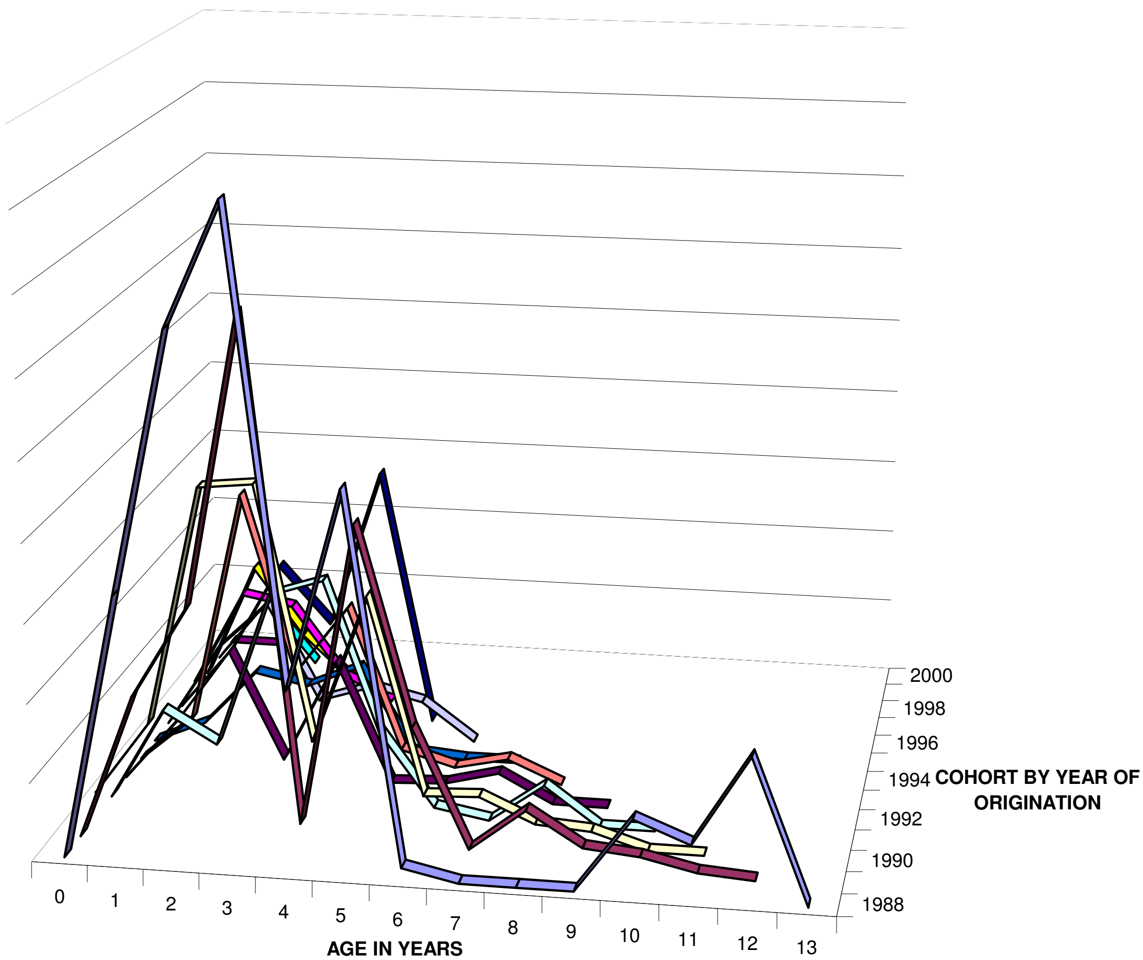
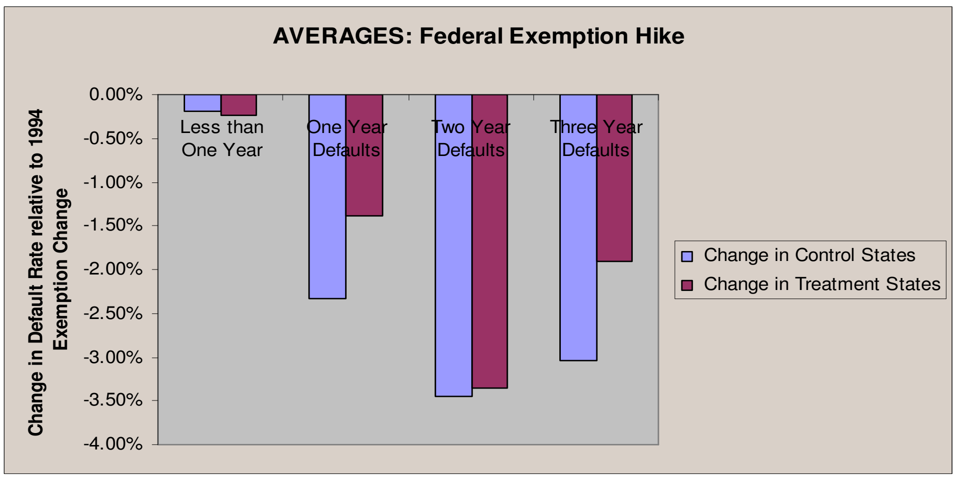


Figure 5: Differences in Differences Intuition
Average one year default rates



As a first pass in evaluating the effect of exemption policy on default rates, we consider average change in default rate.

The figure shows the change in default rates (by age at default) after the 1994 federal exemption increase. The change is broken out for states not affected by the policy (blue bars) and states affected by the policy (red bars). While overall the post-1994 default rates (all changes are negative), default rates in the treated states did not fall as much (the red bars are shorter).

Figure 5: Looking at Averages

FIGURE 6: CHANGE IN DISTRIBUTION OF LOAN SIZE PRE AND POST 1994 POLICY CHANGE

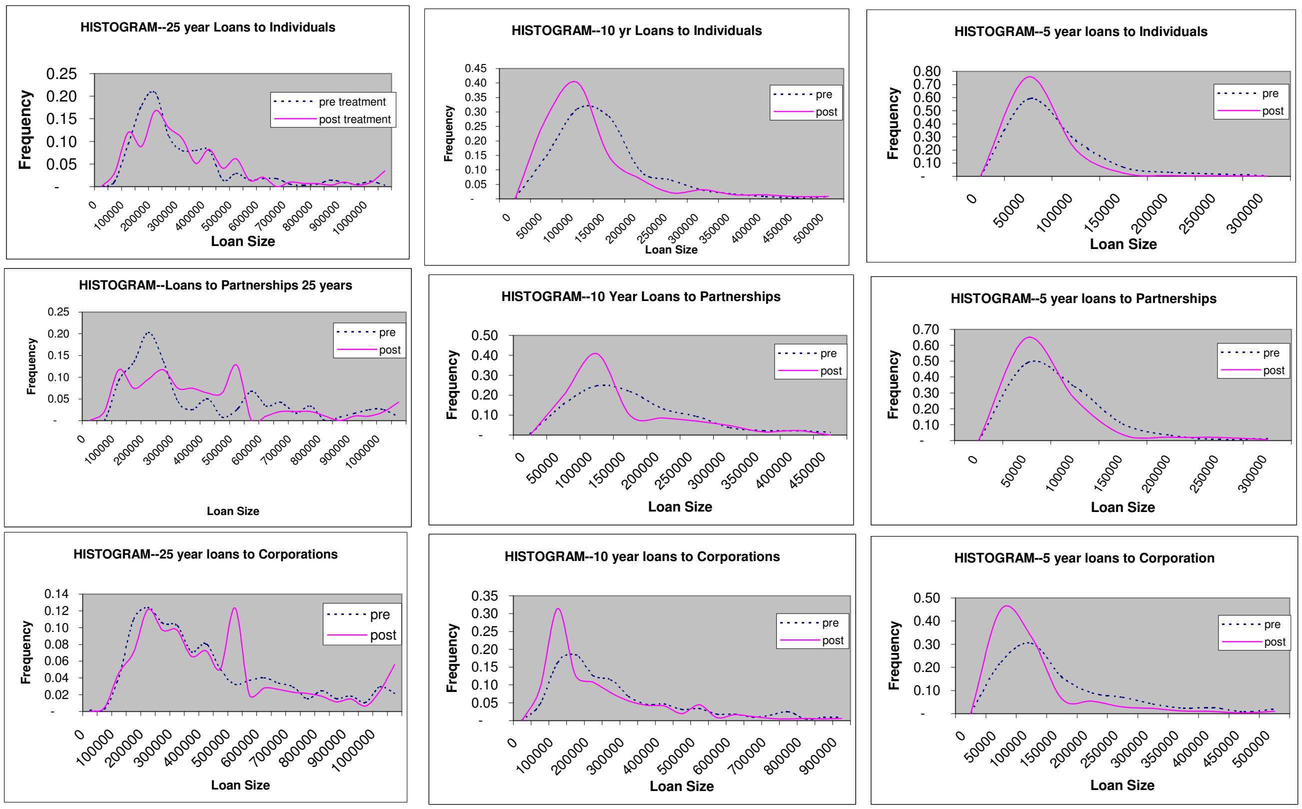


Figure 6: Distribution of loan sizes before and after the 1994 policy change

List of Tables

Table 1: SBA 7(a) Guarantee Program Terms: Loan Purpose

Maturity	*Loan Purpose*
5 years	Working Capital (up to 7 years)
10 years	Fixed Capital
25 years	Acquisition of land or buildings

Table 2: SBA 7(a) Guarantee Program Terms: Maximum Spread over Prime Lending Rate

		Maturity	
		$\leq$ 7 years	> 7 years
Loan Size	[0,$25,000]	4.25%	4.75%
	($25,000,$50,000]	3.25%	3.75%
	> $50,000	2.25%	2.75%

Table 3: SBA 7(a) Guarantee Program Terms: Maximum Guarantee Percentage

Loan Size	*Guarantee Percentage*
$\leq \$150,000$	85%
$> \$150,000$	75%

Table 4: Variables

Borrower Characteristic	*Loan Terms*	*Loan Performance*
SIC	Loan Size	Default Date
Zip Code	Disb. Date	Recovery Rate
New or Existing Bus.	Spread	
Bus. Org. Type	Guarantee Percentage	
	Maturity	

State	PostTreatment Estimate	Pre Treatment Estimate	Difference
Treatment States	int + dstate + dyr + DID	Intercept + dstate	dyr+DID
Control States	intercept + dyr	intercept	dyr
Difference in Differences			DID

Table 5: Difference in Differences Procedure

Table 6: Response of Default Hazard for All Organization Types

	25 year loans	*10 year loans*	*5 year loans*
Wald	< .0001	< .0001	< .0001
Number of Observations	2903	6143	9725
% Default Events	6%	12%	12%
		Coeff. Est. S.E. $\Pr > \chi^2$ Hazard Ratio	
DID	0.42 0.63 50% 1.54	0.26 0.68 41% 1.29	−0.09 0.92 85% 0.92
DID* τ	0.97 0.72 18% 2.64	−0.11 0.39 77% 0.90	0.44 0.56 43% 1.56
DID*MH	−16.83 649.64 98% 0	−15.06 350.23 97% 0	−15.44 399.08 97% 0

[a]Estimation procedure: Cox hazard model with time dependent covariates

[b]τ: age of loan at time of exit from sample

[c]MH: dummy indicating that loan was originated prior to policy change and remained alive during policy change (captures moral hazard as opposed to adverse selection).

[d]Other regressors: Dummy indicating loan was either originated after policy change or was originated prior to change but remained in the sample at the time of the change, dummy indicating loan was orginated in state affected by policy change, quarterly rate of change in gross state product at time loan exits sample, quarterly rate of change in land values at time loan exits sample, loan officer opinion on increase of spread charged to small firms at time of loan origination, quarterly rate of change in bank prime lending rate at time loan is originated, interaction of dummy indicating loan was originated after policy change or alive at point of change with age at time of exit from sample, interaction of state dummy with age at time of exit from sample, interaction of gsp rate at time of exit with age at time of exit, interaction with rate of change in bank prime lending rate at time of origination with age at time of exit, interactin of rate of change in land values at time of exit with age at time of exit, interaction of loan officer opion on spread increases with age of loan at time of exit from sample, individual proprietorship dummy and corporation dummy.

[e]* Significant at the 10% level, ** siginificant at the 5% level, *** significant at the 1% level.

Table 7: Response of Default Hazard for Individual Proprietorships

	25 year loans	*10 year loans*	*5 year loans*
Wald	< .0781	< .0001	< .0001
Number of Observations	808	1892	3605
% Default Events	6%	11%	15%
		Coeff. Est. S.E. Pr χ^2 Hazard Ratio	
DID	2.57* 1.60 10% 13.11	1.36** 0.71 5% 3.92	0.13 1.14 91% 1.13
DID*τ	−1.30 1.92 50% 0.27	−0.48 0.79 54% 0.62	0.42 1.61 79% 1.53
DID*MH	−18.02 1811 99% 0	−15.28 831 99% 0	−14.87 439 97% 0

[a]Estimation procedure: Cox hazard model with time dependent covariates

[b]τ: age of loan at time of exit from sample

[c]MH: dummy indicating that loan was originated prior to policy change and remained alive during policy change (captures moral hazard as opposed to adverse selection.

[d]Other regressors: Dummy indicating loan was either originated after policy change or was originated prior to change but remained in the sample at the time of the change, dummy indicating loan was orginated in state affected by policy change, quarterly rate of change in gross state product at time loan exits sample, quarterly rate of change in land values at time loan exits sample, loan officer opinion on increase of spread charged to small firms at time of loan origination, quarterly rate of change in bank prime lending rate at time loan is originated, interaction of dummy indicating loan was originated after policy change or alive at point of change with age at time of exit from sample, interaction of state dummy with age at time of exit from sample, interaction of gsp rate at time of exit with age at time of exit, interaction with rate of change in bank prime lending rate at time of origination with age at time of exit, interactin of rate of change in land values at time of exit with age at time of exit, and interaction of loan officer opion on spread increases with age of loan at time of exit from sample.

[e]* Significant at the 10% level, ** siginificant at the 5% level, *** significant at the 1% level.

Table 8: Response of Default Hazard for Partnerships

	25 year loans	*10 year loans*	*5 year loans*
Wald	$< .9926$	$< .1526$	*N/A*
Number of Observations	259	549	831
% Default Events	4%	8%	10%
		Coeff. Est. S.E. Pr $> \chi^2$ Hazard Ratio	
DID	-0.73 5346 100% 0.48	17.55 1685 99% 41721649	N/A
DID*τ	5.28 8246 100% 196.15	-31.41 36042 100% 0	N/A
DID*MH	-28.26 8675 99% 0	N/A	15.04 1306 99% 0

[a]Estimation procedure: Cox hazard model with time dependent covariates

[b]τ: age of loan at time of exit from sample

[c]MH: dummy indicating that loan was originated prior to policy change and remained alive during policy change (captures moral hazard as opposed to adverse selection.

[d]Other regressors: Dummy indicating loan was either originated after policy change or was originated prior to change but remained in the sample at the time of the change, dummy indicating loan was orginated in state affected by policy change, quarterly rate of change in gross state product at time loan exits sample, quarterly rate of change in land values at time loan exits sample, loan officer opinion on increase of spread charged to small firms at time of loan origination, quarterly rate of change in bank prime lending rate at time loan is originated, interaction of dummy indicating loan was originated after policy change or alive at point of change with age at time of exit from sample, interaction of state dummy with age at time of exit from sample, interaction of gsp rate at time of exit with age at time of exit, interaction with rate of change in bank prime lending rate at time of origination with age at time of exit, interactin of rate of change in land values at time of exit with age at time of exit, and interaction of loan officer opion on spread increases with age of loan at time of exit from sample.

[e]* Significant at the 10% level, ** siginificant at the 5% level, *** significant at the 1% level.

Table 9: Response of Default Hazard for Corporations

	25 year loans	*10 year loans*	*5 year loans*
Wald	0.001	< .0001	< .0001
Number of Observations	1836	3702	5289
% Default Events	6%	13%	10%
		Coeff. Est. S.E. Pr > χ^2 Hazard Ratio	
DID	0.41 0.86 63% 1.51	−0.34 0.38 37% 0.71	-0.01 0.56 98% 0.99
DID*τ	1.41 1.08 19% 4.08	−0.72 0.60 23% 0.49	0.59 0.68 39% 1.80
DID*MH	−16.79 844 98% 0	-14.92 379 97% 0	−15.60 547 98% 0

[a]Estimation procedure: Cox hazard model with time dependent covariates

[b]τ: age of loan at time of exit from sample

[c]MH: dummy indicating that loan was originated prior to policy change and remained alive during policy change (captures moral hazard as opposed to adverse selection.

[d]Other regressors: Dummy indicating loan was either originated after policy change or was originated prior to change but remained in the sample at the time of the change, dummy indicating loan was orginated in state affected by policy change, quarterly rate of change in gross state product at time loan exits sample, quarterly rate of change in land values at time loan exits sample, loan officer opinion on increase of spread charged to small firms at time of loan origination, quarterly rate of change in bank prime lending rate at time loan is originated, interaction of dummy indicating loan was originated after policy change or alive at point of change with age at time of exit from sample, interaction of state dummy with age at time of exit from sample, interaction of gsp rate at time of exit with age at time of exit, interaction with rate of change in bank prime lending rate at time of origination with age at time of exit, interactin of rate of change in land values at time of exit with age at time of exit, and interaction of loan officer opion on spread increases with age of loan at time of exit from sample.

[e]* Significant at the 10% level, ** siginificant at the 5% level, *** significant at the 1% level.

Table 10: Comparison of Credit Market before and after Federal Exemption Change

			Avg Loan Size	
		25 year loans	*10 year loans*	*5 year loans*
All Org. Types	pre-1994	294	194	97
	post-1994	330	162	69
Individual Proprietorships	pre-1994	273	137	66
	post-1994	312	119	46
Partnerships	pre-1994	344	170	72
	post-1994	375	146	60
Corporations	pre-1994	265	275	153
	post-1994	302	220	100
			Pct. Portfolio Amount	
		25 year loans	*10 year loans*	*5 year loans*
All Org. Types	pre-1994 50%	33%	17%	
	post-1994	59%	29%	12%
Individual Proprietorships	pre-1994	57%	29%	14%
	post-1994	65%	25%	10%
Partnerships	pre-1994	59%	29%	12%
	post-1994	65%	25%	10%
Corporations	pre-1994	38%	40%	22%
			Number of Loans	
All Org. Types	pre-1994	890	1793	2528
	post-1994	2075	4626	7913
Individual Proprietorships	pre-1994	256	489	782
	post-1994	554	1515	
Partnerships	pre-1994	94	165	198
	post-1994	168	386	651
Corporations	pre-1994	540	1139	1548
	post-1994	1335	2725	4325
			Pct. Portfolio Num	
All Org. Types	pre-1994	17%	34%	49%
	post-1994	14%	32%	54%
Individual Proprietorships	pre-1994	17%	32%	51%
	post-1994	11%	30%	59%
Partnerships	pre-1994	21%	36%	43%
	post-1994	14%	32%	54%
Corporations	pre-1994	17%	35%	48%
	post-1994	16%	32%	52%

Table 11: Response of Loan Size (in thousand dollars)

	25 year loans	*10 year loans*	*5 year loans*
Sample Average	312	178	83
Number of Observations	2903	6143	9725
DID	9	-279^{***}	17
	54	30	16
	87%	$< .0001$	28%
DID*Individual	-47	432^{***}	-9^{***}
	57	31	16
	33%	$< .0001$	$< .0001$
DID*Corporation	-46	-16	-24
	54	29	15
	40%	59%	11%

[a]Table entries include coefficient estimate, standard error and p-value.

[b]Other regressors: Dummy indicating loan was originated in state affected by policy change, dummy indicating loan was either originated after policy change or was originated prior to change but remained in the smaple at the time of the change, quarterly rate fo chane in gross state product at time of loan origination, quarterly rate of change in land value at time of origination, quarterly change in bank prime lending rate at time of origination, individual proprietorship dummy, corporation dummy, agricultural sector dummy, manufacturing sector dummy, transportation communications or electric sector dummy, spread over prime lending rate, guarantee percentage.

[c]* Significant at the 10% level, ** siginificant at the 5% level, *** significant at the 1% level.

Table 12: Response of Spread over Bank Prime Lending Rate

	25 year loans	*10 year loans*	*5 year loans*
Sample Average	2.06	2.12	2.19
Number of Observations	2903	6143	9725
DID	−0.0626	−0.0107	−0.2699**
	0.0982	0.1606	0.1266
	52%	95%	3%
DID*Individual	0.1872*	0.5494***	0.0168***
	0.1031	0.1521	0.1281
	7%	0	90%
DID*Corporation	0.1516	0.1600	0.4569***
	0.0973	0.1722	0.1266
	12%	35%	0%

[a]Table entries include coefficient estimate, standard error and p-value.

[b]Other regressors: Dummy indicating loan was originated in state affected by policy change, dummy indicating loan was either originated after policy change or was originated prior to change but remained in the smaple at the time of the change, quarterly rate fo chane in gross state product at time of loan origination, quarterly rate of change in land value at time of origination, quarterly change in bank prime lending rate at time of origination, individual proprietorship dummy, corporation dummy, agricultural sector dummy, manufacturing sector dummy, transportation communications or electric sector dummy, loan size, guarantee percentage.

[c]* Significant at the 10% level, ** siginificant at the 5% level, *** significant at the 1% level.

Table 13: Response of Present Value of Recovery/outstanding Principal and Interest

	25 year loans	*10 year loans*	*5 year loans*
Sample Average	54%	54%	65%
Number of Observations	175	715	1135
DID	0.21	−0.08	−0.16
	0.16	0.31	0.21
	20%	80%	47%
DID*Individual	−0.25**	−0.17*	0.16
	0.12	0.10	0.22
	5%	8	46%
DID*Corporation	N/A	−0.09	−0.12
	N/A	0.29	0.22
	N/A	77%	59%

[a]Table entries include coefficient estimate, standard error and p-value.

[b]Other regressors: Dummy indicating loan was originated in state affected by policy change, dummy indicating loan was either originated after policy change or was originated prior to change but remained in the smaple at the time of the change, quarterly rate fo chane in gross state product at time of loan origination, quarterly rate of change in land value at time of origination, quarterly change in bank prime lending rate at time of origination, individual proprietorship dummy, corporation dummy, agricultural sector dummy, manufacturing sector dummy, transportation communications or electric sector dummy, loan size, guarantee percentage, and spread over prime lending rate.

[c]* Significant at the 10% level, ** siginificant at the 5% level, *** significant at the 1% level.

Table 14: Response of Guarantee Percentage

	25 year loans	*10 year loans*	*5 year loans*
Sample Average	75%	80%	77%
Number of Observations	2903	6143	9725
DID	0.022*	−0.024	0.006
	0.013	0.016	0.014
	9%	13%	69%
DID*Individual	−0.025*	0.097***	−0.018
	0.013	0.017	0.014
	6%	< .0001	19%
DID*Corporation	−0.010	−0.010	0.007
	0.013	0.015	0.013
	40%	48%	60%

[a]Table entries include coefficient estimate, standard error and p-value.

[b]Other regressors: Dummy indicating loan was originated in state affected by policy change, dummy indicating loan was either originated after policy change or was originated prior to change but remained in the smaple at the time of the change, quarterly rate fo chane in gross state product at time of loan origination, quarterly rate of change in land value at time of origination, quarterly change in bank prime lending rate at time of origination, individual proprietorship dummy, corporation dummy, agricultural sector dummy, manufacturing sector dummy, transportation communications or electric sector dummy, loan size, and spread over prime lending rate.

[c]* Significant at the 10% level, ** siginificant at the 5% level, *** significant at the 1% level.