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David M. Primo and Wm Scott Green

Abstract

We explore the link between bankruptcy laws and entrepreneurship in the U.S states. Using two measures of entrepreneurship capturing alternative conceptions of this phenomenon, we find that bankruptcy laws more favorable to debtors lead to increased levels of self-employment in some cases, though the effect is non-monotonic in the level of assets protected by the law. Counter to the conventional wisdom, however, more generous laws are linked to lower levels of "innovative" entrepreneurship. The paper concludes by suggesting why developing more refined measures of entrepreneurship is necessary to better understand the impact of public policies on this most vital of human activities.

KEYWORDS: bankruptcy law, entrepreneurship, regulation

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Introduction

Entrepreneurship, typically construed as the creation of small, and sometimes innovative, businesses, is widely considered a vital component to the success of any economy, and entrepreneurship is often viewed as central to the higher levels of economic growth in the United States relative to Europe (e.g., Hoenig 2005, Schramm 2006). If the conventional wisdom is correct, then policies producing higher levels of entrepreneurship should in turn generate improved economic performance. Governments, therefore, should structure public policies to encourage more entrepreneurship. The question is what policies are effective and what policies are counterproductive?

Bankruptcy laws protecting the assets of debtors from creditors are thought to foster entrepreneurship because they reduce the risk that creating a new business necessarily entails. If potential entrepreneurs have a choice between working for somebody else and starting their own business, they will select the latter only if the expected benefits are higher. Since the full benefits of entrepreneurship are often not internalized, entrepreneurship may be underprovided unless some partial insurance against those risks is provided. To the extent that bankruptcy laws and other policies provide partial insurance or otherwise reduce the costs of failure, entrepreneurial activity should increase.

The importance of this insurance role is underscored by the recent worldwide economic downturn and the associated spike in bankruptcy filings. Clearly, bankruptcy protection continues to provide a safety net for many individuals. The financial downturn that began in 2008 demonstrates, however, that insurance can have perverse consequences. There are varying perspectives about what caused the financial downturn, but they share a common theme: Individual X, Firm Y, or Government Agency Z believed that, should a very negative financial outcome occur, they would not bear the full consequences of that outcome. In the U.S., for instance, mortgage rules in many states have "no recourse" provisions, meaning that the owner of the mortgage cannot pursue a mortgagee for any difference between what a foreclosed home fetches at auction and the amount of the outstanding debt. Similarly, banks and other financial services firms that made huge gambles turned to the government for a bailout when their demise was near. Quasi-government agencies like Fannie Mae did the same.

Public policies that encourage entrepreneurship by providing insurance against downside risk introduce a moral hazard problem similar to the one observed in the run-up to the global recession. Because insurance reduces the costs of an unfortunate outcome and blunts the edge of failure, it may lead individuals to start enterprises that are unlikely to succeed and have little upside potential. In fact, there is increasingly strong evidence that bankruptcy laws

influence levels of entrepreneurship, though not always in a monotonic fashion (e.g., Armour and Cumming 2008, Fan and White 2003, Georgellis and Wall 2006).

Bankruptcy laws may also create an adverse selection problem similar to Akerlof's (1970) market for lemons. To the extent that creditors are aware that borrowers have the protection of bankruptcy laws and cannot fully discriminate between high-risk and low-risk projects, interest rates will tend to be higher, which may cause individuals with low-risk projects to drop out of the pool, leaving only those individuals with high-risk proposals. In the extreme, the end result is the collapse of the credit market for new projects (Hynes and Posner 2002).

While some individuals may view entrepreneurship as an important activity to encourage irrespective of its consequences, entrepreneurship is most valuable because of its economic benefits. Given the presence of moral hazard and adverse selection problems, however, examining only whether more individuals act as sole proprietors (the typical measure of entrepreneurship) as a result of more generous bankruptcy laws may provide a misleading impression of these laws' impact on economic outcomes. If these laws are encouraging entrepreneurship that is likely to fail, then the associated social costs of these negative consequences may be larger than the benefits from encouraging an individual on the fence to pursue a worthwhile project.

In this paper, we examine bankruptcy laws in the U.S. states from 1980 to 1996 and their link to entrepreneurial activity. We first provide a theoretical foundation for why the effects of such policies is far from certain. We focus on the countervailing effects just described, that on the one hand, policies that provide insurance are likely to encourage entrepreneurship. On the other hand, government regulations that insure individuals against a portion of the downside of a risky activity may encourage those individuals to take on ill-advised activities. The moral hazard problem can be mitigated to some degree, since creditors can adjust their behavior in the presence of generous legal provisions by reducing the availability of credit or increasing interest rates. This, however, introduces the adverse selection problem described above.

Empirically, we focus on the generosity of property exemptions in personal bankruptcy laws. Generous bankruptcy laws reflect a view that individuals should be able to get a "fresh start," unencumbered by previous failed enterprises. Using U.S. state-level data, we explore whether bankruptcy laws influence entrepreneurship. Following Baumol, Litan, and Schramm (2007), we distinguish between replicative entrepreneurship (e.g., opening a sandwich shop) and innovative entrepreneurship (e.g., starting Google). To make this distinction clear, we utilize two different measures of entrepreneurship: self-employment (which includes both replicative and innovative entrepreneurship) and venture

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capital spending (a proxy for innovative entrepreneurship). We find that generous bankruptcy laws lead to increased levels of self-employment, but this effect is non-monotonic in the level of assets protected by the law. In addition, more generous exemptions are linked to *lower* levels of innovative entrepreneurship.

Our paper suggests that tighter bankruptcy laws may not have the significant (negative) impact on innovative entrepreneurship feared by many. In the discussion and conclusion, we offer the implications of our findings for scholars and policymakers and discuss the importance of constructing better measures of entrepreneurship that separate small business start-ups into those which are innovative and those which replicate an existing business model.

Bankruptcy Law

In the U.S., unlike in many other countries, it is relatively easy for individuals to file for bankruptcy and, as a consequence, have their debts completely discharged while keeping a portion of their assets. Bankruptcy law is governed by many complex provisions, and popular legal books offer a step-by-step guide to filing (e.g., Elias et al. various years). In 2005 over two million individuals filed for personal bankruptcy under Chapter 7 of the U.S. Bankruptcy Code. About twenty percent of personal bankruptcy filings list business debts, and these debts comprise about half the total liabilities of all filers (Mathur 2007). Lawless and Warren (2005) argue that a significant portion of bankruptcies classified as "individual" bankruptcies ought to instead be classified as business bankruptcies. While bankruptcy laws were tightened in late 2005, resulting in many fewer bankruptcy filings in 2006 (down by about 70% in 2006 from 2005), they still afford significant protections to individual debtors, especially those with business debts. The number of bankruptcy filings spiked in 2008 and 2009 as the worldwide recession hit.

By discharging debts, bankruptcy laws are redemptive and reflect a change from the era of English law under which uncooperative debtors could be put to death (Jackson 1986). To this day, in other nations, a business failure can result in criminal charges or the inability to lead another company (World Bank 2006). Bankruptcy carries relatively little stigma in contemporary American society, but this is a somewhat recent phenomenon. The number of personal bankruptcy cases has increased from around 300,000 in 1980 to the two million figure cited above for 2005. While an increase in consumer debt undoubtedly contributed to this increase, part of the change also reflects a new perspective on filing (Peterson 1991, Romano 1991). To be sure, bankruptcy is still viewed as an unfortunate event. In a 1993 *Worth* magazine poll, 76% of individuals who filed felt "just terrible" about doing so, and a 1991 CBS News-*New York Times* poll found that 55% of respondents would either not do business or be reluctant to do

business with an individual whose business went bankrupt. General attitudes, however, are sympathetic toward struggling small businesses. Even in 1982, when bankruptcy filings were still relatively low, a Harris poll found that 70% of Americans favored providing federal money for loans to small businesses that are near bankruptcy.[1] Bankruptcy laws, therefore, should encourage entrepreneurial behavior in part by reducing the stigma of failure.

An individual who files for bankruptcy can keep some personal possessions and a portion of his or her home equity. The latter is referred to as a homestead exemption. Bankruptcy laws differ across the states. There is a federal set of exemptions, but under the Bankruptcy Reform Act of 1978, states may opt-out of the federal exemptions and institute their own. Many have chosen to do so, but as Hynes, Malani, and Posner (2004) have shown, state exemptions and the opt-out decision reflect historical state-level exemptions. Therefore we view them as exogenous institutions in this paper. The laws can be linked to a state's generosity towards those who have fallen on hard times, as well as the strength of creditor interests in that state.

There is a large theoretical and empirical literature regarding bankruptcy law and entrepreneurship. (For a wide-ranging review of the bankruptcy law literature, see White 2007.) While an increase in the generosity of homestead and other exemptions may stimulate entrepreneurship by providing insurance against downside risk and by offering a "fresh start" through debt discharge (Ayotte 2007, Han and Li 2004, Landier 2006), it will also lead to a response by creditors, who may increase interest rates or leave the market entirely (Fan and White 2003). Thus, entrepreneurship may not be monotonically increasing in exemption levels, or if the effects are monotonic, they may increase at a declining rate.

There is strong support for the claim that creditors respond to bankruptcy exemption levels. Berkowitz and White (2004) find that small businesses have a harder time receiving credit and pay higher interest rates in states with unlimited homestead exemptions compared to states with low exemptions. Gropp, Scholz, and White (1997) find that more generous exemptions open up credit availability to high-asset households, due to a large increase in demand, but close off opportunities for households with low assets. On net, however, more generous exemptions lead to fewer opportunities to take out loans. Berkowitz and Hynes (1999) find that bankruptcy laws do not affect the market for secured credit, such as home mortgages, but Yin and White (2001) reach the opposite conclusion in a separate data analysis. Grant (2003) finds that higher exemptions limit credit but still have beneficial effects in helping households insure against negative shocks.

In addition, there is at least indirect evidence that higher bankruptcy exemptions encourage greater risk taking. In a novel analysis, Persad (2005)

[1] Polling data is from Roper's iPOLL databank.

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finds that individuals in states with higher bankruptcy exemptions tend to have riskier investment portfolios. The intuition is that by providing some consumption insurance, higher exemptions encourage individuals to take greater risks in investing.

The next question, then, is how bankruptcy laws affect the decision to start a business, given the actions of creditors. The impact can reflect both the decision of an individual to start a business, and it may also reflect a Tiebout effect, as individuals may move to a neighboring state and start a business in that state. Mathur (2009) finds both of these effects in a spatial analysis that accounts for bankruptcy exemptions in neighboring states. Higher exemptions in neighboring states decrease the likelihood of starting a business in one's home state, while home-state exemptions are positively linked to entrepreneurship. Using data from the Survey of Income and Program Participation panels and 98,000 observations, Fan and White (2003) find a remarkably large effect of these laws on whether an individual owns a business; moving from the lowest exemptions to the highest increases the probability of owing a business by 35%. Similarly, Georgellis and Wall (2006) find an S-shaped relationship between exemptions and entrepreneurship from 1991 to 1998, with a negative effect initially, followed by a small positive effect, and then another negative effect; they use an aggregate-level analysis rather than individual-level measures. Building on this work, Garrett and Wall (2006) find a similar effect. Armour and Cumming (2008) use cross-national data and find that generous bankruptcy laws have a positive effect on entrepreneurship.

The Role of Taxation and Regulation

To examine how bankruptcy laws compare to other policies, we also consider the role of taxation. Generally, the evidence on tax rates and entrepreneurial entry is mixed. The literature treating taxation as a means of insuring against risk was begun by Domar and Musgrave (1944, 389), whose seminal paper argues that "[b]y imposing an income tax on the investor, the Treasury appoints itself as his partner, who will always share in his gains, but whose share in his losses will depend upon the investor's ability to offset losses against other income." A high marginal tax rate provides some measure of risk insurance, but as Gentry and Hubbard (2005) note, if individuals are risk-averse then the impact of the entire tax schedule (not just the marginal rate) becomes relevant. Cullen and Gordon (2007) argue that because corporate tax rates are lower than personal income tax rates, individuals can incorporate when they become profitable but remain sole proprietors while incurring losses (and thereby receive a bigger tax deduction). High personal tax rates, then, should stimulate entrepreneurship, assuming that personal income tax rates remain higher than corporate tax rates. While Cullen

and Gordon (2007) find evidence that high marginal tax rates spur entrepreneurship, Gentry and Hubbard (2005) find the opposite to be the case and also find that the progressivity of the tax system has a negative effect on entrepreneurship. In addition, Georgellis and Wall (2006) and Garrett and Wall (2006) find a U-shaped relationship between personal income tax rates and levels of entrepreneurial activity.

Taxes may also have a positive effect on growth (and entrepreneurship) to the extent that higher taxes reflect a well-maintained infrastructure and high quality of government services. High-performance schools, roads, and public transportation all contribute to a quality of life that may help company formation and attract employees. That said, high marginal tax rates or progressive tax systems might have additional negative effects, making the business climate generally inhospitable. For instance, Rosen (2005) finds that higher taxes are associated with slower growth, smaller increases in capital accumulation, and smaller job growth. This is intuitive. A higher tax rate may induce one to become an entrepreneur because it insulates against downside risk, but once a business is successful high taxes hamper growth. For instance, in a cross-national analysis, Djankov et al. (2010) find that high corporate taxation hampers entrepreneurship.[2]

More generally, a state's legal and regulatory environment may encourage or discourage entrepreneurship. States that are known for imposing significant red tape to form or run a business may be at a disadvantage relative to states which make starting a business easy. There are no reliable measures of the regulatory environment in a state for the time period under study, but we believe that our measure of overall tax burden taps into the legal and regulatory environment, at least to some degree, and sidesteps the debates over marginal taxation.

Data Analysis

We analyze data on entrepreneurship from 1980 to 1996 in the U.S. states. Standard errors are adjusted for clustering by state (Bertrand, Duflo, and Mullainathan 2004, Primo, Jacobsmeier, and Milyo 2007). All analyses include state and year fixed effects to account for unobserved heterogeneity in the data.

[2] There is a small cross-national level literature examining the relationship between self-employment and regulatory burdens, as well as taxation. For instance, van Stel, Storey, and Thurik (2007) study 39 countries and find that regulations for business start-ups (e.g., the time, cost, or procedures required for business start-ups) are not linked to business formation rates. Wennekers et al. (2005) suggest that, because the nature of entrepreneurshial activity depends on a country's level of economic development, regulations in developing and developed nations should differ to foster economic growth.

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We measure entrepreneurship, our dependent variable, in two ways.[3] One is by dividing the total non-farm proprietors employment by the total number of employees in a state. This is a conventional measure in the scholarly literature, but it is problematic. The category of self-employment is incapable of distinguishing replicative entrepreneurship from innovative entrepreneurship. As Armour and Cumming note, "Our data give us no direct insight as to the relative quality of the projects that are 'brought to market' by entrepreneurs in systems with forgiving bankruptcy laws as opposed to those with harsh consequences for defaulters" (2008, 336).

Our solution to this difficulty relies on venture capital data. In the U.S., venture capital and innovation are closely linked. However, venture capitalists typically do not fund replicative businesses in a mature market. Kreft and Sobel (2005) and Hirukawa and Ueda (2008) offer evidence that venture capital inflows to a state *reflect* rather than *cause* entrepreneurship. Following this result, we use real per capita venture capital (VC) inflows as a proxy for innovative entrepreneurship.

Of course, venture capital is a tiny part of overall financing for new businesses, which includes angel investors, friends, family, and banks. However, for our measure to be useful, all that has to be true is that innovative entrepreneurship tends to be greater as VC funding increases. Since we lack a direct measure of innovative entrepreneurship, we provide some suggestive evidence in this regard. First, Kortum and Lerner (2000) find that venture capital funding is associated with higher levels of patenting. Second, in the U.S., venture capital funding helped grow some of the most successful, innovative firms in history, including FedEx, Google, Microsoft, and Intel. In 2008 companies started with venture capital accounted for 11 percent of private sector employment and $2.9 trillion in revenues in the U.S. (McGuire 2009).

Another objection to this measure is that venture capital is not typically used to support a sole proprietorship, which is the type of business that would most benefit from personal bankruptcy laws. However, we posit that bankruptcy laws may influence whether an innovator pursues his or her idea, a necessary step on the way toward obtaining venture capital funding. In short, this measure is not

[3] We also explored two other potential measures of entrepreneurship. One was using initial public offerings (IPOs) in a state as a measure of entrepreneurial activity, as well as technology-related initial public offerings. While the venture capital measure is not perfect, the IPO measure is presumably even noisier, as it includes companies at various stages of development and those that would not be considered "innovative." Therefore, we were not surprised when this variable performed poorly compared with the venture capital measure. We also explored the possibility of examining what portion of a state's GDP was generated by innovative industries; however, it was not possible to develop a reasonable approach for separating industries in this way, given available data.

perfect, but we believe it is a very useful first step toward studying innovative entrepreneurship.

Our measure of bankruptcy laws is bankruptcy exemptions in a state, which is the sum of the homestead exemption, motor vehicle exemption, and cash and/or "wildcard" exemptions, adjusted for inflation. This data was generously provided by Hynes, Malani, and Posner (2004). Their measure of exemptions accounts for unlimited homestead exemptions by translating these into dollar amounts based on the highest exemptions in other states.

We construct several measures of bankruptcy laws. First, we consider just the dollar values as used in the Hynes, Malani, and Posner study. Second, we place the exemptions into quartiles, since small changes in the laws may not have large effects. Third, we consider a variety of functional forms, including the log of the exemption, a cubic function, and a quadratic function. Because we are running state fixed effects, we cannot include an indicator variable to address unlimited homestead exemptions, which are present in 15% percent of the observations.[4] To address the fact that states with unlimited exemptions (and those with extraordinarily high exemptions) may not be comparable to other states, we re-run the entrepreneurship analyses dropping the seven states with unlimited exemptions during the time period under study, as well as another state (North Dakota) with a very high exemption.

We use a simple measure of taxation and regulation: the state's tax burden, or percentage of income paid out in taxes to all levels of government, as calculated by the Tax Foundation based on data from the Bureau of Economic Analysis. This measure does not make distinctions about how taxes are raised (corporate income tax, individual income tax, etc.), but it serves the purpose of capturing how onerous taxation is in a state, which is a valuable measure because it tells us both about taxation as well as the net effect of taxes on a state's attractiveness for prospective businesses. Control variables include population (in thousands), adherents to a religion[5], population growth, real state personal income per capita, and the percent of individuals 25 and older with a college degree.

[4] We opt for using state fixed effects in lieu of an indicator variable for unlimited exemption because we expect there to be significant unobserved heterogeneity in the data.

[5] The religious notion of redemption, typically associated with Christian religions but present in Islam and other religions, has parallels to bankruptcy in that both allow one to wipe the slate clean and move forward without fear. There is limited research linking religiosity to entrepreneurship in a rigorous way. Carswell and Rolland (2004) and Dodd and Seaman (1998) find little link between one's religion and entrepreneurship, and Dodd and Seaman (1998) also find that there is little difference between the religiosity of entrepreneurs and non-entrepreneurs. There are also historical links between bankruptcy law and the Bible. Oleck (1953, 3) writes, "The Bible made many and various provisions as to the rights and liabilities of debtors and creditors, which are the basis of our law…", and he views the Old Testament as "especially fundamental" in this regard

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Venture capital data is from the Thomson VentureXpert database. Demographic data comes from the Census Bureau, and personal income, economic growth, and sole proprietorship data comes from the Bureau of Economic Analysis. Unemployment data is taken from the Bureau of Labor Statistics. Religiosity is taken from the 1980, 1990, and 2000 surveys of churches and church membership conducted by the Glenmary Research Center. All financial data is in real per capita 1996 dollars, using the Consumer Price Index (CPI). Summary statistics appear in Table 1. In Table 2, we present the average bankruptcy exemption levels by state over the time period 1980-1996 (Hynes, Malani, and Posner 2004).

Table 1. Summary Statistics (N=850)

Variable	Mean	Std Dev	Min	Max
Self-employment (%)	14.31	2.50	8.89	22.38
Venture capital funding ($)	15.29	24.11	0	218.47
Bankruptcy exemption (thousands)	89.24	97.43	10.50	315.33
Religious (%)	52.03	11.94	27.16	77.79
Total tax burden (%)	30.27	1.68	26.00	36.00
College degree (%)	19.07	3.98	10.40	30.80
Real per capita income (thousands)	20.89	34.31	13.27	32.42
Population (millions)	4.97	5.35	.42	32.49
Population growth (%)	1.08	1.22	-3.83	8.44

Note: All variables are measured at the state level. *Self-employment* is the percentage of the total number of employees in a state who are non-farm self-proprietors. *Venture capital funding* is real per capita venture capital inflows, by state. *Bankruptcy exemption* is the inflation-adjusted sum of the homestead exemption, motor vehicle exemption, and cash and/or "wildcard" exemptions for personal bankruptcies. *Religious* is the percent of the population who adheres to a religion. *Total tax burden* is the percentage of income paid out in taxes to all levels of government. *College degree* is the percentage of individuals 25 and older with a college degree. *Real per capita income* is real state personal income per capita. *Population* is the state population. *Population growth* is the growth of the state population. Data sources are listed in the article's main text.

(1953, 16). Sullivan, Warren, and Westbrook (1989) view Biblical jubilees—a forgiveness of debt every seven years—as a foundation for modern law.

Table 2. Mean Bankruptcy Exemptions, 1980-1996 (in thousands of dollars)

State	Exemption	State	Exemption
Alabama	22	Montana	105
Alaska	60	Nebraska	23
Arizona	91	Nevada	122
Arkansas	284*	New Hampshire	34
California	77	New Jersey	28
Colorado	61	New Mexico	74
Connecticut	58	New York	32
Delaware	15	North Carolina	25
Florida	285*	North Dakota	223
Georgia	17	Ohio	17
Hawaii	70	Oklahoma	288*
Idaho	73	Oregon	34
Illinois	27	Pennsylvania	28
Indiana	26	Rhode Island	28
Iowa	284*	South Carolina	17
Kansas	315*	South Dakota	286*
Kentucky	23	Tennessee	21
Louisiana	54	Texas	312*
Maine	29	Utah	19
Maryland	16	Vermont	96
Massachusetts	114	Virginia	16
Michigan	28	Washington	76
Minnesota	271*	West Virginia	26
Mississippi	136	Wisconsin	52
Missouri	17	Wyoming	29

Note: * indicates an unlimited homestead exemption state for some of the time period. Some states have identical means for total exemption levels because they use the federal amounts. Figures are rounded to the nearest thousand. This data is from Hynes, Malani, and Posner (2004).

Results

In Table 3 we present three sets of results when entrepreneurship, measured as self-employment, is the dependent variable. We measure bankruptcy exemptions in dollars, a quadratic function, and a cubic function. Two other measures of bankruptcy laws—the quartile into which an exemption falls and the log of bankruptcy exemptions—never attained statistical significance, and the results are not reported here. Also, recall that we use two samples, one with all states and one restricting consideration to states with exemptions below $200,000. The results for the restricted sample are similar to those with the full sample, and we present only the results for the full sample in Table 3. We note in the text, however, whenever the results between the samples differ in meaningful ways.

Several interesting results emerge from the analysis. First, tax burden does not appear to have a statistically significant effect on self-employment. This

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finding is counter to expectations. One possibility is that the total tax burden may drive decisions about whether to *grow* a business or where to locate a business once it is off the ground, but it may not have a huge effect on the decision to start a business compared to remaining an employee.

Table 3. The Determinants of Self-Employment, 1980-1996, All States

Variable	Model 1	Model 2	Model 3
Bankruptcy exemption (thousands)	.0034	.0063	.028**
	(.0038)	(.0072)	(.012)
Exemption squared	--	-.000012	-.00020**
		(.000020)	(.000095)
Exemption cubed	--	--	-.00000042**
			(.00000020)
Total tax burden (%)	-.080	-.082	-.086
	(.10)	(.10)	(.10)
Real per capita income (thousands)	-.24*	-.22	-.20
	(.14)	(.14)	(.14)
Population (millions)	.026	.030	.024
	(.25)	(.25)	(.25)
Population growth (%)	-.31***	-.31***	-.31***
	(.10)	(.10)	(.10)
College degree (%)	.40**	.39**	.37*
	(.19)	(.19)	(.19)
Religious (%)	-.0059	-.0056	-.0035
	(.031)	(.031)	(.031)
Bankruptcy exemption variables jointly statistically significant?	No	No	Yes*
R^2	.92	.92	.93

Note: OLS regressions with state and year fixed effects and standard errors adjusted for clustering within state. N=850 in all specifications. * $p < .10$, ** $p < .05$, *** $p < .01$.

Turning now to bankruptcy laws, for the complete and restricted samples, the level of bankruptcy exemptions does not have a statistically significant effect on self-employment, consistent with previous work. In the full sample, bankruptcy laws measured via a quadratic function do not have a statistically significant effect on self-employment, but these laws measured with a cubic function do.[6] The substantive effects of these laws, as measured with a cubic function, are as follows: the effect of bankruptcy exemptions initially is positive, but once the exemptions reach about $90-$100K, the effect turns negative before becoming positive again at higher amounts. In addition, the marginal benefit to additional bankruptcy exemptions declines as the exemption level increases. For instance, increasing the bankruptcy exemption level from $50K to $75K increases

[6] In the restricted sample, both the quadratic and the cubic functions achieve statistical significance.

entrepreneurship by about .17 percent, but increasing it from $75K to $100K increases it trivially, by less than .05 percent.

When these regressions are re-run using our measure of innovative entrepreneurship—venture capital inflows—we find that these laws have a negative effect on entrepreneurship for the entire range of exemption levels. The level of exemptions narrowly misses statistical significance in the main specification, but when we restrict the sample to states with exemptions below $200,000, the measure becomes statistically significant. When we use measures reflecting the log, cubic function, or quadratic function of the exemption levels, they are jointly statistically significant in all specifications. Quartiles of the exemption levels are never statistically significant. See Table 4 for the results using levels, the quadratic function, and the cubic function in the full sample.

Table 4. Determinants of Venture Capital Funding, 1980-1996, All States

Variable	Model 1	Model 2	Model 3
Bankruptcy exemption (thousands)	-.077	-.20***	.25
	(.046)	(.065)	(.17)
Exemption squared	--	.00052***	-.00088
		(.00016)	(.0017)
Exemption cubed	--	--	-.00000082
			(.0000036)
Total tax burden (%)	-.90	-.78	-.78
	(.80)	(.79)	(.79)
Real per capita income (thousands)	.20	.17	.16
	(.14)	(.14)	(.15)
Population (millions)	4.50***	4.34***	4.35***
	(.81)	(.77)	(.77)
Population growth (%)	.40	.28	.29
	(1.17)	(.12)	(1.18)
College degree (%)	4.14***	4.49***	4.52***
	(1.49)	(1.52)	(1.52)
Religious (%)	-.080	-.093	-.097
	(.035)	(.036)	(.035)
Bankruptcy exemption variables jointly statistically significant?	No	Yes**	Yes**
R^2	.73	.73	.73

Note: OLS regressions with state and year fixed effects and standard errors adjusted for clustering within state. N=850 in all specifications. * $p < .10$, ** $p < .05$, *** $p < .01$.

These results are substantively significant (a $100,000 increase in exemption levels leads to a decline of $8 per capita in venture capital funding in the levels analysis, and even higher in the cubic or quadratic analyses), striking, and unexpected. A possible explanation for these findings is that credit markets in states with high exemption levels are tighter than in other states, making it hard for innovative entrepreneurs to get to the position where a venture capitalist is

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interested in their ideas. This idea is backed up by recent work by Cerqueiro and Penas (2010). They find that start-up firms in states with generous bankruptcy laws rely less on debt financing and more on informal sources, such as friends and family, and they point to a reduced supply of credit in those states as the likely source of this differential.

A further explanation for this puzzle emerges from the recent work of Hasan and Wang (2008). These authors study the effect of bankruptcy exemptions on the amount and rounds of financing received by a firm, and find that more generous exemptions are associated with smaller amounts of funding and fewer rounds of funding. Hasan and Wang posit that generous personal exemptions increase the likelihood of opportunistic behavior by firm founders, which is consistent with the argument made here. Another, related, possibility is that stricter bankruptcy laws have the effect of making other activities more attractive to weaker entrepreneurs without dissuading innovators from pursuing their ideas.[7] This self-selection makes it easier for investors and creditors to determine the quality of the remaining pool of entrepreneurs. In the end, then, our findings, combined with recent work, suggest that innovative entrepreneurship may actually be hindered by generous bankruptcy exemptions.

Discussion and Conclusion

The results of this paper are consistent with previous work showing that generous bankruptcy exemptions encourage self-employment, albeit in a non-monotonic fashion. Surprisingly, our results also point to a negative relationship between generous bankruptcy laws and innovative entrepreneurship. What are the implications for our understanding of the role that public policies have in shaping entrepreneurship in the U.S. states?

First, our results show that the fears surrounding reduced entrepreneurship due to stricter bankruptcy laws may be overstated.[8] Fan and White (2003), in an important piece, caution against more stringent bankruptcy laws. They write:

> However, our analysis suggests that an unintended consequence of these reforms would be a reduction in the attractiveness of self-employment. Instead of being able to shelter their future incomes and some or all of their assets from creditors if their businesses fail, owners of failed

[7] Baumol (1990) and Murphy, Shleifer, and Vishny (1991) argue that high returns to rent seeking can cause individuals to move away from productive activities, including entrepreneurship. Our argument is related. As bankruptcy laws become stricter, those individuals with the weakest ideas have less of an incentive to pursue them because the expected returns decrease.

[8] Reasonable people can disagree about whether the recent reforms, for instance, are unfair to those who fall on hard times (as opposed to those who have a failed business).

> businesses would face heavy taxation of their future earnings to repay their old business debts. … While some self-employment ventures under the current bankruptcy law are probably inefficient, the proposed changes in personal bankruptcy procedures make the small-business environment so much tougher that both efficient and inefficient ventures are likely to be eliminated. The result could be a slower rate of growth for the U.S. economy (Fan and White 2003, 563-564).

If fact, stricter laws may make the environment more favorable to innovative entrepreneurs seeking to get to the stage where they can seek funds from venture capitalists.[9]

Second, this paper is one step toward thinking about the role of a state's social, legal, political, economic, and cultural "infrastructure" for entrepreneurship. For instance, religion, an important component of American culture, is not meaningfully related to entrepreneurship in this article, but this may be due to data issues rather than the lack of any relationship. The study of religion and economics is a nascent field, so building on existing work and thinking about how religion and other social and cultural factors may encourage or discourage entrepreneurship is a logical next step. For instance, does the "stigma" associated with failure drive the decision to become an entrepreneur? Another interesting possibility is that the educational culture in which a student is immersed can influence the decision to become an entrepreneur. Examining this question, Sobel and King (2008) find that counties with school choice programs—presumably fostering a more innovative environment—have higher rates of youth entrepreneurship.

Moreover, we need a better understanding of how taxation and regulation affect the decisions of entrepreneurs, especially as policymakers and think tanks work to design institutions that increase state-level economic performance (e.g., Laffer and Moore 2007). High levels of taxation and regulation are often associated with significant levels of rent-seeking, and there is a large literature showing that rent-seeking has crowded out entrepreneurship throughout history (e.g., Baumol 1990 and Murphy, Shleifer, and Vishny 1991). Murphy, Shleifer, and Vishny (1991, 505) write, "Landes (1969) believes that the differential allocation of talent is one reason why England had the Industrial Revolution in the eighteenth century England had the Industrial Revolution in the eighteenth century but France did not. In more recent times the allocation of talent to the

[9] However, even though generous *personal* bankruptcy laws hinder innovative entrepreneurship, generous *corporate* bankruptcy policies may have the opposite effect. For instance, in a cross-national analysis, Acharya and Subramian (2009) find that weaker creditor rights encourage innovation in technologically innovative industries, in part by making firm liquidations less likely (and, therefore, encouraging risk taking).

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rent-seeking sectors might be the reason for stagnation in much of Africa and Latin America, for slow growth in the U.S., and for success of newly industrializing countries where these sectors are smaller."

Finally, we close with a focus on measurement. Our results point to the need for better measures in the area of entrepreneurship research. We lack well-defined measures of regulatory burdens in the states, where better measures would help us understand how regulations influence entrepreneurship. In addition, it is difficult to distinguish between replicative entrepreneurship and innovative entrepreneurship, which are perhaps best viewed as lying at opposite ends of a continuum. Our self-employment results, therefore, by necessity lump together very different sorts of businesspeople. We have provided a start toward separating these two groups by using venture capital funding as a proxy for innovative entrepreneurship, but more work remains to be done. The Kauffman Firm Survey is another very positive step in this direction.[10]

To see why measures matter, consider recent work by Shane (2008), who argues that policies directed toward entrepreneurship are misguided. He takes as his definition of entrepreneurship from Merriam-Webster's Online Dictionary as "the activity of organizing, managing, and assuming the risks of a business or enterprise" (2008, 2) and measures this both by looking at business ownership and self-employment. Given this starting point, it is not surprising that he finds entrepreneurs to be a less-than-transformative force in society and produces statements such as this one: "The United States is not a very entrepreneurial country" (Shane 2008, 7). By contrast, our perspective is that transformative, innovative entrepreneurship is what drives economic performance. Shane may be correct, but trivially, that public policies ought not encourage an excessive amount of entrepreneurship. Which analyst would disagree? Our concern here, rather, is that policies that are improperly designed or focused on the wrong sorts of start-up may lead to *lower-than-optimal* levels of *innovative* entrepreneurship. To find out what the basket of efficient and effective policies looks like, we need better theory and better data. As the centrality of entrepreneurship to economic well-being becomes increasingly established, we hope that broader and more nuanced measures will help us better understand the conditions that enable entrepreneurship to thrive.

[10] See http://www.kauffman.org/kfs.

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