

Small Firms in the SSBF

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December 2, 2008

Abstract

This paper uses SSBF data to better understand how the owners of small firms use decisions about legal organization, firm size, capital structure, and owner investment in the firm to manage firm risk. The main findings are: Firms with unlimited liability are smaller, both when measured by assets and number of employees, and tend to be less leveraged than those whose owners limit their personal exposure to firm liabilities. Entrepreneurs tend to hold largely undiversified positions by investing heavily in their firms, and this does not differ appreciably by legal organization. The percentage of firms with limited liability has remained virtually constant through time, although within this group there is a trend toward hybrid legal organizations with beneficial tax treatment. We estimate return on assets and find that entrepreneurship is a very risky undertaking, with high upside gain. The possibility of high future returns helps explain the coexistence of a large percentage of firms with negative equity and low default rates. The shape of the return distribution and limited liability also interact – the option to declare bankruptcy shields owners from personal loss in the lower tail of the distribution while preserving the potential for significant firm returns in the upper tail.

JEL Classification Numbers: D92, E01, G33, G38, L25, L26

Keywords: Small Firms; SSBF; Entrepreneur;

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We thank Joanna Alexopoulos, George Deltas, Cristina De Nardi and Kevin Williams for helpful discussions. We gratefully acknowledge financial support from National Science Foundation grant SES-031839, NCSA computation grant SES050001, the Center for Private Equity Research at the University of Illinois, Kauffman Foundation grant 20061258 and the Academy for Entrepreneurial Leadership. Any opinions, findings, and conclusions or recommendations expressed in this paper are those of the authors and do not necessarily reflect the views of the National Science Foundation or any other organization.

1 Introduction

Understanding small firms is an important task. These firms produce more than half of non-farm private U.S. GDP, employ half of all private sector employees, pay 45 percent of total private payroll, and generate many new jobs.¹ We use the Survey of Small Business Finance (SSBF), a survey administered by The Board of Governors of the Federal Reserve System and the U.S. Small Business Administration, to identify facts about key variables chosen by small firms. Conducted in 1987, 1993, 1998 and 2003, each survey is a cross sectional sample of non-farm, non-financial, non-real estate small businesses, representing about 5 million firms.² The surveys use the Small Business Association classification for small firms as those with less than 500 full-time equivalent employees but in practice these firms are quite small, whether measured by assets or number of employees.³ They contain information on the characteristics of firms and primary owners, including owner age, gender, industry, type of business organization, and financial information (owner resources and firm income statements and balance sheets, use and source of financial services, recent borrowing experience, trade credit and capital injections such as equity).

Our effort to derive a broader set of facts to better understand small firms complements recent studies using other U.S. data sets such as the Panel Study of Entrepreneurial Dynamics and the Survey of Consumer Finances, and related data sets in the U.K. and Italy.⁴ Such empirical analyses are important for developing theory, calibrating quantitative macro models, and identifying areas in which additional data collection would be valuable. We compare our results to the Survey of Consumer Finances (SCF) whenever possible. The SCF provides information on a representative sample of U.S. households, while the SSBF collects information on a representative sample of small U.S. firms.⁵ Because these surveys sample different populations, some interesting differences in results occur – in percentages of legal types, net equity and return distributions.

We sort the data, whenever possible, by firm legal organization (i.e., sole proprietorship, partnership, S or C-corporation and two recent legal hybrids). We also construct the distribution of return on assets for small firms, and find that the returns from owning a small business can be substantial, but involve significant risk. Nearly a third of firms lose money in a given year (negative

¹ See <http://www.sba.gov/advo/stats/sbfaq.pdf>.

² All surveys are available at <http://www.federalreserve.gov>.

³ For example, the median number of employees is 3 and median total assets are about \$67,000, for all firms in 2003 survey with sample weight adjustment.

⁴ See Blanchflower (2008), Blanchflower and Shadforth (2007), Campbell and Nardi (2008), DeNardi, Doctor, and Krane (2007), and Magri (2008).

⁵ Both surveys contain useful demographic information, and an important difference is their focus on households and firms, respectively. The SCF is especially useful for analyzing household savings behavior and the SSBF is especially useful for analyzing firm financial structure.

real returns) and negative equity (firm liabilities that exceed firm assets) varies from 12% to 26% over the samples. Yet owners invest substantial personal net-worth in their firms, with recent capital structure drift toward equity among firms without limited liability. The fact that most owners work at their firms adds to the risk of small business ownership.⁶ We conjecture that limited liability, the shape of the return distribution and the ability of owners to choose firm scale and capital structure interact to allow firms to manage this risk. The ability of firms with limited liability to declare bankruptcy shields them from the downside risk in the lower tail of the return distribution while preserving the potential for significant upside gain in the upper tail.⁷

Our conjecture regarding the importance of a firm's exit option is consistent with three recent papers. In a companion paper to this study, Herranz, Krasa, and Villamil (2008) show that firms of less risk averse owners with a bankruptcy option tend to be large and have high future value. This high future value credibly limits their incentive to default.⁸ In Abbring and Campbell (2005), the authors formulate and estimate a model of firm dynamics and find that a large component of firm value is due to the option to exit. A similar mechanism is at play in Hopenhayn and Vereshchagina (2006)'s model of occupational choice. Collectively these papers show that a firm's option to exit is valuable, and this paper suggests that limited liability might make such an option even more valuable *ceteris paribus*.

The paper proceeds as follows. In section 2 we discuss firm legal organizational form, and its association with firm size, capital structure, owner net-worth invested in the firm, negative equity, and loan repayment rates. In section 3 we compute the distribution of return on assets for small firms. The final section concludes.

2 Firm Organizational Form

The legal form a firm chooses has important implications for owners' personal liability, taxes and firm governance.⁹ In the U.S. these legal structures are of four main types: sole proprietorships, partnerships, C-corporations or S-corporations. In this section we consider the essential characteristics of each of these long-standing legal forms and two recent innovations, limited liability

⁶In SSBF data for incorporated firms, the percentage of primary owners who work at their firms is 79% in 1993 and 89% in 1998. The percentages are even higher for other legal categories – all sole proprietors work at their firms.

⁷For recent quantitative analyses of bankruptcy see, for example, Athreya (2002), Chatterjee, Corbae, Nakajima, and Rios-Rull (2007), Herranz, Krasa, and Villamil (2008) and Livshits, MacGee, and Tertilt (2007).

⁸The ability to choose firm size and financial structure, borrowing constraints, and modest heterogeneity with respect to risk aversion are also important.

⁹Governance structure is important for large firms, but is less important for most small firms, except for S versus C-corporations as explained below, because small firms tend to be identified with their owners and closely held.

companies and limited liability partnerships. We next document changes in the numbers of firms of each type over time in the Survey of Small Business Finance and then compare the patterns to those observed in the Survey of Consumer Finance, when possible. The goal is to better understand the link between firm legal organization and small firm attributes. In order to accomplish this, we derive distributions of firm size, capital structure, negative equity and owner investment over time, sorted by firm legal type. We also examine the effect of legal organization on loan repayment rates.

The main historical benefit of incorporation was to provide owners with a liability shield (cf., Hovenkamp (1991)). An incorporated firm is a separate legal entity from its owners, recognized under the law as a distinct legal “person” that can make contracts, is liable for firm obligations, and pays taxes on firm earnings. Creditors can seize only firm assets; owners are not personally liable for business debts or other judgments. In contrast, *sole proprietors* and *partners* are personally liable for firm obligations, unless they specifically limit liability. Partnerships are simply proprietorships with more than one owner. With regard to tax treatment, all profit from a business is directly “passed through” to owners in sole proprietorships and partnerships and thus taxed only once as personal income. Income from firms organized as *C-corporations* is subject to double taxation; profit is taxed and owners are taxed again at the personal level when the firm makes distributions or pays dividends. This double taxation problem does not occur if the firm organizes under subchapter S of the U.S. Internal Revenue Code, but an *S-corporation* can have only 100 shareholders who generally must be individuals.

Two recent legal innovations, *limited liability companies (LLC)* and *limited liability partnerships (LLP)*, have led to five additional variations on these four main firm types. LLC and LLP firms have the liability shield characteristics of a corporation (owner liability limited to capital contributions) and the beneficial tax characteristics of a proprietorship or partnership (the option to “pass-through” income directly to owners to avoid double taxation). LLCs, generally considered to be the most flexible legal form, are growing in popularity (see table 1 below).¹⁰ In contrast, there are relatively few LLPs and they are mostly concentrated among lawyers, physicians, architects and other professionals, with some states limiting LLPs to these groups.¹¹ U.S. firms are chartered by states, and state laws vary somewhat with regard to liability and taxation. For example, a few states charge LLCs a tax for the benefit of limited liability, but this tax is lower than the corporate tax.¹² Similarly, the amount of liability protection is determined by an exemption parameter that

¹⁰LLCs can choose to be taxed as a sole proprietor, partnership, S-corporation or C-corporation. Corporations are the least flexible, but are a better known legal entity and thus more useful for raising large amounts of capital.

¹¹This legal form was initiated after the S&L crisis to shield from liability the lawyers and accountants that had advised failed banks with few recoverable assets.

¹²In 1977, Wyoming was the first U.S. state to enact a modern LLC. By 1993, 36 states allowed this legal entity. By

varies by U.S. state (see Athreya (2006) or Herranz, Krasa, and Villamil (2008)).

Table 1 summarizes the number and percentage of firm types in the Survey of Small Business Finance (SSBF). The 1993 SSBF reports the four basic organizational forms (sole proprietorships, partnerships, and C and S-corporations) and the 1998 and 2003 surveys add the more recent LLC and LLP hybrids, leading to nine legal types. The surveys approximate a population of about 5,000,000 U.S. small firms, with about 4,000 total firms interviewed in each survey.¹³ All surveys are stratified random samples from Dun and Bradstreet’s *Dun’s Market Identifier File*, which contains company data, executive names, corporate links, DUNS numbers, organization status, and marketing information for about 17 million U.S. businesses, including public, private, and government organizations. The SSBF includes only for profit, non-government, non-farm, non-financial, non-subsidary firms, with less than 500 employees. Each sample is divided into four employment size groups: 1-19 and unknown, 20-49, 50-99 and 100-499. Some groups are over sampled (e.g., employee groups of size 20 and above), and the surveys contain weights to ensure that sample statistics represent the population. For example, in 2003 a sample of almost 38,000 businesses was selected from the Dun and Bradstreet market identifier file, with the sample stratified according to employment size, census division, and urban/rural status, and the Standard Industrial Classification code (SIC).¹⁴

Table 1: SSBF population number and % of firms of each legal type (with sample weights)

	Unltd Liability		Ltd Liability						Ltd Liability
	income pass through		Income Pass Through						Double Tax
	<i>Sole Prop</i>	<i>Partner</i>	<i>Sole Prop LLC</i>	<i>Partner LLC</i>	<i>Corp LLC</i>	<i>Partner LLP</i>	<i>Corp LLP</i>	<i>S-corp</i>	<i>C-corp</i>
1993	2,158,193	399,956	NA	NA	NA	NA	NA	1,015,476	1,420,531
1998	2,604,524	307,039	6,828	7,519	386	53,274	39,685	1,262,966	1,009,023
2003	2,675,662	343,478	129, 216	144,927	71,500	59,553	16,050	1,951,951	901,264
1993	43.21%	8.01%	NA	NA	NA	NA	NA	20.33%	28.44%
1998	49.22%	5.80%	0.13%	0.14%	0.01%	1.01%	0.75%	23.87%	19.07%
2003	45.51%	5.46%	2.05%	2.30%	1.14%	0.95%	0.26%	31.01%	14.32%

Table 1 focuses on the two main characteristics that determine small firm type. The first is

1997 all 50 states permitted LLCs, and the IRS relaxed the requirements to obtain favorable tax treatment.

¹³The 1993 survey has 4637 firms, the 1998 survey has 3561 firms, and 2003 survey has 4240 firms.

¹⁴Hazelwood, Mach, and Wolken (2007), p. 2 note that the SIC was used to sort the frame before systematic selection within each stratum, providing implicit stratification by SIC to help improve the representativeness of the sample with respect to industry.

owner liability for firm debt, indicated by unlimited liability or limited liability. The second is how firm profit is taxed, indicated by income pass through (no taxation at the firm levels) or double taxation (taxation of profit at the firm and personal level).¹⁵ In the first main column, sole proprietors and partners have no liability protection (i.e., potentially are subject to unlimited liability) but enjoy income pass-through – profits taxed only at the personal level. The center column contains firms that have limited liability and income pass-through – the five hybrids and S-corporations. Finally, the last column contains C-corporations, which have limited liability but income is subject to double taxation because there is no income pass-through. The top data panel in the table reports weighted population numbers for each firm type and the bottom panel reports the numbers as percentages of total firms.

Two patterns are evident in the SSBF data in table 1.

- Owners without liability protection (sole proprietors and partners) account for roughly half the sample in all three years: 51% in 1993, 55% in 1998, and 51% in 2003.
- Among firms with limited liability, the data show a pronounced shift toward tax advantaged pass-through. From 1993 to 2003, C-corporations fell by about 14 percentage points and S-corporations increased by nearly 11 percentage points. LLCs also grew, although the number is still small.

DeNardi, Doctor, and Krane (2007) consider firm legal structure among entrepreneurs in the Survey of Consumer Finances (SCF). It is instructive to compare the results in the two data sets. The top part of table 2 reproduces their table 5 on legal structure, with the raw number of firms n added, and the bottom part provides the comparable data for the SSBF. The SCF contains data on the four main firm legal types, thus the bottom part of table 2 reports the related data from the SSBF, in order to compare the results.

Two patterns in the SCF and SSBF data are evident in table 2.

- The percentage of entrepreneurs with unlimited liability is much higher in the SCF than in the SSBF (sole proprietorships plus partnerships). As noted previously, roughly half of the firms in the SSBF have unlimited liability in each survey. In contrast, in the SCF the corresponding percentages are uniformly higher, varying from 59% to 74%.
- In the SCF the percentage of firms with unlimited liability is declining over time, while in the SSBF surveys there is no trend across the two liability groups. There is, however,

¹⁵The fourth possible case, unlimited liability and double taxation, does not exist in practice.

Table 2: SCF and SSBF % of firms of each legal type

SCF	Unlimited Liability		Limited Liability	
	<i>Sole Prop</i>	<i>Partner</i>	<i>S-corp</i>	<i>C-corp and other</i>
1989 (<i>n</i> = 566)	54.6%	22.4%	10.1%	12.9%
1992 (<i>n</i> = 837)	58.8%	15.2%	11.3%	14.7%
1995 (<i>n</i> = 838)	56.5%	17.7%	14.6%	11.2%
1998 (<i>n</i> = 856)	53.9%	15.5%	15.8%	15.8%
2001 (<i>n</i> = 878)	51.4%	11.6%	19.7%	17.4%
2004 (<i>n</i> = 931)	47.3%	12.1%	18.2%	22.4%

SSBF	Unlimited Liability		Limited Liability		
	<i>Sole Prop</i>	<i>Partner</i>	<i>S-corp</i>	<i>C-corp</i>	<i>LLC & LLP</i>
1993 (<i>n</i> = 4637)	43.21%	8.01%	20.33%	28.44%	NA
1998 (<i>n</i> = 3561)	49.22%	5.80%	23.67%	19.07%	2.04%
2003 (<i>n</i> = 4240)	45.51%	5.46%	31.01%	14.32%	6.70%

movement across tax categories within the groups with limited liability in the more detailed data provided by the SSBF summarized in table 1. In the SCF, the growth in the “C-corp and other” category likely reflects growth in LLCs rather than C-corporations.

We believe that the SCF and SSBF data sets have different percentages of firm types because they sample different populations. The SSBF excludes farms, financial and real estate businesses, contractors and has implicit SIC stratification. In contrast, in pooled 1989 and 1992 SCF data, DeNardi, Doctor, and Krane (2007) table 4 reports that 13.3% of the sample consists of farm, agricultural service and landscaping businesses and 6.7% consists of real estate and insurance. Thus, there is at least a 20% difference in the samples solely due to this selection criterion. The SSBF also excludes contractors but includes construction, while these groups are reported jointly in the SCF and account for 15.2% of the sample. The largest group in the SCF is professional practices (law, medicine, etc.) at 16.2%. This group is at most half as big in the SSBF – virtually all partnerships are professional practices but they range in size in table 1 from only 6% to 8%.

In addition, because the SSBF samples firms and the SCF samples households, they treat firms with multiple owners differently – roughly one third of the SSBF sample.¹⁶ In order to better understand this, consider a firm with two owners. The SSBF identifies such a business as a single firm, while the SCF identifies each owner as an entrepreneur. Furthermore, DeNardi, Doctor, and Krane (2007), p. 19, note that a self-employed business owner in the SCF is a household in which

¹⁶The fraction of firms in the SSBF with multiple owners is 39% in 1993, 31% in 1998, and 39% in 2003.

“the head declares being self-employed as a primary job, owning a business (or a share of one), and having an active management role in the firm.” Requiring respondents to be self-employed excludes full-time wage earners who run a business as a hobby and active management likely excludes high wealth individuals who acquire a business as a passive investment. The definition also requires entrepreneurs to have an investment stake in the firm, which likely excludes people who are self-employed only because their outside wage opportunities are poor. The owner-management requirement further skews the sample toward small firms. In contrast, the SSBF selects firms using *Dun’s Market Identifier File*, focusing on 5 million of the 17 million firms identified.

Because the data sets differ with regard to their focus on consumers versus firms, which survey is more appropriate depends on the underlying economic question to be addressed. For example, in models involving wealth accumulation, the focus on households in the SCF seems most appropriate (e.g., Cagetti and DeNardi (2006) or Quadrini (2000)). In models that focus on firms, the SSBF is likely to be most appropriate (e.g., Herranz, Krasa, and Villamil (2008) examine how entrepreneurs use firm decisions to manage risk). See Quadrini (2008) for an excellent survey of macroeconomic models and entrepreneurship.

2.1 Firm Size, Capital Structure, Negative Equity & Owner Investment

We now use the SSBF to show how the liability aspect of firm legal organization affects empirical distributions of key variables chosen by firms – size (measured by assets and employees), capital structure, owner net-worth invested in the firm, negative equity and loan repayment rates. We focus on distributions because they better reflect the heterogeneity in behavior by small firms than summary statistics such as the mean and variance. In some cases the data show shifts in the distributions over time and in other cases the distributions are stable across time.

2.1.1 Firm Size

We begin with two standard measures of firm size, assets and number of employees. In the SSBF, firms with limited liability are about four times larger than firms without limited liability, when measured by median assets.¹⁷ Figure 1 shows that the distribution of firm assets varies with legal organization. The distributions differ markedly by liability status, but are similar across samples within the two liability groups. In order to better understand the differences evident in figure 1,

¹⁷In 1993, median firm assets were \$143,00 for all firms with liability protection and \$35,133 for all firms subject to unlimited liability, while firm assets dropped to \$108,092 and \$24,518 in 1998 and \$108,817 and \$26,245 in 2003, respectively. All assets are reported in 1993 dollars.

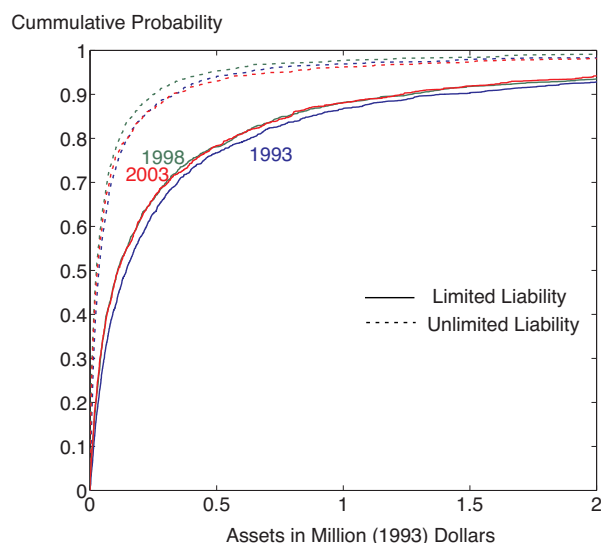


Figure 1: Distribution of Assets: Limited Liability & Unlimited Liability

tables 3 and 4 consider firm size in more detail. In table 3, nearly half of all firms with unlimited liability are very small, having less than \$25,000 in assets. Both types of firms are represented roughly equally in the range \$25,000 to \$100,000. As one might expect, the percentage of firms with unlimited liability declines dramatically as assets grow – significantly more owners of large firms have liability protection.¹⁸ Clearly, there is more at stake for such firms and their owners.

Table 3: Size measured by Firm Assets, thousand USD

Assets	< 25	25-50	50-100	100-250	250-500	500-1000	1000-2500	>2500
1993 Unltd Liability	41.4%	16.5%	14.6%	14.3%	7.2%	2.9%	1.6%	1.5%
1998 Unltd Liability	50.1%	14.0%	13.7%	12.5%	5.3%	2.3%	1.5%	0.5%
2003 Unltd Liability	49.1%	14.6%	14.5%	10.7%	5.3%	3.0%	1.7%	1.2%
1993 Ltd Liability	16.4%	11.3%	14.0%	21.2%	13.9%	9.9%	7.7%	5.6%
1998 Ltd Liability	20.7%	13.6%	13.6%	18.2%	12.0%	9.9%	6.4%	5.6%
2003 Ltd Liability	22.1%	12.7%	13.6%	18.1%	12.3%	9.3%	7.1%	4.8%

Table 4 reports firm size measured by number of employees and finds a similar pattern.¹⁹ Firms with limited liability tend to have more employees. About 80% of firms without limited liability have less than 5 employees. Thus, whether measured by assets or employees, firms differ systematically with regard to the liability aspect of legal organization. Big firms protect owners' assets.

¹⁸Bigger firms also tend to have more owners; see Basaluzzo (2006). Owners would be jointly liable in the absence of limited liability.

¹⁹The definition of an employee changed slightly over the samples. In 1993 the SSBF recorded the number of full time and part time employees, with part time employees counted as half. The 1998 and 2003 surveys recorded the

Table 4: Size Measured by Number of Employees

Numbers of Employees	0-1	2-4	5-9	10-19	20-49	50-499
1993 Unlimited Liability	42.9%	41.3%	11.3%	2.8%	1.2%	0.5%
1998 Unlimited Liability	33.2%	47.9%	13.9%	3.3%	1.1%	0.7%
2003 Unlimited Liability	31.9%	48.6%	13.8%	3.9%	1.4%	0.4%
1993 Limited Liability	12.8%	32.0%	26.1%	14.2%	9.5%	5.5%
1998 Limited Liability	8.0%	33.6%	26.6%	15.6%	11.1%	5.2%
2003 Limited Liability	10.2%	32.1%	26.0%	16.7%	10.3%	4.8%

Finally, we note a difference in legal structure among the “largest small firms,” which depends on whether firm size is measured by assets or number of employees.²⁰ Table 3 measures size by assets and indicates that among firms with \$2.5 to \$5 million in assets, in 1993 1.5% had unlimited liability and 5.6% had limited liability. Thus, the ratio of firms with unlimited/limited liability is 27% in 1993, 9% in 1998 and 25% in 2003. It may seem surprising that roughly 10-25% of these relatively big firms do not seek liability protection. The same calculation, when done for firms with 50 to 499 employees, gives markedly different ratios of 9% in 1993, 13% in 1998 and 8% in 2003 – smaller and more consistent percentages.

Two factors may account for the different ratios between large firms measured by assets versus size. First, the SSBF sample is stratified by the employment groups given in table 4, not assets. Firms with unlimited liability are under sampled when measured by assets because such firms tend to have fewer employees.²¹ This illustrates the importance of understanding stratification choices. Second, large firms (measured by assets) that lack liability protection tend to operate in specific sectors: real estate, auto dealerships, professional partnerships (lawyers, accountants, etc.) and construction.²² Thus, this subgroup contains a higher percentage of capital intensive firms with few employees than the general population.

number of owners and non-owners working on a “typical day.”

²⁰We thank Cristina De Nardi for pointing this out.

²¹Among firms with assets of \$2.5 to \$5 million, in 1993 there were 567 firms with limited liability and only 71 firms with unlimited liability. The corresponding numbers in 1998 are 337 and 23. The numbers are imputed in 2003.

²²For example, in the general population 16% of firms were partnerships in 1993, while in the \$2.5 to \$5 million asset group 59% of firms were partnerships. In 1998 the corresponding numbers are 11% and 63%, and in 2003 they are 11% and 82%. Note, however, the small numbers problem for large firms measured by assets without liability protection in the previous footnote.

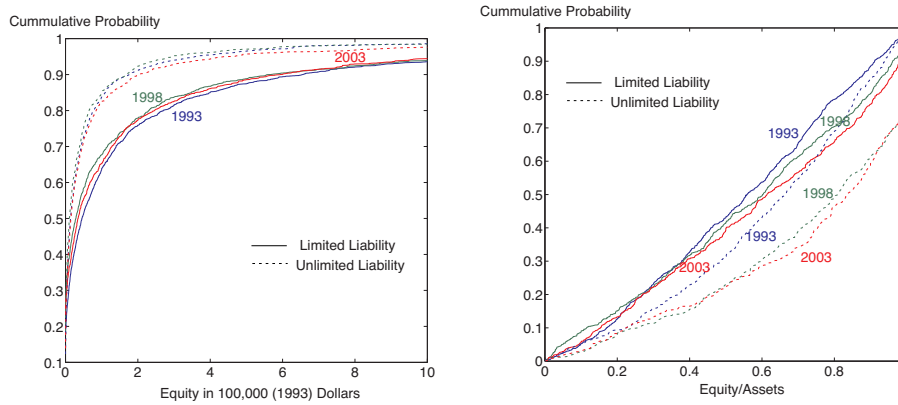


Figure 2: Distributions of Equity & Equity/Assets: Limited Liability & Unlimited Liability

2.1.2 Firm Capital Structure

Figure 2 compares the distributions of firm equity and capital structure across surveys. Firm equity, like assets, is similar across samples but differs by firm type. Figure 1 shows that firms are smaller when owner liability for firm debt is unlimited (measured by assets or employees), and the left panel of figure 2 shows that these owners also have less equity in their firms. Herranz, Krasa, and Villamil (2008) construct a theoretical model with modest differences in owner risk aversion and show that firms with and without liability protection can coexist. More risk averse owners run smaller firms and remain personally liable for firm debt (e.g., sole proprietors or partners) because this legal status mitigates a problem – they are unable to commit ex-ante to refrain from excessive default on firm debt ex post. Forgoing liability protection allows these owners to put some personal assets at risk, which improves their welfare because it credibly weakens their incentive to default. In contrast, less risk averse owners run larger firms with higher future value, which limits their incentive to default and obviates the need to forgo liability protection. These different incentives may explain the pattern in the data.

The right panel of figure 2 shows firms' debt-equity patterns. By definition total assets equal equity plus liabilities, thus equity/assets is a measure of firm capital structure. We again see different patterns by legal status. Consider first firms with limited liability. The approximately uniform cdfs in 1993, 1998 and 2003 indicate that all capital structures are equally likely for these firms. This suggests substantial heterogeneity among firms with limited liability, if individual firm capital structure is optimal (a uniform distribution for all firms is consistent with a determinate capital structure for each firm). Furthermore, the distributions for firms with limited liability are approximately stable across samples.

The right panel of figure 2 indicates that firms with unlimited liability are increasingly financed by equity over the sample years. The capital structure drift toward equity is quite pronounced in 1998 and 2003. Interestingly, equity is mostly provided by owners’ personal funds (over 90%) in the SSBF, though the data do not tell us why these small firms without liability protection are increasingly financed by equity. However, we note that the result is consistent with Blanchflower and Shadforth (2007), who find that about half of the increase in finance for small firms in the U.K. was due to the increase in the value of housing.²³ Of course, this suggests that recent declines in the housing market may have a significant effect on very small firms’ access to funds.

2.1.3 Owner Net-worth Invested in the Firm

Owner net worth, defined as personal net-worth plus net equity in a primary residence, is available only in the 1998 and 2003 SSBF surveys. We report data for the percent of net-worth invested for firms with positive net-worth outside the firm and non-negative equity. Figure 3 shows the empirical cdfs for the percent of net-worth an owner invests in the firm and table 5 reports summary statistics. We find only a slight difference by firm type for owner net-worth invested in the firm, though there may be a difference over time. The time pattern, which seems evident in the figure, cannot be confirmed due to data problems.²⁴

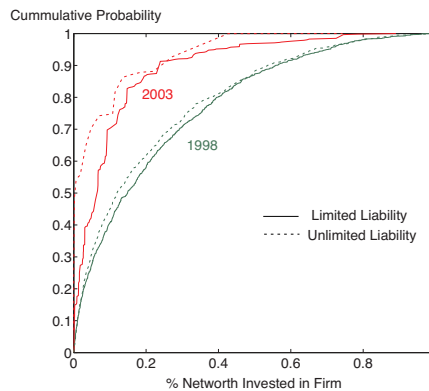


Figure 3: Distribution of Networth Invested for Firms with Limited Liability & Unlimited Liability

Table 5 quantifies the slight difference between firm types in means and medians in 1998 – owners of firms with limited liability invest slightly more personal net-worth in their firms. Most

²³We discuss owner net worth in the SSBF, which includes home equity, in the next section.

²⁴The 1998 SSBF has 1324 and 1260 observations for incorporated and unincorporated firms, respectively, while the 2003 SSBF has only 141 and 24 observations, respectively.

striking is that both types of firms show a surprising lack of diversification: in 1998, 2% invested more than 80% of their personal net-worth in the firm, 8% invested more than 60%, and about 20% invested more than 40%. This is especially surprising given that most owners work at their firms, thus if the firm goes bankrupt owners lose their job and funds invested.

Table 5: Proportion of Personal Net-worth Invested in the Firm in 1998

1998	median	mean	≥ 20	≥ 40	≥ 60	≥ 80
Limited Liability	14.88	22.20	42	20	8	2
Unlimited Liability	11.95	20.67	38	19	8	2

2.1.4 Negative Equity

Negative equity and negative firm returns are distinct concepts that tend to be related in practice. Negative equity occurs when the value of debt exceeds the value of assets. This can happen if a firm’s return is sufficiently low or the value of its assets fall.²⁵ A useful feature of the SSBF is that it contains data on firm assets and liabilities, and this permits us to compute the distribution of return on assets for firms, which we do in section 3. Negative real returns occur (i.e., the firm loses money) when a firm’s return realization x is less than one plus the rate of inflation. We will see that negative real returns are common among firms in the SSBF. In 1993, for example, the CPI inflation rate was 3%, thus the probability of a realization $0 < x < 1.03$ is slightly higher than 30%.²⁶ Sufficiently negative returns can cause a firm to have negative equity.

Table 6 shows that the percentage of firms with negative equity is high and varies with firm legal type. Firms with limited liability have uniformly higher negative equity than those without liability protection. The relatively high percentages of negative equity may seem surprising, particularly for firms with limited liability, because declaring bankruptcy would limit personal losses. Herranz, Krasa, and Villamil (2008) show that the empirically observed negative equity levels and low default rates can be optimal in a dynamic model if a firm expects future returns that are high enough to offset current losses. In this case, an owner will be willing to “bail the firm out” from a current loss, with personal funds, in order to maintain the firm’s option value in the future. Table 5

²⁵When a firm is in a negative equity position, it uses non-business assets to cover business losses (e.g., personal funds or unpaid bills absorbed by creditors).

²⁶More precisely, the probability that the real return is between 0 and 1 is 25.86%, 12.56% and 21.50% in 1993, 1998 and 2003 respectively, and the probability of the real return is between 0 and 1 plus the inflation rate is 32.41%, 20.50% and 20.74%.

shows that entrepreneurs inject significant amounts of personal net-worth in their firms. As a consequence, a current loss and negative equity does not necessarily lead to default.

Table 6: Percentage of firms with (strictly) negative equity in the SSBF

	1993	1998	2003
Limited Liability	17.84	26.31	23.36
Unlimited Liability	12.24	18.56	13.83

2.1.5 Loan Repayment Rates and Default

Small firms are risky, yet loan repayment rates are high. The SSBF surveys do not collect information on loan default, but they report the number of times a firm has been delinquent on at least one obligation for more than 60 days over the past three years. For all firms in the sample in 1993, 1998 and 2003, the percentage of firms that have not been delinquent are 81%, 87% and 84%, respectively. For all incorporated firms the figures are 79%, 84% and 81% respectively. Thus, loan repayment rates do not vary much with legal organization in the SSBF. Our finding of relatively high repayment rates is consistent with other studies that measure default. In particular, Glennon and Nigro (2005) find that the default rate on loans guaranteed by the Small Business Administration (SBA) is 3.5%. Boissay and Gropp (2007) estimate the default rate on trade credit by small French firms to be 4.49%, where their rate includes firms that were insolvent (filed for bankruptcy), illiquid (could not pay on time or in full) or omitted repayment without reason (Table 2.4).²⁷

3 Small Firm Returns

We now compute the distribution of return on assets for firms in the SSBF in 1993, 1998 and 2003. Return on assets is the ratio of net income to total assets, which indicates the net benefit received from investment after expenses. For example, a return on assets of 10% indicates that every dollar invested in total assets generates firm income net of expenses of 10%. We focus on return on investment in the small firm sector, treating each firm as an independent observation. We assume that each firm has a common blueprint production technology with constant returns to scale.²⁸

²⁷Note that a non-delinquency rate of 80% is high because late payments do not necessarily lead to default.

²⁸A model may generate different firm size prediction with a constant returns to scale technology if there is a source of heterogeneity. Herranz, Krasa, and Villamil (2008) assume preference heterogeneity (i.e., differences in the coefficient of risk aversion) and derive model predictions that are consistent with the SSBF data on firm size.

Each observation is a random draw from the return distribution of this technology. We construct the distribution for firms with limited liability because the SSBF contains the data required to construct returns for these firms – after tax profit, firm assets and interest payments (though we must impute interest payments in 1998 and 2003).²⁹ Finally, we screen by a minimal asset size of \$50,000 because low asset levels would introduce a large error (the calculation requires division by assets).

The distribution of the returns on firm assets for 1993 is straightforward to compute from the SSBF because this survey includes interest payments. Unfortunately, the 1998 and 2003 surveys did not collect information on firm interest payments. We will first explain the 1993 procedure, and then describe how we impute the interest rate in 1998 and 2003. A firm’s nominal after-tax return on assets is given by:

$$x = \frac{\text{Profit after taxes} + \text{Interest Paid}}{\text{Assets}} + 1. \quad (1)$$

Interest paid is added to after tax profit because the ROA must include payments to both debt and equity holders.³⁰ The nominal rate is adjusted by 3% for inflation (BLS CPI 1993).

Solely to put the SSBF data in perspective, we compare the return on assets for firms in the 1993 SSBF survey to that of a typical firm in the S&P 500. Return on assets in the S&P 500 is computed from Compustat’s Research Insight 7.6 database (440 companies in 1993 with complete data) as follows:

$$x = \frac{IBCOM + XINT + DVP}{AT} + 1$$

IBCOM is income before extraordinary items, XINT is interest expense, DVP is preferred stock plus dividends, and AT is total assets.

Figure 4 compares the empirical return on asset density function to a normal density with the same mean and variance. The left panel shows SSBF data and the right panel shows S&P 500 data for 1993. First note that small firms are noticeably more risky, as the standard deviation indicates, with the higher risk somewhat compensated by a higher mean. Both distributions are tighter around the mean than a normal density because variance is generated by some firms that do exceptionally well. This, in turn, generates high kurtosis. However, losses and gains are less extreme for S&P 500 firms, which is reflected in the lower standard deviation. Table 7 provides summary statistics about firms’ return on assets in the 1993 SSBF and S&P 500. The standard deviation shows that returns in the SSBF involve significantly greater risk than the S&P 500. The kurtosis is also higher,

²⁹Sole proprietorships and partnerships do not account for the entrepreneur’s wage from running the firm. Furthermore, personal assets and business assets are often difficult to distinguish for sole proprietors.

³⁰We use after tax returns as this is relevant for an entrepreneur to decide how much net-equity to invest.

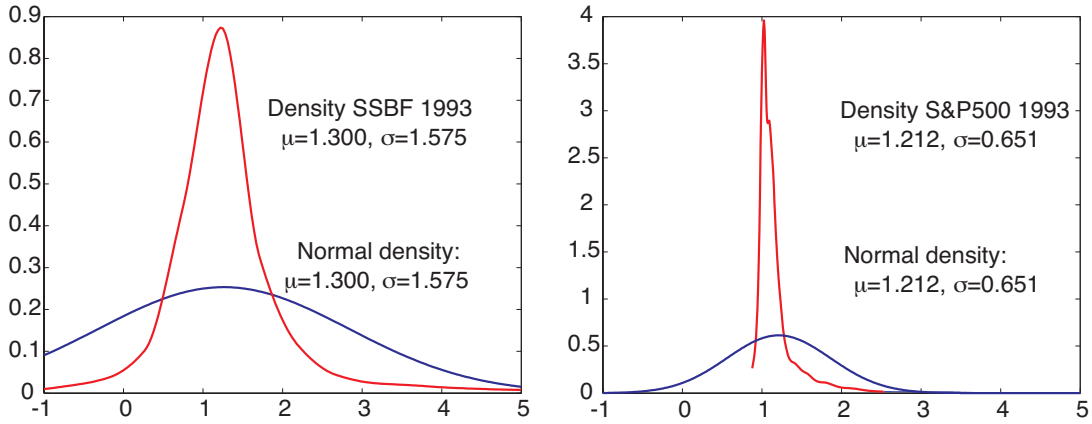


Figure 4: pdf of firm return on assets in SSBF 1993 and S&P500 (Compustat) vs. normal pdfs

indicating the SSBF has thicker tails. A risk averse investor generally prefers a distribution with low kurtosis because the returns are not far from the mean. However, when a firm has the option to declare bankruptcy with liability protection, the bankruptcy effectively provides insurance against these low realizations. In this case, only the desirable fat upper tail is relevant.

Table 7: Real Firm Return Summary Statistics, 1993 SSBF and S&P 500

moment	median	mean	standard dev.	skewness	kurtosis
1993 SSBF	1.094	1.30	1.57	13.2	290
95% conf.	[1.08, 1.11]	[1.22, 1.38]	[0.95, 2.13]	[2.3, 17.3]	[29, 488]
1993 S&P500	1.093	1.21	0.65	13.1	221
95% conf.	[1.07, 1.10]	[1.16, 1.28]	[0.28, 1.02]	[3.1, 14.6]	[20, 277]

We now describe how we construct the return on asset distribution for the 1998 and 2003 surveys. Recall that the problem with these surveys is that firms' interest payments are not available and must be imputed. We use a multiple imputation process similar to the one in the 2003 SSBF, with a randomized regression model. We first use data from the 1993 SSBF to find the best linear fit, which is given by using total liabilities, total loans, the square of total loans and total assets as the explanatory variables. Next we use the coefficients of this regression to make a prediction for the interest expense in 1998 and 2003. To account for the uncertainty of this prediction, we add a random component based on the residuals obtained from the 1993 regression. The residuals are not normally distributed, so the random component is generated as a random draw from the empirical distribution of the residuals. This error assignment process is repeated five times, in order to obtain

five different imputations.³¹

Table 8: Real Firm Return Summary Statistics: 1993, 1998 & 2003 SSBF

moment	median	mean	standard dev.	skewness	kurtosis
1993 SSBF	1.094	1.30	1.58	13.2	290
95% conf.	[1.08, 1.11]	[1.22, 1.38]	[0.95, 2.13]	[2.3, 17.3]	[29, 488]
1998 SSBF	1.166	1.47	2.65	-8.87	286
95% conf.	[1.138, 1.193]	[1.29, 1.61]	[1.59, 3.70]	[-16.03, 9.07]	[87.05, 584]
2003 SSBF	1.153	1.58	2.25	-2.34	451
95% conf.	[1.123, 1.184]	[1.46, 1.71]	[1.43, 3.04]	[-21.92, 11.13]	[56.04, 1103]
loss	≥ 20%	≥ 40%	≥ 60%	≥ 80%	≥ 100%
% of firms 1993	12%	7%	5%	4%	4%
% of firms 1998	6%	4%	3%	2%	2%
% of firms 2003	5%	2%	2%	1%	1%
gain	≥ 50%	≥ 100%	≥ 200%	≥ 300%	≥ 1,000%
% of firms 1993	21%	10%	4%	2%	0.3%
% of firms 1998	26%	24%	7%	5%	0.5%
% of firms 2003	29%	16%	6%	3%	0.8%

Table 8 reports the real firm ROA summary statistics for 1993, 1998 and 2003. For example, in 1993 the median return is 9.4%, the average return is 30%, and the distribution of firm returns (net profit) exhibits substantial variation: The standard deviation is 158%; the distribution is skewed to the right, which means that returns are not symmetric (the right tail is heavier than the left); and the distribution has a long upper tail (high kurtosis).³² These features of the distribution are also evident in the real losses and gains reported in table 8. Row *loss* indicates that 12% of small firms lost more than 20% of the assets invested (debt plus equity), 7% lost more than 40%, and 4% lost more than 100%. However, row *gains* shows that returns can also be substantial: 21% of small firms had returns of more than 50%, 10% had returns of more than 100%, and 4% had returns of more than 200%. These statistics indicate that the empirical distribution of returns for these small firms differs substantially from the normal distribution.

Figure 5 compares the three distributions and shows that they have similar shapes. Clearly, all are non-normal. Returning to table 8 we see that the means and medians are higher in 1998 and

³¹The reported results are virtually unchanged for all five imputations of the 1998 and 2003 data.

³²In table 8 the 95% confidence bands are computed for each moment using bootstrap sampling.

2003 than in 1993, the standard deviations are larger and the kurtosis is higher in 2003. The upper and lower tails are clearly more favorable in the more recent distributions – losses are less likely and big gains are uniformly more likely than in 1993. However, the 1998 and 2003 distributions are more risky, measured by the standard deviation, and the distributions are slightly skewed to the left. When there is more mass in the lower tail bankruptcy is particularly important because it allows agents to limit their losses.

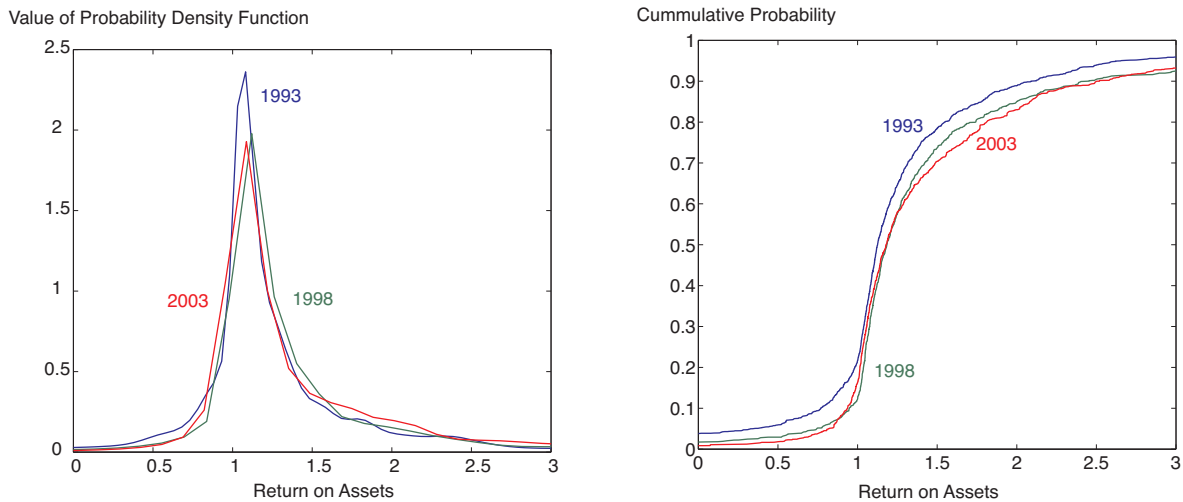


Figure 5: SSBF ROA pdfs and cdfs for 1993, 1998, and 2003

DeNardi, Doctor, and Krane (2007) compute two measures of the rate of return from running one’s own business for pooled SCF data, and then construct the corresponding distributions. Because the SCF records net equity in a business but does not separate assets and liabilities, our rate of return calculations are not directly comparable. They construct their measures by computing the distribution of business income cash flow (BCF) for self-employed businesses.³³ Furthermore, the SCF and SSBF sample different populations. Yet DeNardi, Doctor, and Krane (2007) find high median returns, significant risk and high kurtosis.

Finally, we compute a return on assets rather than a return on equity because, as we documented in the previous section, many small firms have negative equity. By excluding these firms we would lose between 18 to 26 percent of the roughly 2000 firms with limited liability, which would bias the remaining sample. Furthermore, computing return on equity can be misleading for firms near distress. When firms have low but positive equity, a small profit gives a high percentage return.

³³BCF is business income plus wages and salaries of household heads and spouses working for the business as a percent of total household income (i.e., pre-tax profits from operation in a given SCF year – wage and salary income and other distributions drawn from the business by the entrepreneur and spouse).

Finally, many loans are collateralized; the book value of equity understates owner contribution (the “correct” value of equity).

4 Concluding Remarks

The idea that owners of small firms bear significant risk is well established. The contribution of this paper is to use SSBF data to illuminate how owners structure their firms to manage these risks. Legal organization, size, capital structure, and owner investment in the firm are all tools that entrepreneurs can use to manage firm risk. For example, when firms organize as legal entities which limit personal liability for firm losses they effectively truncate the lower tail of the risky return distribution when they declare bankruptcy. This insurance aspect of bankruptcy has received much attention recently. What is surprising is the significant number of owners who choose to run small firms without liability protection in the SSBF surveys. While no individual fact reported in the paper is decisive, when viewed together we suspect that the firm legal form, size and capital structure patterns we observe have important implications for managing firm risk. Specifically, leaving personal assets at risk by not limiting liability may allow the owners of some small firms to credibly signal to lenders their intention to not default “excessively,” which in turn may be important for securing access to outside finance. In contrast large firms have more at stake, along with greater future need for access to finance, giving them a different incentive to minimize default – which frees them to protect personal assets. The association between firms that choose to remain small and no liability protection, and those that are larger and limited liability, suggests an underlying heterogeneity that is beyond the scope of this paper.³⁴

Empirical analyses such as this are important for developing theory, calibrating quantitative models, and identifying areas in which additional data collection would be valuable. See Quadrini (2008) for an excellent discussion of theory and quantitative models. We close with a discussion of useful additional data. A main focus of the paper was to construct the distribution of returns on assets for each survey. We assumed that firms have access to a common blueprint technology. The ability to compute distributions by SIC would be interesting given the heterogeneity in small firms, but data in the SSBF are limited and in some cases incomplete (especially in 2003 and more generally regarding the omission of appropriate data to compute firm profit (e.g., wages) for sole proprietors and partners). Sometimes pooling across years can be used to solve the problem

³⁴Herranz, Krasa, and Villamil (2008) construct a model where the source of heterogeneity is a modest difference in willingness to bear risk (along with credit constraints and endogenous default) and show that it can account for patterns observed in the SSBF data.

of limited data, but our analysis shows differences across samples, especially for firms unlimited liability. Thus, we focused on computing return on assets for firms with limited liability for each year, but note that breakdowns of returns by industry would be interesting.³⁵

In addition, the SSBF is a cross sectional survey. Panel data are also desirable and permit researchers to address questions that cannot be analyzed with cross section data, such as whether or not there is temporal correlation in firm returns. Of course, an analysis of correlation requires returns for various years for the same firm, and the SSBF does not track firms across time. In order to construct the distribution of the return on assets, we assumed that all firms draw from the same distribution every year and, implicitly, that draws for a particular firm across different years are statistically independent. More evidence about this would be welcome, but requires panel data. We note that the PSED contains panel data, but on nascent entrepreneurs (new businesses) and thus is not applicable to this question (cf., Campbell and Nardi (2008))

Even within the SSBF, we hope that the problems evident in the 2003 data are corrected in future surveys, e.g., many missing observations for owner net worth invested in the firm. Net-worth includes the value of equity in a primary residence and Blanchflower and Shadforth (2007) showed that housing was an important source of funds for entrepreneurs in the U.K. Significant appreciation in the price of housing occurred in the U.S. over the last several years, and this is consistent with our finding of recent “equity drift” in the 1998 and 2003 surveys of sole proprietorships and partnerships (a tendency toward more finance by owners’ personal funds). We speculate that growth in housing values and in owners’ ability to tap these funds may account for some of the drift. Given the recent negative shocks to the value of housing and credit markets, it would be extremely useful to have more complete data on owner net-worth, including housing, to determine the effects of these recent shocks on firm finance. Finally, data on default, its cost, and recovery rates would also be useful (firms that have defaulted are not in the SSBF survey).

³⁵For example, each survey has about 1750 to 2000 firms with limited liability, which are screened by a minimum assets level of \$50,000. Screening by SIC reduces the data for each industry significantly.

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