A Spatial Model of the Impact of Bankruptcy Law on Entrepreneurship[1]

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Abstract

This is the first paper that highlights the role of spatial interactions, in the context of bankruptcy laws, in the entrepreneurship decision. The focus of the paper is on small businesses. Small and medium enterprises represent between 96%-99% of all enterprises in most OECD economies, and play a large role in entry and exit in the OECD economies. However, as compared to some European countries, the US stands out as having significantly higher rates of entry and exit, especially for small firms. At the same time, unlike the European economies, the US has traditionally had pro-debtor bankruptcy laws. This paper asks whether laws that facilitate easy exit are an important consideration in entry of small businesses. This paper studies the decision of an individual to begin (or end) a business in a particular state, as a function of bankruptcy regulations and other macroeconomic and business variables in that state *as well as those in neighboring states*. I use spatial econometric techniques to model these interactions. The study uses longitudinal data from the SIPP dataset. Model estimation is computationally challenging due to the large number of observations and the presence of a lagged endogenous variable, individual random effects and state dummies. The paper finds that higher bankruptcy exemptions in neighboring states lower the probability of starting a business in the state of residence. The bankruptcy exemption in one's own state has a significant and positive impact on entrepreneurship.

Keywords: Entrepreneurship, Bankruptcy law, Small firms, Spatial Econometrics

JEL Classification: M13, K35, C21, C23

[1] I wish to express my gratitude to my advisors Prof. Harry Kelejian, Prof. John Shea, Prof. Ginger Jin and Prof. Gelbach for their advice and comments. Thanks also to Kartikeya Singh, Dr. Devesh Roy and seminar participants at the International Atlantic Economic Conference, Chicago, for useful comments. All errors are mine. The research was funded by the Small Business Administration and was conducted while the author was a student at the University of Maryland, College Park.

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1 Introduction

This paper analyzes the impact of bankruptcy law on births and closures of small businesses. The reason why we study small firms is that the OECD Small and Medium Enterprises (SMEs) Outlook 2002 reports that SMEs represent between 96%-99% of all enterprises in most OECD economies. The rates of gross job creation and destruction are highest among small firms. Haltiwanger, Davis and Schuh (1993) find that the rate of gross job creation in US manufacturing is nearly double for firms with less than 100 employees as compared to firms with more than 25000 employees. However, there is no clear relationship between *net* job creation rates and firm size, since small firms destroy a disproportionately large share of existing jobs.[3] Thus small businesses are responsible for much of the "churning" or turnover in the US economy. Overall from 1989 to 1995, 2.9 million small firms were born, and 2.6 million small firms died.[4] In Europe, too, employment growth is strongest in small enterprises.[5]

Small firms play a large role in entry and exit in the OECD economies. If we define overall job turnover as the sum of openings and expansions, plus contractions and shutdowns, then another interesting finding emerges. As the OECD Jobs Study (1995) reports, *openings* account for the majority of job gains in the US while *closures* account for the majority of job losses. In other OECD economies, like Italy and Germany, however, the majority of job creation and destruction is accounted for by *expansion* and *contraction* of existing establishments. This finding is documented by Bartelsmann, Scarpetta and Schivardi (2003) as well, who find that entry rates in the US are significantly higher than entry rates in Germany and Italy. Also, entry rates for small firms (less than 20 employees) are significantly higher than for other size classes of firms across these countries.

[3] Between 1990 to 1995, 90.1% of the 371,547 net new establishments in the US were small firms (less than 500 employees), and very small firms (less than 20 employees) accounted for 68.4% of these. During the same period, small firms created 76.5% of the 6.85 million net new jobs, while the very small firms created 49%.

[4] Small Business Growth by Major Industry (SBA).

[5] The report of the European Observatory on SMEs (No.7, 2003) cites country studies by Gallagher and Stewart (UK,1986), Heshmati (Sweden, 2001) and Hohti (Finland, 2000), which suggest that small firm dynamics are similar to the US in European economies, and in some countries like Sweden, Denmark and Finland, there is a similar negative link between gross job creation rates and firm size.

A question that arises therefore is whether laws that determine the costs and benefits of exit, such as bankruptcy laws, are important to entry of small businesses. The US is unusual in having very pro-debtor bankruptcy laws. For example, while US bankruptcy law provides for discharge of debts of failed businesses when the business owner files for bankruptcy, German bankruptcy law does not. The owner of a failed business in Germany who files for bankruptcy continues to be liable for the business' debts and can be forced to repay these debts from future earnings for many years after filing. The differential impact of bankruptcy law is evident from the fact that among the industrialized countries, only the US has a high and rapidly rising bankruptcy filing rate.[6]

The focus of this paper is on US personal bankruptcy law. The US personal bankruptcy system functions as a bankruptcy system for small unincorporated businesses as well as consumers. If a firm fails, the entrepreneur has an incentive to file for bankruptcy under Chapter 7, since both business debts and the entrepreneur's personal debts are discharged. The entrepreneur must give up assets above a fixed bankruptcy exemption level for repayment to creditors. However, future earnings are entirely exempt.[7]

These exemption levels are set by the states and vary widely across states and over time. Thus the US provides a natural panel to analyze the impact of bankruptcy law on entrepreneurship. The effect of high exemptions, as documented in the literature, is two-fold. Fan and White (2003) have shown that the wealth insurance effect of exemptions encourages entrepreneurship, while Berkowitz and White (2004) find that small firms are more likely to be denied credit if they are located in states with unlimited exemptions. My results confirm those of Fan and White (2003), that despite the possibility of a negative credit access effect, entrepreneurs would prefer to be in states with high, rather than low exemptions.

[6] Fan and White (2003)

[7] Proposed changes in the law (Bills HR333 and S420) make it harder for individuals above a certain median income to file for bankruptcy, and place a cap on the maximum exemption limit. Only wage earners whose household incomes are below their state's median (the U.S. median for a family of four was recently $59,981) will be permitted to file under Chapter 7.

The unique contribution of this paper is that it studies the effect of bankruptcy law in a spatial setting, whereby entrepreneurs choose the optimal location of their business from a choice of locations including one's own, and neighboring states. Their decision to start (or end) the business is therefore a function of business conditions in these competing locations. Introducing spatial effects is not without basis. Holmes (1998), Karvel, Musil and Sebastian (2002) and other authors, provide evidence that business relocation decisions could be prompted by competing business conditions in neighboring states.

I make use of a detailed longitudinal dataset that tracks individuals over a period of three years and has monthly information on labor force characteristics, state of residence and demographic characteristics. Hence I am able to know the exact location of the individual at the time of starting (or ending) a business. That further allows me to use state business conditions, such as the bankruptcy exemption level, as factors affecting the transition to entrepreneurship.

The paper finds that higher bankruptcy exemptions in neighboring states lower the probability of starting a business in the state of residence. The bankruptcy exemption in one's own state has a significant and positive impact on entrepreneurship.

The plan of the paper is as follows. The next section provides an overview of the study. Section 2 provides a literature review and evidence for spatial effects. Section 3 develops a theoretical model, and provides details of the empirical methodology. Section 4 provides results for business starts and closures. Section 5 outlines different specifications and Section 6 concludes.

1.1 Overview

In this paper, I propose a two-part study. The first part of the paper will focus on job creation through the birth of small businesses. The second will focus on job destruction through the death of small businesses. In particular, I look at the decision of a cross sectional unit (an individual or a family) to either begin or end a business in a particular state, as a function of bankruptcy regulations and other business and macroeconomic variables in that state as well as those in neighboring states. I propose to expand upon models in the literature, most notably Fan and White (2003), in a number of ways. First, I will allow for spatial interactions. There has been no paper to my knowledge that has looked at spillover effects from adjoining states on the probability of starting or ending a business in a particular state. I believe that these effects are important, since individuals have the option to move and locate their businesses in states that offer better conditions, such as higher exemptions or lower tax rates[8]. To allow for these interactions, I will introduce a weighting matrix that puts a positive weight on business conditions in adjoining states. We expect that the probability of starting (ending) a business in a particular state is inversely (directly) related to business conditions in adjoining states.

Second, I will be using additional variables that have not been considered in previous literature. To the extent that some individuals move from unemployment to starting a business, policies relating to the level of unemployment benefits will also be important. Self-Employment Assistance programs for people receiving unemployment benefits vary by state and may also play a role in an individual's decision to start a business in a particular state.[9] Finally, I examine if the cost of health insurance for the entrepreneur has an impact on the decision to start a business.

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[8] I assume that individuals start or end businesses in the state in which they reside.

[9] Self-Employment Assistance programs offer dislocated workers the opportunity for early re-employment. The program is designed to encourage and enable unemployed workers to create their own jobs by starting their own small businesses. Under these programs, States can pay a self-employed allowance, instead of regular unemployment insurance benefits, to help unemployed workers while they are establishing businesses and becoming self-employed. This is a voluntary program for States and, to date, fewer than 10 States have established and currently operate Self Employment Assistance programs. (Source: US Department of Labor)

Third, my study is based on Survey of Income and Program Participation data relating to two panels: 1993-1995 and 1996-1998. In future drafts, I intend to extend the paper by using data relating to the period 1983-85. In 1978, a new Federal Bankruptcy code allowed each US state to set its own bankruptcy exemption level, which they all did by 1982. It may be interesting to look at 1983 data to see the immediate impact of these exemptions on individual decisions to start or end a business.[10] Moreover, by pooling data for these years with 1993-98, I get more variation in state policies over time.

My formulation of the model allows for state dummies and individual random effects. I specifically test to see whether the state dummies are significant. My formulation of the model has a richer set of state level variables than other studies to fully capture all of the state level effects. Fan and White (2003) in their panel data model considered only a random effects specification. They did not include state dummies, and did not test to see if their state variables were sufficient to capture all the state effects.

Finally, I introduce a lagged dependent variable to control for the possibility that individuals who owned (or did not own) a business in the past may be more likely to start (end) a business today.

The contribution of the paper is also methodological. As described in detail in Appendix A.1, the estimation of a probit model containing random effects, a lagged dependent variable and state dummies, with a large number of cross sectional units and a relatively short time dimension, requires special manipulations and programs for empirical implementation. In particular, separately identifying the effect of the lagged dependent variable and unobserved heterogeneity (the random effect) requires modeling of initial conditions, which further complicates the estimation procedure. None of the papers surveyed here have introduced all of these features in a single model.

[10] If possible, I will try to obtain data for before 1978, and see if results are significantly different.

2 Literature Review

In this section, I will review some of the theoretical and empirical literature that has researched the role of various demographic, human capital, and financial considerations in the decision to become an entrepreneur. Most previous studies have examined the importance of the earnings differential between entrepreneurship and paid employment, taxation, liquidity constraints, and intergenerational transfers. As this review shows, there has been relatively little research on the role of bankruptcy law as an important factor in spawning innovation and employment, and further, there has been no paper, to our knowledge, that has used a spatial econometric model to study the same.

There have been two papers of note that have looked at the role of bankruptcy exemptions. The first is Fan and White (2003) and the other is Georgellis and Wall (2002). Fan and White (2003) consider the impact on entrepreneurial activity of bankruptcy exemptions, along with other variables that have been used extensively in the literature. They find a significant and positive relationship between the probability of starting a business and the exemption level. The probability of starting a business rises by about 22% from the lowest exemption states to the highest exemption states. Their results also suggest that the probability of ending a business is higher in states with high bankruptcy exemption levels, increasing by about 18% between the lowest exemption states and the unlimited exemption states. However the results for ending a business are not statistically significant. As pointed out before, Fan and White do not consider spatial effects. For instance, if neighboring states have higher exemptions, this may influence a family's decision to start or end a business in their own state. They also did not test to see if state fixed effects are important. In my model I find that including the spatial exemption variables causes the own exemption to become insignificant. Hence what appears to be important is not the exemption level per se, but the own exemption *relative* to neighbor exemptions.

Georgellis and Wall (2002) do not look at micro data on individuals or families. Instead they define the rate of entrepreneurship in a state as the proportion of the working age population that is classified as non-farm proprietors. They regress this on state policy measures, controlling for state and time dummies and for measures of business and demographic conditions, using US state panel data for 1991-98. The business condition measures include the state's unemployment rate, per capita real income and industry employment shares. The policy measures include the maximum marginal tax rate and the bankruptcy homestead exemption. The results indicate that at very low and high initial levels, an increase in the homestead exemption reduces the number of entrepreneurs. In the mid-range of homestead exemption rates, there is a positive relationship between the exemption level and entrepreneurship. Further, only for relatively high homestead exemption rates will the level of entrepreneurship be higher than if there were no exemption at all. This result is different from that of Fan and White (2003), who find the relationship between the exemption level and homeowners' probability of owning a business to be monotonically increasing. Georgellis and Wall (2002) also find significant state fixed effects. Since their paper deals with data aggregated at the state level, Georgellis and Wall are unable to analyze factors that may be more relevant at the individual level, such as family wealth, the age of the entrepreneur and so on. Moreover, even at the macro level, they do not consider factors such as the percentage of union workers in each state, which I incorporate. [11]

Other papers in this literature test for liquidity constraints, controlling for macroeconomic variables. Holtz-Eakin, Joulfaian, Rosen (1994), Evans and Leighton (1989) and Evans and Jovanovic (1989) find that higher inheritances and liquid assets increase the likelihood of entrepreneurship. Another strand of research has focused on the differential tax treatment of income earned while working for others versus income from self-employment. Some noteworthy papers include Cullen and Gordon (2002) and Bruce (1998), who find a positive relationship between personal tax rates and entrepreneurship. The role of race and work history has also been considered in the literature on self-employment. Meyer (1990) and Blanchflower and Meyer (1992) find that blacks are significantly less likely to be self-employed than whites, while older, married, male workers are more likely to be self-employed. Moreover, Evans and Leighton (1989)

[11] Previous research has shown that the probability of moving from a wage and salary occupation to owning a business is lower for union members (Bruce,1998).

conclude that people who have had low earnings in the past or who have shorter job tenures are also more likely to be self-employed.

There are other papers that have looked specifically at the factors leading to closure of businesses. These are very similar to factors that are significant for starting businesses, such as availability of financial capital, human capital in the form of skills of the entrepreneur and the relative attractiveness of being a wage earner versus owning a business. Kangasharju and Pekkala (2001) find that firms run by more educated individuals have a higher probability of survival. Also, the probability of exit is lower for firms run by more educated individuals during recessions, but higher during booms. One reason for this may be that highly educated individuals face a higher outside demand for their labor during economic upturns than less educated individuals. In another paper, Pfeiffer and Reize (1998) find that firm survival rates are lower if a previously unemployed individual founded the firm. None of these papers have looked at the role of bankruptcy exemptions, and they do not consider the role of regional differences and spatial interactions in determining this probability.

2.1 Evidence for Spatial Effects

The Census Bureau (2000) report on state-to-state migration flows between 1995-2000 states that the largest migrations were to adjacent or nearby states. For instance, Arizona's largest migration inflow was from California and its largest outflow was to California. Similarly, there were large flows between New York and New Jersey, California and Nevada, and so on. A Goldwater Policy Institute Report (2004) further finds in census data that states with the highest total tax burdens suffered a net loss of more than 1,700,000 residents between 1995 and 2000 and that business climate significantly influenced millions of household decisions to move across state lines during the 1990s.

Moreover, Elul and Subramanian (1999) find that considerations of bankruptcy laws influence interstate migration. They estimate that roughly 1% of moves to states with higher exemption limits are motivated by considerations of differences in bankruptcy laws. This corresponds to approximately 17000 moves. These figures are roughly the magnitude of the estimates obtained by other authors for welfare related migration.

Karvel, Musil and Sebastian (1998) studied business out migration from Minnesota**.** Of the 183 firms surveyed, eighty-two (44.8 percent) went to Wisconsin, forty-six (25.1 percent) went to South Dakota, thirty-four (18.6) percent went to North Dakota, and twenty-one (11.5 percent) went to Iowa. Business taxation (workers' compensation rates, commercial-industrial property taxes, corporate income taxes, and sales taxes) constituted the primary reason for relocation. Local and state government incentives from neighboring states comprised the next most important reason for business outmigration decisions, while the absence of Minnesota state and local government incentives to *compete* in retaining or expanding businesses were the third most important set of reasons for the respondents' decisions to leave Minnesota. Karvel et al (1998) also cite a previous small-scale study carried out by the Center for Business Research, which examined a single border city—Hudson, Wisconsin. Hudson was selected because it was known that a number of Minnesota businesses had relocated or started businesses there. The major finding of the Hudson study was that the two most important reasons for locating a business in Hudson rather than Minnesota were high workers' compensation rates and commercial-industrial property taxes in Minnesota.

Finally, Holmes (1998) provides evidence that state policies play a role in the location of industry. The paper classifies a state as pro-business or anti-business depending on whether or not the state has a right-to-work law. The paper finds that on average there is a large abrupt increase in manufacturing activity when crossing a border from an anti-business state into a pro-business state. Other papers, like Glaeser (2001) and Brueckner (1999), also study the effect of business incentives, such as taxes, on location decisions by firms.

3 Details of Proposed Study

3.1 Theoretical Model

In this section, I develop a theoretical model for my study, which uses the basic framework in Fan and White (2003) as a starting point. However, unlike that paper, this model considers business conditions in neighboring states and demand conditions. The model analyses an individual considering whether to start up a new business in the home state, *h*, or to locate in another, neighboring state, *n*. Production costs are assumed to be the same in each location. We assume, however, that there is a cost of moving from the home state to the neighboring state, which is proportional to the distance moved.

There are two periods. In period 1, the individual invests in a project that has a cost of *I*. The potential entrepreneur's initial wealth is given by *W*, which he invests in the project in period 1, and he incurs a fixed amount of debt $B>0$. The debt is unsecured, has an interest rate r_i (where *i* indexes the state), and is due in period 2. The return on the project is realized in period 2 and is uncertain at the time of investment due to uncertain demand conditions in period 2. The inverse demand function for period 2 is given by

$$p_{2i} = a - q_{2i} + u \qquad i=h,n \quad u \sim f(u) \qquad (3.1.1)$$

Where p_i and q_i denote price and quantity in location *i*, *a* is a positive constant, and $u \in [\underline{u}, \overline{u}]$ is a stochastic demand component, with $E[u]=0$ and $var[u]=v$. We assume that the moving decision is made prior to the realization of demand shock, *u*. We also assume that $\underline{u}<X_i$, where X_i is the bankruptcy exemption in state *i*.

The cost of production is given by

$$C = cq_{2i} \qquad i=h,n \qquad (3.1.2)$$

Firms will not produce if $p_{2i} < c$.[12]

[12] This can be shown as follows:

Let $\pi_i = (a-q_{2i}+u-c)q_{2i}$ denote the level of profits. *(3.1.3)*

The value of q_{2i} that maximizes this profit function is given by

$$q_{2i}^{*} = \frac{a+u-c}{2} \qquad (3.1.3a)$$

This is monotonically increasing in *u.*

If the entrepreneur files for bankruptcy then the debt of $B(1+r_i)$ will be discharged but he has to give up all assets above the fixed exemption limit X_i, to be used for repayment to creditors. Then,

$$\theta_i = W-I+B+\pi_i-fd_i \qquad (3.1.4)$$

represents the realized gross wealth of the individual at the end of period 2 . Note from *(3.1.3a)* that both the maximised level of profits, $\pi_i(q_{2i}^{*})$ and θ_i, are monotonically increasing in u. fd_i represents the cost of moving, which is zero if the individual does not move i.e $d_h=0$ for home state. The entrepreneur's net wealth at the end of period 2 is $\theta_i-B(1+r_i)$ if they don't file for bankruptcy, and X_i if they do. Thus the level of gross wealth at which he is indifferent between filing and not filing is given by

$$\overline{\theta}_i = X_i+B(1+r_i) \qquad (3.1.5)$$

Hence if $\theta_i<\overline{\theta}_i$, the individual will file for bankruptcy. Given this, the wealth that the individual will end up with in period 2 will be determined both by the decision to file for bankruptcy, as well as the exemption level. If the individual files for bankruptcy *and* his wealth is greater than the exemption level, he will be left with exactly the exemption amount. If he files and his wealth is less than the exemption level, he will be left with his

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$p_{2i} < c \Rightarrow u < c - a + q_{2i}$. However, since the value of q_{2i} that maximizes the profit function is given by $\frac{a+u-c}{2}$, this $\Rightarrow u = c - a + 2q_{2i}$, contradicting the above statement.

actual wealth. This information can be summarized in the following way. The entrepreneur has wealth

θ_i if $\theta_i<X_i$, *(3.1.6)*

X_i if $X_i \leq \theta_i \leq \overline{\theta}_i$, *(3.1.7)*

$\theta_i - B(1+r_i)$ if $\theta_i > \overline{\theta}_i$ *(3.1.8)*

Since θ_i, is monotonically increasing in u, corresponding to $\overline{\theta}_i$, is a unique realization of u, which we denote by u_i*. Thus if u_i is less than u_i^*, the individual will file for bankruptcy, and if it is higher than u_i^*, he will not. Further, if the individual does file for bankruptcy, conditions *(3.1.6)* and *(3.1.7)* indicate that he can either be left with the exemption amount, or his actual wealth. We denote by $\hat{\theta}_i$ the level of wealth such that $\theta_i = X_i$. Again, corresponding to $\hat{\theta}_i$ there is a unique realization of u, which we denote by $\hat{u}_i$. If $u<\hat{u}_i$, the level of wealth is below X_i and the individual is left with exactly θ_i, and if $u>\hat{u}_i$, the individual is left with X_i.

CREDIT MARKET

The lenders in the credit market are assumed to be risk neutral. They face a fixed opportunity cost of funds denoted by r_f, and they are willing to lend as long as they earn zero expected profits. If the realization of u is between $\hat{u}_i$ and u_i^*, the individual files for bankruptcy and the lenders receive ($\theta_i - X_i$), while if $u<\hat{u}_i$, lenders receive nothing. Thus the lenders' zero profit condition is given by

$$L \equiv \int_{\hat{u}_i}^{u_i*} (\theta_i - X_i) f(u)du + \int_{u_i*}^{\bar{u}} B(1+r_i) f(u)du - B(1+r_f) = 0 \qquad i=h,n \quad (3.1.9)$$

Lenders set the interest rate to satisfy this equation, otherwise they do not lend. To study the effect of changes in exemptions on the rate of interest charged by creditors, we take the total derivative of *(3.1.11)* to get[13]

[13] It can be shown that other terms, involving derivatives of the limits, cancel out.

$$\frac{dr_i}{dX_i} = -\frac{-\int_{\hat{u}}^{u^*} f(u)du}{\int_{u^*}^{\bar{u}} Bf(u)du} > 0 \qquad i=h,n \qquad (3.1.10)$$

Hence lenders will charge higher rates of interest on loans as exemptions increase, since the amount that they can reclaim at the time of bankruptcy is lower.

INDIVIDUALS

The individual chooses whether to start a business at home, to start a business in the neighboring state, or to start no business and receive U(W`). The expected utility from starting a business in state *i* is given by,

$$\int_{\underline{u}}^{\hat{u}_i} U(\theta_i) f(u)du + \int_{\hat{u}_i}^{u^*} U(X_i) f(u)du + \int_{u^*}^{\bar{u}} U(\theta_i - B(1+r_i)) f(u)du \qquad i=h,n$$

(3.1.11)

where the limits are as defined before.

The individual will be willing to move if the expected utility from moving *(EU_M)* is greater than U(W') and greater than the expected utility from not moving *(EU_{NM})*. Assuming that entrepreneurship is more attractive than wage employment, the individual moves if

$\Delta EU = EU_M -$

$$EU_{NM} = \int_{\underline{u}}^{\hat{u}_n} U(\theta_n) f(u)du + \int_{\hat{u}_n}^{u_n^*} U(X_n) f(u)du + \int_{u_n^*}^{\bar{u}} U(\theta_n - B(1+r_n)) f(u)du \; -$$

$$\int_{\underline{u}}^{\hat{u}_h} U(\theta_h) f(u)du + \int_{\hat{u}_h}^{u_h^*} U(X_h) f(u)du + \int_{u_h^*}^{\bar{u}} U(\theta_h - B(1+r_h)) f(u)du > 0 \qquad (3.1.12)$$

Note that the the cost of moving is included in the definition of θ_n .Next we consider how changes in the exemption level in the neighboring state affect the attractiveness of moving, given by ΔEU. To do this, we take the total derivative of *(3.1.14)* and substitute for $\frac{dr_i}{dX_i}$ from *(3.1.12)* and find,[14]

$$\frac{d\Delta EU}{dX_n} = \int_{\hat{u}_n}^{u_n*} U'(X_n) f(u)du - \int_{u_n*}^{\bar{u}} U'(\theta_n - B(1+r_n)) f(u)du \frac{\int_{\hat{u}_n}^{u_n*} f(u)du}{\int_{u_n*}^{\bar{u}} f(u)du} \qquad (3.1.13a)$$

Similarly for the home state:

$$\frac{d\Delta EU}{dX_h} = -\left(U'(X_h) \int_{\hat{u}_h}^{u_h*} f(u)du - \int_{u_h*}^{\bar{u}} U'(\theta_h - B(1+r_h)) f(u)du \frac{\int_{\hat{u}_h}^{u_h*} f(u)du}{\int_{u_h*}^{\bar{u}} f(u)du}\right) \qquad (3.1.13b)$$

The sign of these expressions are, respectively, the signs of

$$U'(X_n) - \frac{\int_{u_n*}^{\bar{u}} U'(\theta_n - B(1+r_n)) f(u)du}{\int_{u_n*}^{\bar{u}} f(u)du} > 0 \qquad (3.1.14a)$$

$$-\left(U'(X_h) - \frac{\int_{u_h*}^{\bar{u}} U'(\theta_h - B(1+r_h)) f(u)du}{\int_{u_h*}^{\bar{u}} f(u)du}\right) < 0 \qquad (3.1.14b)$$

The effect of neighbor's exemption on the attractiveness of moving is positive. The expression *(3.1.14a)* equals the entrepreneur's marginal utility of wealth when they file for bankruptcy and keep X_n minus their average marginal utility of wealth when they avoid bankruptcy and keep $\theta_n - B(1+r_n)$. For risk averse entrepreneurs, this expression must be positive, since wealth when filing for bankruptcy is lower than wealth when avoiding bankruptcy, so their marginal utility of wealth must be higher when they file for bankruptcy. Thus as long as credit is available, an increase in the neighbor's exemption

[14] Note that the total derivative involves other terms, like derivatives of the limits, which cancel out.

level increases the attractiveness of becoming a business owner in the neighboring state, even though credit is more expensive when the exemption limit is higher.[15] In other words, individuals are less likely to start businesses in own state if business conditions in neighboring state are better. At the same time, expression *(3.1.14b)* suggests that an increase in own state exemptions reduces the attractiveness of moving.

3.2 Empirical Model

In this paper I do a two-part empirical study. I first examine small business openings, and then consider small business closings. I use the same structure for both parts. I adopt a probit formulation with a latent variable specification, allowing for individual random effects and testing the significance of the state dummies in different specifications. Since the structure of the model is the same for openings and closures, for expositional purposes I discuss only the model for small business openings. Model estimation is discussed fully in the appendix.

My model can be specified as

$$Y_{it}^{*} = \delta_0 + \delta_1 D_{it1} + \delta_2 D_{it2} + \ldots + \delta_{44} D_{it39} + X_{it} B_1 + (W_{it.} Z_t) B_2 + (Y_{it-1,2}) B_3 + \varepsilon_{it} \; ; \; i=1,..,N, \; t=3..T \quad (3.2.1)$$

$$Y_{it}=1 \text{ if } Y_{it}^{*} > 0$$

$$Y_{it}=0 \text{ if } Y_{it}^{*} \leq 0$$

$$\varepsilon_{it} = \alpha_i + u_{it}$$

For values in years $t=1,2$, data on $Y_{it-1,2}$ is not available. For these observations, I specify:

$$Y_{it}^{*} = \gamma_0 + \gamma_1 D_{it1} + \gamma_2 D_{it2} + \ldots + \gamma_{44} D_{it39} + X_{it} B_4 + (W_{it.} Z_t) B_5 + \varepsilon_{it} \; ; i=1,\ldots,N, \; t=1,2 \quad (3.2.1a)$$

$$Y_{it}=1 \text{ if } Y_{it}^{*}>0$$

$$Y_{it}=0 \text{ if } Y_{it}^{*} \leq 0$$

$$\varepsilon_{it} = \alpha_i + u_{it}$$

[15] One can also show that the model implies that the net expected utility is decreasing in the cost of moving (or distance moved) and that higher expected profits, or better demand conditions in neighboring state, increase the attractiveness of moving.

The subscript *i* relates to the cross sectional unit. The subscript *t* relates to the time period. My latent variable is Y_{it}* and my observed dependent variable is Y_{it}. Y_{it} relates to a cross sectional unit *i's* decision (for expositional purposes) to start a business in year *t*. In particular, Y_{it}=1 if the ith cross sectional unit starts a business in year t, and 0 otherwise. Note that the sample consists only of people who did not own a business at the beginning of year t. The lagged dependent variable $Y_{it-1,2}$ indicates whether the household owned a business at some point in the preceding two years.[16] The cross sectional unit is assumed to start a business in the state in which it resides. Y_{it} is explained in terms of the latent variable Y_{it}*, which captures the factors responsible for the decision.

X_{it} is the vector of explanatory variables relating to cross sectional unit *i* in year *t*. These variables include both state-level variables, such as unemployment benefit variables and bankruptcy exemption measures, and also family level variables such family wealth, entrepreneurs labor or business income, and other demographic characteristics. These are explained in detail below. B_1 is a coefficient vector.

$W_{it.}$ is a 1x40 row vector that assigns a positive weight to "neighbor states", as defined below. The weight assigned to all other states is zero. The reason why there are only 40 states is that the SIPP dataset identifies 41 individual states and the District of Columbia. The nine other states are aggregated into three groups.[17] However, in my model, I drop observations for Hawaii (since no neighbors can be defined), and New Mexico and DC.[18] Further, I add New Hampshire to the state unit comprising Maine and Vermont, and define Rhode Island and Connecticut as one state unit.[19] Neighboring states are defined as those that are adjacent to the state in which the cross sectional unit resides. I assume that the *i*th unit will not consider moving to states that are not adjacent, and I assign these

[16] Since the data is available monthly, I define a business start as a person who did not own a business in January of that year, but did own a business at some point during the year.

[17] These groups are (1) Maine and Vermont; (2) Iowa, North Dakota and South Dakota; (3) Alaska, Idaho, Montana and Wyoming.

[18] These states are dropped due to insufficient observations, and they cannot be merged with neighbors since their policies are not similar.

[19] New Hampshire lies *between* Maine and Vermont, so it forms a natural unit. Rhode Island has few observations and is similar to Connecticut in its policies.

states a weight of zero. In different specifications of the model, I experiment with assigning a positive weight to all neighbor states or only to those neighboring states that have more favorable business conditions than the state in which the cross sectional unit is currently located, since these are arguably the only states the *i*th unit would consider as an alternate location for the business. The formulation of the weighting matrix is explained in detail below.

Z_t is a 40xK matrix of observations on K state-level macroeconomic variables. These variables vary across time and state. They are explained in more detail below. B_2 is a Kx1 parameter vector.

ε_{it} is the disturbance term in the latent variable formulation. It has an error components structure, where the process $\{u_{it}\}$ is *iid* over *i* and *t*, and the cross sectional component α_i is *iid* over *i*. Finally, $D_{it1,\ldots\ldots,}D_{it39}$ are dummy variables for individual states or groupings of states.

3.3 Definition of Variables

The vector of explanatory variables includes state-level variables as well as demographic variables[20]. In particular, X_{it} includes the following:

1. *Bankruptcy Exemption*: These are the bankruptcy exemptions that the cross sectional unit faces in its home state. I use the homestead exemption as well as the personal property exemption. The homestead exemption is an exemption for equity in owner occupied housing. As shown in Figure 1 for the year 1996, this varies widely among states, with some states having no exemption and seven states having unlimited exemptions. Most states also have exemptions for household belongings, equity in vehicles, retirement accounts, and a wildcard category that can be applied to any type of asset. The exemption levels have changed over time in many states. For instance between 1993-1998, 28 states effected changes to their homestead and/or property exemptions. These

[20] For the grouped states, I use sample population weighted averages of these variables.

exemptions provide partial wealth insurance to entrepreneurs, and are therefore expected to encourage entrepreneurship.

2. *State per capita income:* This variable has been changing over time for all states. High state incomes may be associated with high demand, encouraging entrepreneurship. At the same time, this may mean higher incomes for current job earners, and thus transitions to entrepreneurship may be reduced.
3. *The top marginal state income tax rate*, which has changed over time for 25 states in the period 1993-1998. Most studies find that high personal taxes encourage transitions to entrepreneurship, except for Georgellis and Wall (2002), who find the relationship to be U-shaped.[21] High personal taxes encourage tax avoidance which is easier for business owners than for salary workers.
4. *State unionization rate, state unemployment rate* and the proportion of population in non farm employment. High state unionization rates may discourage entrepreneurship as wages may be higher, while different studies find differing effects of unemployment rates. The nonfarm employment rate is entered to correct for the fact that bankruptcy law is different for farmers.
5. *The self employment or unemployment assistance benefits* for each state. For the unemployment benefits, I consider the replacement rate (the ratio of the average unemployment benefit paid out to the average weekly wage) in each state. This variable varies over time for 25 states in the sample. The data is available from the US Department of Labor. The sign on this coefficient is ambiguous since the availability of generous benefits may discourage any kind of movement out of unemployment, but at the same time, the financial assistance provided may encourage entrepreneurship.
6. *Individual and family level variables,* including marital status, age, race, health insurance coverage, employment status and education level, as well as family income from wealth and whether the family owns their home.

The matrix Z_t includes observations on state-level variables that may be important for starting a business in neighboring states, such as

[21] Cullen and Gordon (2002), Bruce (1998)

1. *The bankruptcy exemption variable*
2. *Per capita income*
3. *The maximum marginal state income tax rate*

Finally, I describe the Nx40 spatial weights matrix, $W_t=[W'_{1t.},\ldots\ldots\ldots,W'_{Nt.}]'$. At any time t, the ith row of this matrix is given by $W_{it.}$, which specifies "neighborhood sets" for each observation i. The ij-th element of W_t, namely, $w_{ij,t}$, is positive if j is a "neighbor" of i, and is zero otherwise. I consider distance and population weighted averages of exemptions, per capita incomes and tax rates in neighboring states, and also simple averages of these variables. For instance, for distance weights,

$$w_{ijt} = \frac{\frac{1}{dist_{ijt}}}{\sum_k \frac{1}{dist_{ikt}}}$$ where k is the number of "neighbor" states for individual i.

By convention, a cross sectional unit is not a neighbor to itself, so that the diagonal elements of W_t are all zero i.e $w_{ii,t}=0$. I will be using a scale normalized version of the weighting matrix. I also experiment with assigning a positive weight to only those "neighbors" that have the highest exemptions.

3.4 Data Sources and Description

In my study, I use longitudinal datasets available from the Survey of Income and Program Participation (SIPP), published by the Census Bureau. I use the SIPP longitudinal datasets for 1993-1995 and 1996-1998, and I present results for the pooled panel 1993-98, as well as for the sub-sample 1993-95. SIPP is a multi-panel longitudinal survey of adults, measuring their economic and demographic characteristics over a period of approximately three years. Persons selected into the SIPP sample continue to be interviewed once every four months over the three years of the panel. At the time of the interview they are asked questions relating to the previous four months. Thus the data is available monthly for each person in the panel. For instance, the 1993 SIPP panel consists of approximately 120,000 individuals who were interviewed in 1993, 1994 and 1995. I will look at a balanced panel of cross sectional units that have data available for all three years. Though the data is available at an individual level, it is possible to uniquely identify a family or a household, and construct family level variables. The data gives information about the state (though not the county) in which the individual is located at the time of the interview. Thus SIPP records movement of members in the sample and changes in the household composition.

The summary statistics in Table 1 reveal sample characteristics for the 1993-98 panel. SIPP interviews all individuals above 15 years of age in the sample household. The sample has a larger proportion of whites, while Blacks form only 13% of the sample. About 30% of the sample has attended college, while about 38% are married. About 59% of the overall sample (and 70% of the business owners) own a home, thus justifying the use of the homestead exemption as an important factor in the analysis. Over the entire period, about 1.5% of the sample started a business, while 1.9% ended one. Figure 3 profiles business owners in the sample. Controlling for sample shares of the relevant groups, a large fraction of business startups are by white males. College educated individuals and married men are more likely to start businesses, as are people younger than 50. The corresponding statistics for business closures (not shown) are the reverse of those for business startups; white, college educated, young and married males are less likely to close down their businesses.

As shown in Figure 2 and Table 2, there appears to be a large and positive correlation between business starts and closures across states in different years. In particular, even controlling for population size, states with high start up rates, such as California and Florida, also have high closure rates. Further, Figure 2 suggests a mild positive correlation between exemptions and startups (.0139), and exemptions and closures (.0036) (controlling for sample state size).

4. Regression Results[22]

4.1 Business Start Results

In this section, I present regression results for business starts, estimated with the random effects probit described in detail in the appendix. I define a dummy equal to one if the cross sectional unit did not own a business at the beginning of the year, but does own a business at some point during the current year. The sample is thus restricted to all individuals who did not own a business at the beginning of the year. Table 3 presents results with the lagged dependent variable and the health insurance variables, but without the spatial variables. Table 4a presents results with the spatial variables for the pooled 1993-98 panel and for the 1993-95 panel separately.[23] The sample size is 120,219 individuals over the period 1993-1995, and 312,845 for the pooled panel.[24]

Estimation Technique

The estimation strategy involves the following steps. *Step 1*: Following the specification outlined in Appendix A.1, we pool data across the years 1993-95, but allow for different coefficients in 1995 for which we have data on lagged business ownership available. Note that the effect of state-level conditions on entrepreneurship can be captured by putting in either *state-level variables,* or *state dummy variables* for each year for the 40 state units defined in the sample. My hypothesis is that my state variables, whose values vary over time, are sufficient to account for *all* the state effects. There are overall 40 state units, and I have a time intercept and 16 state variables, which leaves 23 degrees of freedom. Thus, I specify the regression equation in *each year* with all the demographic variables, 16 state variables (own state and weighted neighbor state), a time intercept, and 23 state dummies. The time intercept is considered because I allow the intercept to change along with the coefficients of all the state dummy variables. The first hypothesis

[22] The state units are as defined in Table 2.

[23] The estimated variances for the 1996-98 panel were larger than for 1993-95, hence pooling imposes the arbitrary restriction of equal variances. That is why I report results for the 1993-95 panel separately as well, rather than just the pooled panel.

[24] Note that the 1993 panel covers the period October 1992-Dec 1995, so I have only three years of full data.

that we test is whether the (23 ×3) coefficients relating to the state dummy variables for each year, are jointly significant in a regression which includes all of my 16 state variables.[25] The joint test of significance of the state dummy coefficients revealed the state dummy variables to be insignificant, thus the model is specified without them.

A further test of the model involved testing for equality of the coefficients on state-level variables in 1995 and 1993-1994. The chi square statistic was small, leading us to accept the hypothesis that the coefficients are identical. Thus the model is specified with time varying coefficients for the demographic variables, but time-invariant coefficients for the state-level variables for all three years.

Step 2: The procedure for model estimation and the treatment of state dummies was replicated for the 1996-98 panel. Testing revealed the state dummies to be jointly insignificant. I then tested for similarity of the coefficients on state-level variables in 1998 and 1996-97, and concluded that they were insignificantly different from each other.

Step 3: Finally, I pooled across the two panels. The coefficients on state-level variables for 1996-98 were not significantly different from 1993-95, hence the pooled model allowed for time-invariant coefficients for state-level variables for all six years.

Results

I first estimated the model without the spatial variables, as shown in Table 3. The coefficient on exemptions is significant and positive at the 1% level, similar to Fan and White (2003), and Georgellis and Wall (2002). The predicted probability of starting a business is increasing in the exemption level.[26] I also get good results for the lagged dependent variable (positive and significant), as well as the health insurance variables.

[25] The usual Hausman specification test did not work due to numerical problems. Also, inclusion of all state dummies in this specification would have lead to collinearity problems.
[26] On average, an increase in the exemption limit by $50,000 increases the probability of a business start by 20%.

Since these results are similar in the model with spatial variables, I discuss these in greater detail in the following section.

Results with the spatial variables are presented in Table 4a. The model performs well, in that it confirms previous findings on the demographic variables, and also produces significant estimates of the spatial variables. The explanatory variables include whether the individual is male, has attended college and is married, all of which have a positive and significant impact on business formation. I also include race and ethnicity effects, which confirm earlier results (Meyer, 1990) that Blacks and other ethnic minorities are less likely to start businesses. The positive linear and negative quadratic terms in age imply that the effect of age is U-shaped. Younger individuals are more likely to start businesses. The effect of family wealth is positive and significant, suggesting that high wealth reduces credit constraints that the business owner may face (Holtz-Eakin et al, 1994, Evans and Jovanovic, 1989). Individuals who have high earnings from current jobs may be less likely to switch to starting a business (Evans and Leighton, 1989). At the same time, individuals with high incomes may have the financial means to start a business. This coefficient is significant, but produces mixed results for the two samples, as shown in Column 1 and Column 4. Fan and White (2003) surprisingly do not find a statistically significant effect of earnings or wealth on entrepreneurship.

This paper finds two new interesting results on the role of health insurance in entrepreneurship. If a person is in a wage and salary occupation and receives employer insurance, he is less likely to move towards self-employment, whereas if the individual has self-purchased insurance, he is more likely to start a business. Holtz-Eakin et al (1996) did not find a statistically significant impact of health insurance variables on transitions to entrepreneurship, using SIPP 1984, 1986 and 1987 panels.[27] The marginal effects suggest that employer insurance reduces the probability of transition by 5%,

[27] They controlled for other job characteristics, like whether the job offered dental insurance, pension etc, and whether the spouse had insurance. I control for income from job, and whether the person was self-insured. SIPP 1993 panel does not specifically ask whether the spouse had insurance.

whereas self-insurance increases the likelihood by nearly 1%.[28] If the person is unemployed, he is significantly less likely to start a business. I defined a dummy for whether the person was unemployed, and (in some specifications, as shown in Column 4) interacted that dummy with the average unemployment benefit for that state *and* a dummy for whether the state had a Self Employment Assistance (SEA) program. The coefficient on the interaction term is insignificant, but the coefficient on SEA is positive and significant at 15%, providing some evidence on the effectiveness of these programs in transitions to entrepreneurship out of unemployment. The above mentioned results are robust to different specifications.

Apart from the demographic variables, I control for the level of state per capita income, (PCI), which serves as an indicator of demand conditions, and for the maximum marginal state income tax rate. The sign on the tax coefficient is positive, though insignificant, which is in accordance with Bruce (2000), who finds that high tax rates induce individuals towards self-employment due to the tax avoidance incentive. State PCI is also positive and significant in some specifications, thus better economic conditions induce transitions to entrepreneurship. I use state unemployment rates, state unionization rates and nonfarm employment as additional controls. In some specifications, the state unemployment rate is positive and significant, suggesting that a lack of job opportunities may push people towards entrepreneurship.

The main variables of interest are the bankruptcy exemptions in one's own state as well as in neighboring states. To study the effect of own state exemptions, I use the sum of the actual homestead and personal property exemption level, by setting a value of 250000 for the unlimited homestead exemption. I now examine the spatial variables more closely.

I define the variable, AVGNBEX, as a weighted average of exemptions of all neighboring states. High average exemptions in neighboring states may have two opposing effects on entrepreneurship. First, if we look at Figure 1, there appears to be

[28] For the 1993-95 panel, the corresponding value for employer insurance is 7%, and for self-purchased insurance, 6%.

some clustering of states across different exemption ranges. So high average neighbor exemptions imply that the individual's own state is likely to be located in a "high exemption" region, and this has a positive effect on entrepreneurship. However, at the same time, the individual could presumably be better off moving to a neighboring state with *higher* exemptions than in own state, which lowers the probability that the entrepreneur will start a business in his own state. To capture the second effect clearly, I define a separate dummy variable, DUMAVEX, for whether the average exemption of the neighboring states is higher than one's own exemption.

In Column 1, I report results for the full set of state variables, using the pooled 1993-98 panel. Own state exemption is insignificant in this specification. DUMAVEX is significant and negative at 5%, suggesting that if the average neighbor exemption is higher than one's own, this significantly lowers entrepreneurship in one's own state. Interpreting the marginal effect, this reduces the probability of starting a business by about 1% (given the base probability of 1.51%), which is economically significant.[29] I also put in dummy variables, DUMAVPC and DUMAVTX, which equal one if neighbor PCI is higher, or neighbor tax rate is *lower*, respectively, than in one's own state. DUMAVTX and DUMAVPC are the right sign, but insignificant.

I also control for average conditions in neighboring states, by using distance weighted averages of conditions in neighbor states. Distance between any two states is defined as distance between their respective capital cities. The greater the distance between neighboring states, the lower will be the effect of high exemptions in that state on entrepreneurship in one's own state. Distance weighted AVGNBEX is insignificant. Other spatial variables included in the model are average neighbor per capita incomes, AVGNBPC, and average neighbor tax rates, AVGNBTX. AVGNBPC is negative and significant at 10%, thus high average incomes in neighboring states reduce entrepreneurship in own state.

[29] Note that the total number of business starts in my sample is approximately 4600, out of the total sample of 312,000 (approx.). If the probability is reduced by 1%, this implies that there are roughly 50 less starts. Weighting these numbers by the total US population, this reduces business starts by approximately 50,000.

Results in Column 1 suggest that controlling for DUMAVEX reduces the significance of own state exemptions. I test to see if the results change when I drop own state exemptions and average neighbor exemptions from the model. Column 2 reports results with this specification. The estimated marginal effect for DUMAVEX does not change and is negative, but the significance level improves to 1%. I also drop AVGNBPC and AVGNBTX from the model. In this specification, the effect of higher neighbor incomes captured by DUMAVPC, is significantly negative on entrepreneurship in one's own state. Estimates of other variables are similar to those in Column 1, though it is worth noting that the unemployment rate is positive and significant.

In column 3, I introduce the own state exemption variable, EXEMPTION, into the model, but not AVGNBEX. DUMAVEX is still significant, but EXEMPTION is not. DUMAVEX reduces the probability of business formation in own state. Thus even controlling for own state exemptions does not reduce the significance of DUMAVEX. AVGNBPC in negative and significant as in Column 1.In this specification, PCI is also positive and significant.

In Column 4, I present results for the sub-sample 1993-95, using population weighted averages of neighbor conditions. Results are similar to those outlined in Column 1. Population weights capture the idea that individuals are more likely to move to more populous states (since in general these are also the states with more job opportunities, larger markets, etc). The signs on the demographic variables do not change. The coefficient on the exemption level is not significant, but DUMAVEX is negative and significant as before.

Summarizing the results on the effect of exemptions, it is interesting to note that when the spatial variables are included in the model of Table 3, the effect of own state exemptions is insignificant. Thus it appears that while exemptions are important to entrepreneurs, they care more about the *relative* exemption in their state vis-à-vis the neighboring states. This is plausible since as pointed out in the introduction, small firms are subject to high failure and closure rates, and risk averse entrepreneurs would make the optimal choice among competing locations.

Finally, I present results for the lagged dependent variable, LAGBSTRT. This is a dummy variable equal to 1 for those individuals who owned a business at some point in the previous two years. This variable is positive and significant, suggesting that people who have owned a business before are nearly 40% more likely to start a business today. This is consistent with the recent study of small business owners by Sullivan et al (1998) which finds that business owners who file for bankruptcy have a higher likelihood of starting new businesses within the next year. Note that this variable is not defined for the years 1993, 1994, 1996 and 1997, since lagged information is not available for these years.

In other specifications (not shown), I look at the effect of the *highest* exemption neighbor on the entrepreneurship decision. Coefficients are similar to those reported in Column 1 of Table 4a.

As another check, I pooled data from the only two years with the lagged variable defined i.e. 1998 and 1995, to ensure that the results are not sensitive to the specification across different periods. For the latter specification, I do not use random effects since these are independent panels. Results (not shown) are similar to those described above.

4.2 Business Closure Results

Table 4b presents results for business closures. I define a business closure by use of a binary variable equal to 1 if the person owned a business at the beginning of year t, but did not own a business at some point during year t. Thus the sample only includes people who owned a business at the beginning of the year. As a result, the sample size for the years 1993-1998 is fairly small, comprising only 14,983 observations. The model specification is similar to that estimated for business starts.

The probability of small business closures is significantly lower for males, for people in the younger age group, and for individuals who are married and is significantly higher for Blacks and Mexicans. More educated individuals are less likely to close businesses, confirming the result in Kengasharju and Pekkala (2001). The coefficient on family wealth is positive and significant, thus asset income provides entrepreneurs insurance as they look for other jobs, making it easier to shut down weak businesses. Individuals who own homes are significantly less likely to shut down, perhaps because the businesses are home based. Own income, which includes income from the business, is significantly negatively related to business closure, which is not surprising.

I use additional controls for state per capita income, PCI, state maximum marginal tax rates, state unemployment and state unionization rates. Surprisingly, state unionization rates significantly reduce the probability of business closures. This could be because firms are more reluctant to hire workers in these markets, thus entrepreneurs may less easily transition towards wage and salary occupations. Or it may be tougher for firms to shut down if workers are unionized. Other interesting results include the impact of SEA programs on the probability of business closure. The effect is negative and moderately significant at 15%.

In the regression without the spatial variables (Column 2 in Table 3), the effect of own exemptions on small business closure is positive, but significant only at the 15% level. Our interpretation of this finding is that if individuals are in states with high exemptions, they find it easier to shut down due to the wealth insurance provided by these high exemptions. Including the spatial variables in the regression (Table 4b), makes the own state exemptions insignificant. I use distance weighted averages of neighbor conditions in Column 1. The sign on the spatial variable, DUMAVEX is significant and positive. DUMAVEX captures the idea that higher average exemptions in neighboring states increase the probability of business closure as businesses may decide to relocate to higher exemption states. AVGNBTX and AVGNBEX are not significantly related to closure.

In Column 2 of Table 4b, I present results for the sub-sample 1993-95. I drop AVGNBEX from the model. DUMAVEX is significant and positive at 10%. In this specification, DUMAVTX and MAXAVTX are significant and have the right sign. *Lower* taxes in neighbor states increase the probability of business closure, as entrepreneurs may decide to relocate to these states to take advantage of better conditions. MAXAVTX captures the effect of average tax rates going up, when average taxes are lower than in own state.[30]

Finally I include a lagged dependent variable, LAGBSCLOS, which is equal to 1 if the individual *did not own* a business in the previous two years. The positive sign on this variable indicates that people who did not own a business before are more likely to shut down.

5. Specification tests

I estimated several alternative specifications of the above model. I divided the own state exemptions into five categories, as in Fan and White (2003), to allow for the possibility of a non-monotonic relationship between exemptions and entrepreneurship, as in Georgellis and Wall(2002).[31,32] I found no significant effect of own state exemption variables. The spatial variables remained significant and had the same signs. I also tried adding a quadratic term (along with the linear term) in the own exemption variable, and found that the quadratic was not significant.

I redefined the business ownership variable to include only those businesses whose owner spent more than 35 hours per week on his business. Further, I allowed for the exemption variable to have different effects depending on whether the business owner

[30] In other specifications, I also introduced DUMAVPC into the model. It was insignificant, and did not affect other results.
[31] The categories are: States with unlimited exemptions, states with exemptions in the range 95000 to 200000, states with exemptions in the range 60000 to 95000 and states with exemptions in the range 20000 to 60000.
[32] They find that entrepreneurship falls at certain high exemption levels, which may be due to lower credit availability in states with high exemptions (Berkowitz and White, 2002).

was a renter or a homeowner. The estimated coefficients were larger for homeowners. The results were robust across different specifications.

Also, as a final check, I imposed equality of all coefficients across the two panels, and estimated the model by introducing time-invariant state dummies into the pooled 1993-98 model. The results did not change.

The main conclusion that can be drawn from these results is that spatial variables are significant predictors of small business formation across states. States must recognize that businesses have the option to move outside the state to take advantage of better business conditions. Thus states must follow policies that are competitive with at least their immediate neighbors, since much migration happens between neighboring states. While some existing studies have looked at tax competition between competing jurisdictions, e.g Brueckner et al (1999), this is the first paper to study the effect of competing policies encouraging small business formation among US states.

6. Conclusion

This paper has provided empirical evidence on the effect of bankruptcy law on small business formation. The unique contribution of this paper is the addition of spatial terms measuring the effect of business conditions in surrounding states on the decision to set up or close a business in the current state. The results suggest that entrepreneurs choose the location of their businesses in response to competing business conditions, in and outside the state. The focus of this paper is on small businesses. Since these represent the majority of all businesses and contribute to high rates of both job creation and job destruction in most OECD economies, it is important to study the factors that determine their birth and closure, which this paper has attempted to do. While the focus of this paper is on small businesses in the US, the policy implications of this study apply more generally to all economies. In particular, in Europe, where bankruptcy laws and other business conditions are not as friendly towards small business, and also in developing economies, where the majority of individuals own small businesses, adopting appropriate policies towards bankruptcy may encourage the growth of these economies.

Appendix

A.1 Maximum Likelihood Estimation

In the model with a lagged dependent variable, the initial value of the dependent variable may be correlated with the random effects term. One solution for this is to specify a separate equation for the initial value of the dependent variable (Heckman, 1981). Our procedure is explained in detail below.

Consider the model

$$Y_{it}^{*} = x_{it}'\beta + \gamma Y_{it-1,2} + \varepsilon_{it} \qquad t = 3,...,T; i = 1,..,N \tag{1}$$

$$Y_{it} = 1 \text{ if } Y_{it}^{*} > 0 \tag{1a}$$

$$Y_{it} = 0 \text{ otherwise} \tag{1b}$$

$$\varepsilon_{it} = \alpha_i + u_{it} \tag{1c}$$

where x_{it} is an exogenous vector and where α_i and u_{it} are random elements. We assume that the processes $\{\alpha_i\}$ and $\{u_{it}\}$ are independent, α_i is *i.i.d.N(0,* σ_{α}^{2}*)* and u_{it} is *i.i.d. N(0,* σ_{u}^{2}*)* over both *i* and *t*. In the model specified above, (1) is defined for *t=3,..,T*. The reason for including the lagged value $Y_{it-1,2}$, is to capture "state dependence". I allow the unit to have owned or not owned a business, in the previous two years. For *t=1,2* we assume that Y_{it}^{*} is generated by a similar process, except that there is no lagged dependent variable. Hence we allow the coefficients to be different for these years. This is similar to the formulation by Arulampalam (2000), although unlike that model, my model involves joint estimation based on $(Y_{i1},....,Y_{iT})$ so that the likelihood function includes the initial years. Therefore, when *t=1,2*, we assume

$$Y_{it}^{*} = x_{it}'\lambda + \varepsilon_{it} \qquad i=1,..,N \tag{2}$$

$$Y_{it} = 1 \text{ if } Y_{it}^{*} > 0 \tag{2a}$$

$$Y_{it} = 0 \text{ otherwise} \tag{2b}$$

$$\varepsilon_{it} = \alpha_i + u_{it} \tag{2c}$$

where x_{it} is exogenous, the processes $\{\alpha_i\}$ and $\{u_{it}\}$ are independent, and u_{it} is *i.i.d N(0,* σ_{u}^{2}*)*. Thus combining specifications, u_{it} is *i.i.d.N(0,* σ_{u}^{2}*)* for *t=1,..,T* and *i=1,..,N*.

Let $G_{i,(1,T)}(y_{i1},....,y_{iT} \mid \alpha_i)$ be the joint density of $(Y_{i1},....,Y_{iT})$ conditional on α_i, and the sequence $x_{i1},...,x_{iT}$. The dependence on the entire sequence of *x'*s is the reason for the subscript *(1,T)* in the joint density. Then recalling that u_{it} is *i.i.d*. over *t=1,..,T* and using evident notation,

$$G_{i,(1,T)}(y_{i1},....,y_{iT} \mid \alpha_i) = g_{i1}(y_{i1} \mid \alpha_i) g_{i2}(y_{i2} \mid \alpha_i) g_{i3}(y_{i3} \mid y_{i1,2},\alpha_i)....g_{iT}(y_{iT} \mid y_{iT-1,2},\alpha_i) \quad (3)$$

$$= \prod_{t=3}^{T} g_{it}(y_{it} \mid y_{it-1,2},\alpha_i) g_{i2}(y_{i2} \mid \alpha_i) g_{i1}(y_{i1} \mid \alpha_i) \quad (4)$$

Recalling that α_i is *i.i.d*., let $h(\alpha_i)$ be the density of α_i. Then the likelihood for the entire sample, which is not conditional on $\alpha_1,.....,\alpha_N$, is

$$L = \prod_{i=1}^{N} L_i \quad (5)$$

where

$$L_i(\beta,\lambda,\gamma,\sigma_\alpha,\sigma_u \mid y_{i2},.....,y_{iT},x_{it},....,x_{iT}) = \int_{-\infty}^{\infty} \prod_{t=3}^{T} g_{it}(y_{it} \mid y_{it-1,2},\alpha_i) g_{i2}(y_{i2} \mid \alpha_i) g_{i1}(y_{i1} \mid \alpha_i) h(\alpha_i) d\alpha_i \quad (6)$$

and where $y_{it} = 0,1$ for all $i = 1,..,N$ and $t = 1,...,T$.

Note that, $g_{it}(y_{it} \mid y_{it-1,2},\alpha_i)$, the density of Y_{it} conditional on $Y_{it-1,2}$ and α_{i}, can be expressed as follows,

$$g_{it}(y_{it} \mid y_{it-1,2},\alpha_i) = \Pr ob(\varepsilon_{it} > -x'_{it}\beta - \gamma y_{it-1,2})$$

for $y_{it} = 1; t = 3,..,T; i = 1,..,N$ (7)

and when *t=1,2*

$$g_{it}(y_{it} \mid \alpha_i) = \Pr ob(\varepsilon_{it} > -x'_{it}\lambda) \qquad \text{for } y_{it} = 1; i = 1,..,N \quad (8)$$

Similarly,

$$g_{it}(y_{it} \mid y_{it-1,2}, \alpha_i) = \Pr ob(\varepsilon_{it} < -x_{it}'\beta - \gamma y_{it-1,2})$$

for $y_{it} = 0; t = 3,...,T; i = 1,...,N$ (9)

and, when *t=1,2*

$$g_{it}(y_{it} \mid \alpha_i) = \Pr ob(\varepsilon_{it} < -x_{it}'\lambda) \qquad \text{for } y_{it} = 0; i = 1,..,N \tag{10}$$

Now, note that $\varepsilon_{it} \mid \alpha_i \sim N(\alpha_i, \sigma_u^2)$ for all *t=1,..,T*. Therefore, the change of variable $z_{it} = \dfrac{\varepsilon_{it} - \alpha_i}{\sigma_u}$ in the probability expressions in (7)-(10) will yield probability statements based on the standard normal variable, z_{it}. For example, carrying out this substitution in (7) and (8) would yield the following,

$$g_{it}(y_{it} \mid y_{it-1,2}, \alpha_i) = \Pr ob(z_{it} > \frac{-x_{it}'\beta - \gamma y_{it-1,2} - \alpha_i}{\sigma_u}) \text{ ; } t=3,....,T \tag{11}$$

and, when *t=1,2*

$$g_{it}(y_{it} \mid \alpha_i) = \Pr ob(z_{it} > \frac{-x_{it}'\lambda - \alpha_i}{\sigma_u}) \tag{12}$$

Let F(.) denote the CDF of the standard normal variable. Then, using evident notation, (11) and (12), respectively can be expressed as follows. For *t=3,..,T*,

$$g_{it}(y_{it} \mid y_{it-1,2}, \alpha_i) = 1 - F(\frac{-x_{it}'\beta - \gamma y_{it-1,2} - \alpha_i}{\sigma_u}) \quad \text{for } y_{it} = 1; y_{it-1,2} = 0,1 \tag{13}$$

and, when *t=1,2*

$$g_{it}(y_{it} \mid \alpha_i) = 1 - F(\frac{-x_{it}'\lambda - \alpha_i}{\sigma_u}) \qquad \text{for } y_{it} = 1 \tag{14}$$

Similarly, (9) and (10), respectively can be expressed as follows. For *t=3,..,T*,

$$g_{it}(y_{it} \mid y_{it-1,2}, \alpha_i) = F(\frac{-x_{it}'\beta - \gamma y_{it-1,2} - \alpha_i}{\sigma_u}) \qquad \text{for } y_{it} = 0; y_{it-1,2} = 0,1 \tag{15}$$

and, when $t=1,2$

$$g_{it}(y_{it} \mid \alpha_i) = F(\frac{-x'_{it}\lambda - \alpha_i}{\sigma_u}) \qquad \text{for } y_{it} = 0 \tag{16}$$

Therefore, substituting the expressions for $g_{it}(y_{it} \mid y_{it-1,2}, \alpha_i)$ and $g_{it}(y_{it} \mid \alpha_i)$ given in (13)-(16), in the expression for the likelihood function in (16), and using evident notation,

$$L_i(\beta, \lambda, \gamma, \sigma_\alpha, \sigma_u \mid y_{i2},.., y_{iT}, x_{i2},..x_{iT}) = \int_{-\infty}^{\infty} \prod_{t=1}^{T} \left[F(Up_{it}) - F(Low_{it})\right] \exp[-(\frac{\alpha_i^2}{2\sigma_\alpha^2})] \frac{1}{(2\pi)^{1/2}\sigma_\alpha} d\alpha_i$$

for all $i=1,...,N$ and $t=1,..,T$ (17)

where, when $t=3,..,T$

$$\text{for } y_{it} = 1, [Low_{it} = (\frac{-x'_{it}\beta - \gamma y_{it-1,2} - \alpha_i}{\sigma_u} \mid y_{it-1,2}, \alpha_i) \text{ and } Up_{it} = \infty]; \qquad y_{it-1,2} = 0,1 \tag{18}$$

$$\text{for } y_{it} = 0, [Low_{it} = -\infty \text{ and } Up_{it} = (\frac{-x'_{it}\beta - \gamma y_{it-1,2} - \alpha_i}{\sigma_u} \mid y_{it-1,2}, \alpha_i)]; \quad y_{it-1,2} = 0,1 \tag{19}$$

and, when $t=1,2$

$$\text{for } y_{it} = 1, [Low_{it} = (\frac{-x'_{it}\lambda - \alpha_i}{\sigma_u} \mid \alpha_i) \text{ and } Up_{it} = \infty] \tag{20}$$

$$\text{for } y_{it} = 0, [Low_{it} = -\infty \text{ and } Up_{it} = (\frac{-x'_{it}\lambda - \alpha_i}{\sigma_u} \mid \alpha_i)] \tag{21}$$

Finally, using the substitution $w_i = \alpha_i / 2^{1/2}\sigma_\alpha$ in (17),

$$L_i(\beta, \lambda, \gamma, \sigma_\alpha, \sigma_u \mid y_{i2},.., y_{iT}, x_{i2},..x_{iT}) = \frac{1}{\pi^{1/2}} \int_{-\infty}^{\infty} \prod_{t=1}^{T} \left[F(Up_{it}) - F(Low_{it})\right] \exp(-w_i^2) dw_i$$

for all $i=1,...,N$ and $t=1,..,T$ (22)

where in place of α_i, we substitute $\alpha_i = w_i 2^{1/2}\sigma_\alpha$ in the expressions for Up_{it} and Low_{it} in (18)-(21). This function is amenable to Gauss-Hermite quadrature, and can be computed using standard software.

Table 1

Sample Summary Statistics for the SIPP 1993-1998 Panel

Variable	Mean	Std. dev
Males	.470	.499
Whites	.827	.377
Blacks	.128	.335
Mexican	.030	.171
Attended College	.306	.471
Married	.385	.486
Own house	.588	.492
Bankruptcy Exemptions		
(1)Homestead	68411.17	77215.65
(2)Property	10106.56	14832.59
State Income Tax Rate (percent)	5.06	3.09
State Per Capita Income	24398.36	3443.3
Number of business starts over whole panel		
Mean	.0151	.122
Total	5268	
Number of business closures over whole panel		
Mean	.0194	.285
Total	6083	
Correlation between exemptions and		
(1)starts	.0139	
(2)closures	.0036	
Change of state (movers)	.011	.107
Person **monthly** income	1257.58	1995.17
Family **property** income/month	140	492.76
Business Income /month	2300	4368

Type of business at beginning of sample in 1993:		
(1)Sole proprietorship	480	
(2) Partnership	96	
(3) Corporation	124	
Persons with insurance coverage at time of business start (1993)		
(1) Own	.345	.475
(2) Employer	.266	.442
Average union percentage	14.59	6.47
Average unemployment rate	5.69	1.47

Table 2

Business Starts And Closures Across U.S States

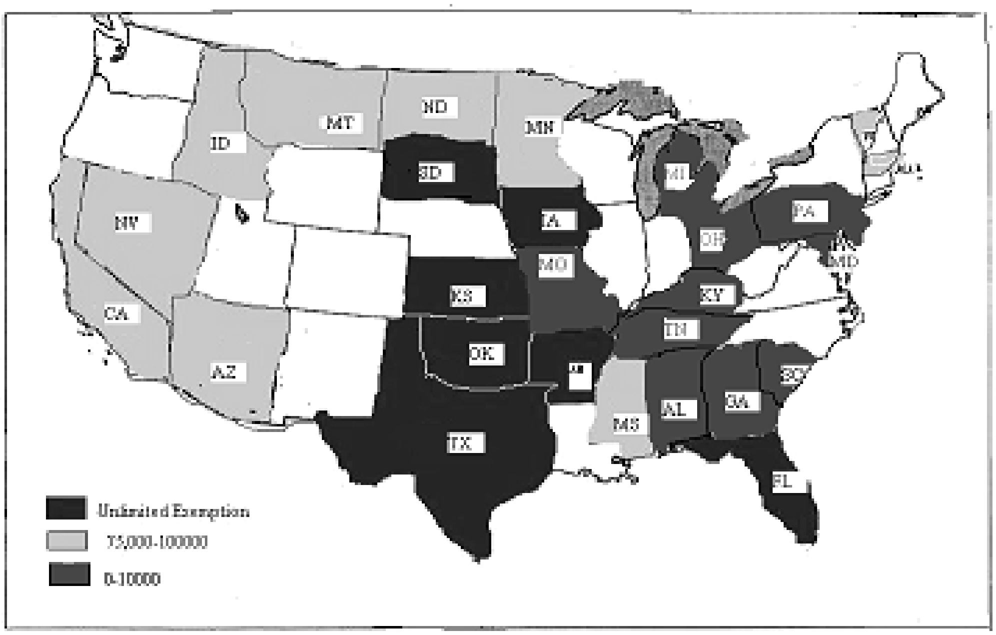
SIPP 1993-1998

States	1993-98 Starts	1993-98 Closures
Alabama	50	12
Arizona	98	111
Arkansas	40	61
California	649	800
Colorado	67	76
Connecticut, Rhode Island	84	81
Delaware	13	19
Florida	273	335
Georgia	110	164
Illinois	194	233
Indiana	114	47
Kansas	56	87
Kentucky	61	80
Louisiana	73	73
Maryland	67	102
Massachusetts	101	140
Michigan	161	170
Minnesota	132	144
Mississippi	46	65
Missouri	103	135
Nebraska	42	57
Nevada	21	32
New Jersey	153	160
New York	267	322
North Carolina	128	183
Ohio	192	221
Oklahoma	91	111
Oregon	93	109
Pennsylvania	161	214
South Carolina	58	23
Tennessee	84	95

Texas	390	441
Utah	47	46
Virginia	92	126
Washington	117	106
West Virginia	33	30
Wisconsin	81	100
Maine, Vermont, New Hampshire	64	79
Iowa, North Dakota, South Dakota	62	70
Alaska, Idaho, Montana Wyoming	27	37

Figure 1

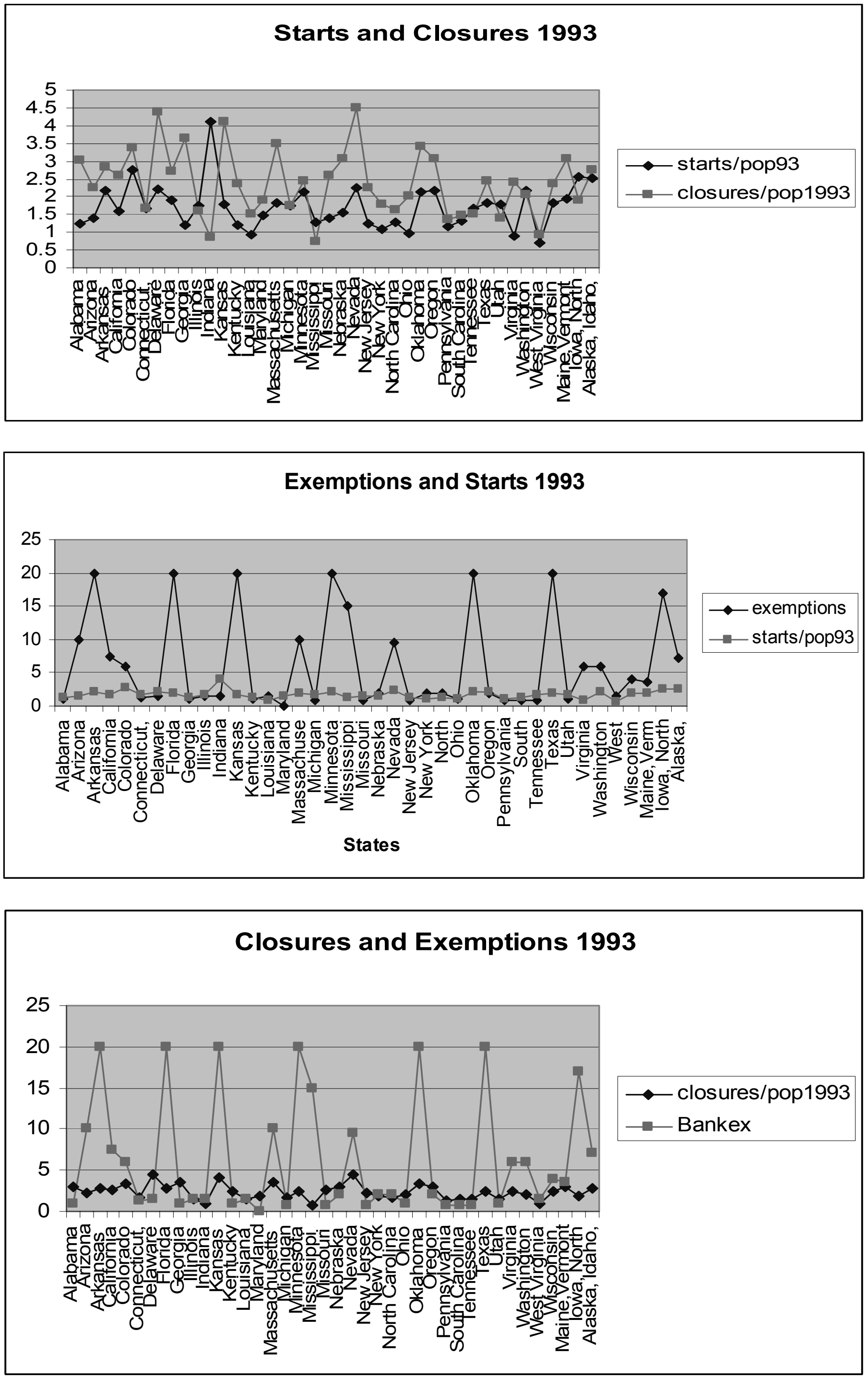
<u>Homestead Exemptions 1996</u>



Correlation (state exemption, neighbor exemption) =.4761

Figure 2

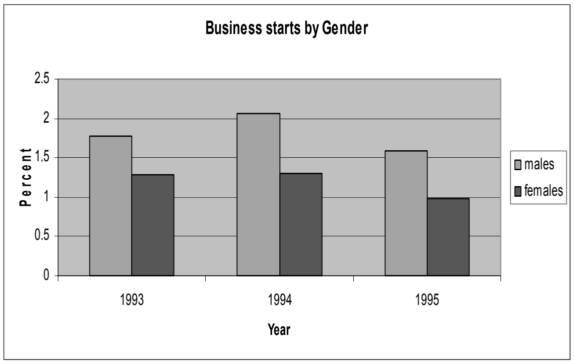
Exemptions, Births and Closures[33]

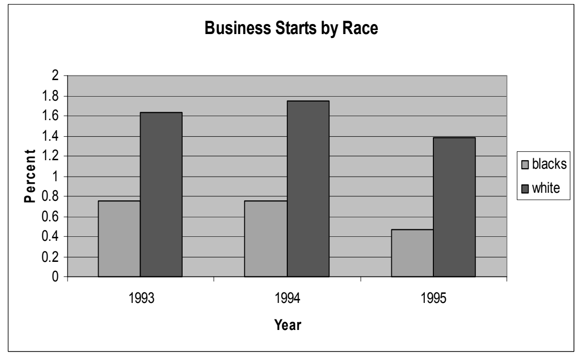


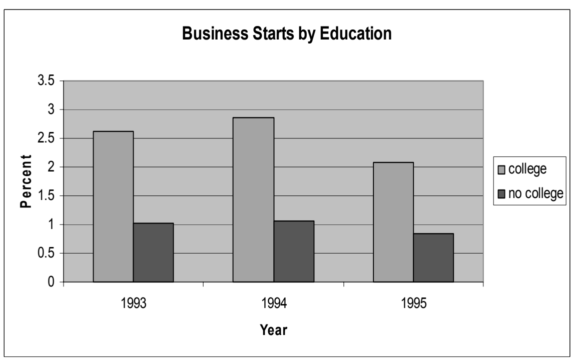
[33] Note: Business Starts and Closures are scaled by sample state populations and exemption variables have been rescaled to allow comparison. These graphs are representative of other sample years.

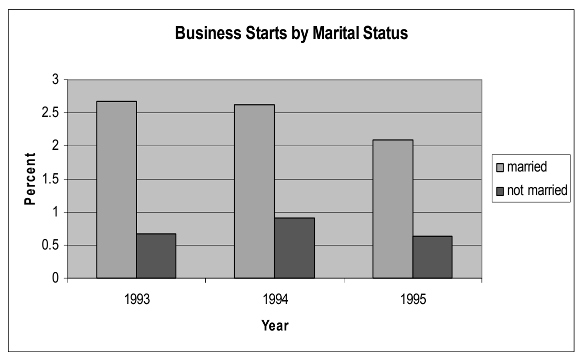
Figure 3

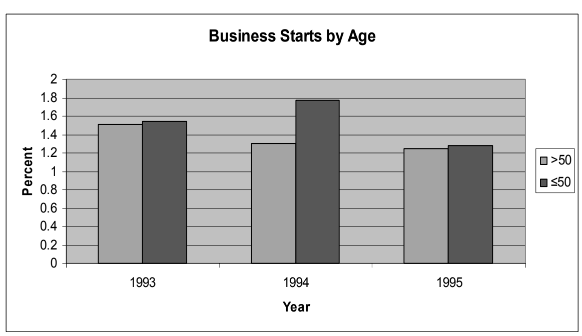
Profile of Business Owners: SIPP[34]











[34] All business starts are expressed as percentages of the relevant share of the group in the overall population. These charts are representative of other years in the sample.

Table 3: Regression Without Spatial Effects

Selected Coefficients: 1993-98

Dependent Variable	Business Start (1) Marginal Effect (p-value)	Business Closure (2) Marginal Effect (p-value)
Self-insurance	.0001	.0075
	(.002)	(.487)
Employer insurance	-.0007	
	(.000)	
Exemption	8.89e-10	1.22e-07
	(.001)	(.102)
Per Capita Income	6.40e-09	-1.13e-07
	(.530)	(.962)
Tax Rate	7.91e-06	.0014
	(.263)	(.497)
Lagged Variable	.0062	.4360
	(.000)	(.000)
N	**312,845**	**14,983**

Note: All regressions are estimated with time dummies, all the demographic variables, and some state variables like the proportion of nonfarm employment, unemployment rate and unionization rate.

Table 4a: Random Effects Probit Regression: Marginal Effects				
Dependent Variable: Business Start				
Weights	**Distance**		**Distance**	**Population**
	(1)	**(2)**	**(3)**	**(4)**
Years	1993-98	1993-98	1993-98	1993-95
Male	.0006	.0006	.0006	.0010
	(.000)	(.000)	(.000)	(.000)
Black	-.0003	-.0003	-.0003	-.0006
	(.000)	(.000)	(.000)	(.001)
Mexican	-.0002	-.0002	-.0002	-.0006
	(.000)	(.001)	(.001)	(.002)
Family Wealth	1.48e-07	1.48e-07	1.49e-07	2.62e-07
	(.000)	(.000)	(.000)	(.004)
Person Income	1.48e-08	1.47e-08	1.48e-08	-8.82e-08
from Job	(.043)	(.044)	(.043)	(.034)
College	.0002	.0003	.0003	.0006
	(.000)	(.000)	(.000)	(.001)
Unemployed	-.0003	-.0003	-.0003	.0001
Dummy=1 if person	(.000)	(.000)	(.000)	(.367)
is unemployed				
Age	.0002	.0002	.0002	.0003
	(.000)	(.000)	(.000)	(.000)
Agesquare	-2.27e-06	-2.28e-06	-2.27e-06	-4.04e-06
	(.000)	(.000)	(.000)	(.000)
Married	.0002	.0002	.0002	.0004
	(.000)	(.000)	(.000)	(.004)
Own house	-3.27e-06	-4.81e-06	-2.77e-06	.0001
	(.932)	(.901)	(.943)	(.257)
Employer	-.0007	-.0007	-.0007	-.0010
Insurance	(.000)	(.000)	(.000)	(.000)
Self Insurance	.0001	.0001	.0001	.0007
	(.002)	(.002)	(.002)	(.009)
Unemployment	.00002	.00003	.00002	.00001
Rate	(.245)	(.069)	(.144)	(.812)
Unionization rate	-5.01e-06	-5.43e-06	-5.98e-06	-7.93e-06
	(.273)	(.156)	(.182)	(.474)

Table 4a (*continued*)				
Exemption	-1.04e-10		1.62e-10	-3.00e-10
	(.817)		(.672)	(.769)
Average Neighbor	7.20e-10			2.54e-09
Exemption	(.183)			(.185)
Dumavex	-.0001	-.00009	-.00008	-.0002
Dummy=1 if average Neighbor Exemption Higher	(.046)	(.009)	(.069)	(.043)
Tax Rate	.00001	.00001	7.72e-06	-8.94e-07
	(.279)	(.186)	(.329)	(.972)
Average Neighbor	-3.25e-06		-8.20e-07	1.62e-06
Tax	(.824)		(.953)	(.965)
Dumavtx	-.00005	-.00003		-.00004
Dummy=1 if Average Neighbor Tax Lower	(.361)	(.556)		(.752)
Per Capita Income	1.17e-08	2.05e-09	1.89e-08	1.29e-08
	(.452)	(.846)	(.098)	(.735)
Average Neighbor	-2.42-08		-2.89e-08	2.26e-08
Per Capita Income	(.086)		(.010)	(.579)
Dumavpc	-.00005	-.00001		
Dummy=1 for Average Neighbor Income higher	(.377)	(.002)		
LAGBSTRT	.0062	.0063	.0062	.0154
	(.000)	(.000)	(.000)	(.005)
Unemployment	.0007		.0002	.0021
benefit (avben)	(.207)		(.544)	(.156)
Avunemsea				-.0001
=*avben*(dummy =1 if unemployed)*sea*				(.886)
SEA (*=1 if state had program)*	.0001		.0001	.0002
	(.088)		(.103)	(.117)
N	312,845	312,845	312,845	120,219

Note: All specifications use time dummies (and no constant term), and control for nonfarm employment. Separate coefficients for 1995 and 1998 not shown. p-values in parentheses.

Table 4b: Random Effects Probit Regression: Marginal Effects

Dependent Variable: Business Closure

Weights	Distance	Population
	(1)	(2)
Years	1993-98	1993-95
Male	-.083	-.1999
	(.000)	(.000)
Black	.0522	.3594
	(.053)	(.009)
Mexican	.0510	.3381
	(.235)	(.192)
Family Wealth	.00001	.00002
	(.039)	(.351)
Person Income	-4.55e-06	-.00003
	(.001)	(.000)
College	-.0046	-.0566
	(.659)	(.266)
Age	-.0279	-.0933
	(.000)	(.000)
Agesquare	.0002	.0009
	(.000)	(.000)
Married	-.0209	-.1584
	(.098)	(.009)
Self Insurance	.0066	-.0163
	(.544)	(.751)
Own House	-.0842	-.2414
	(.000)	(.000)
Unemployment Rate	.0137	.0411
	(.035)	(.057)
Union Percentage	-.0033	-.0065
	(.015)	(.283)
Nonfarm Employment	.0052	.0169
	(.360)	(.498)

Table 4b (continued)		
Exemption	1.13e-07	7.40e-07
	(.379)	(.157)
Average Neighbor Exemption	-1.82e-07	
	(.276)	
Dumavex	.0248	.1146
Dummy=1 if Neighbor Exemption higher	(.100)	(.059)
Tax Rate	.0016	.0082
	(.504)	(.578)
Average Neighbor Tax *(avgnbtx)*	-.0048	.0081
	(.286)	(.684)
Dumavtx		.3809
Dummy=1 if Neighbor Tax lower than own		(.013)
Maxavtx		-.0587
*=dumavtx*avgnbtx*		(.031)
Per Capita Income	4.42e-06	.00002
	(.146)	(.084)
Average Neighbor Income *(avgnbpc)*		-7.04e-06
		(.694)
LAGBSCLOS	.4360	.4365
	(.000)	(.000)
Unemployment Benefit *(avben)*	.1010	
	(.567)	
SEA *(=1 if state had program)*	-.0325	
	(.108)	
N	14,983	7692

Note: All regressions use time dummies (and no constant). Separate coefficients for 1995 and 1998 not shown. p-values in parentheses.

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