MULLING OVER MASSACHUSETTS: HEALTH INSURANCE MANDATES AND ENTREPRENEURS

by

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DEDICATION

This dissertation is dedicated to my extended family, parents and especially my Grandmother Ludy Mathis-McKnight who at 96 years old remains as feisty as ever and who as a woman minister since 1957 has always been an encouragement for me to cut my own path.

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ABSTRACT

Mulling Over Massachusetts: Health Insurance Mandates And Entrepreneurs

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The author examines the impact of the Massachusetts' health reform law of 2006, *Chapter 58 of the Acts of 2006: An Act Providing Access to Affordable, Quality, Accountable Health Care*, which uses both individual and employer insurance-mandates on Entrepreneurship in the formation of new organizations. Previous studies have employed policy analysis and simulation modeling to the impact of theoretical mandatory health insurance regimes on small business, but the contributions of this study are that it is the first to explore the impact of a real world health insurance system or policy change on the entrepreneur and to do so empirically, in real time and within the most natural economic geography, a single MSA or Labor Market Area. It therefore tests whether a given social policy facilitates or impedes the formation of new organizations, and therefore, encourages or discourages employment growth via new organization formation. The author finds significant and persistent suppression of new organization formation when controlling for organization size, sector and owner gender, and limited

evidence of geographic displacement of firms across the New Hampshire border. While theory suggests mandatory insurance should reduce insurance costs and improve worker productivity, the author finds that the regulation has no significant impact on worker productivity and limited evidence of increases in insurance costs, and estimates the expected cost in terms of lost employment, sales to the local economy and tax revenue to in the majority of cases exceed the benefit.

Chapter 1. Introduction

> It is obvious to everyone that the patient is ill. But the physicians agree on little else: not the underlying cause, certainly not the appropriate course of treatment and least of all which among them is best qualified to administer it. As they argue the patient just gets sicker. (Economist 2007a)

As the political race for President of the United States heats up, several issues seem poised to dominate the public discourse: the war in Iraq, the increasing fiscal deficit of the U.S. Federal government, uncertainty about the economy and the changing landscape of healthcare in the United States. Organizations as diverse at the Service Employees International Union and the National Federation of Independent Business have rallied behind the banner of health care system change though their individual descriptions of the solution vary substantially (Turner 2008b). Some have described the focus on universal coverage as "perplexing" given that " of the 47m uninsured, perhaps 10m are illegal immigrants" and the remainder are healthy or only temporarily uninsured (Economist 2007a; Herrick 2006).

Not only have previous attempts at universal coverage been spectacular failures politically, but even modest attempts at improving coverage for the recently and temporarily unemployed have failed (Moon, Nichols, and Wall 1996; Zuckerman, Haley,

and Fragale 2001; Dukakis 1994; Oliver 2005). Dukakis (1994) notes that even Hawaii's universal coverage system fails to actually provide universal coverage, and the Small Area Health Insurance Estimates put Hawaii's uninsured population in 2000 at 13.1% ranging from 12.4 – 16.6% versus the national average of 14.2% despite an employer mandate (Census 2008). The employer provision of Oregon's health plan expired without being implemented, and a similar though much more modest employer insurance mandate attempt in California in 2003 was repelled through a ballot initiative before implementation. An earlier attempt in1992 stalled in the California State Assembly and when proponents attempted to circumvent the legislature through a ballot initiative, the initiative failed by a spectacular two-to-one margin. Questions remain about whether such provisions in either California or Massachusetts would survive court challenges. Consistent in the failure of previous attempts have been protracted implementation schedules coinciding with economic downturns and in some cases either a failure to pass as ballot initiatives or once implemented, repealed in response to ballot initiatives. (Oliver 2005)

The first mover Massachusetts has found that there are potentially hidden costs to universal coverage, having underestimated the demand for subsidized coverage, and overestimated the ability of the state Connector to contain cost. Current estimates suggest that contrary to theory, insurance premiums in Massachusetts are expected to increase 10-12% (Economist 2007b), leading to "a $147 million budget shortfall…." (Turner 2008a). Premium increases are largely the result of the state controlling rates in

the subsidized markets, putting upward pressure on prices in the open, private market, and pushing premiums up faster than inflation. Something very similar took place with drug prices in the mid-90s after the passage of Medicaid Best Price legislation which mandated sub-average rates on drugs for Medicaid and the Veterans Administration (Clemans-Cope, Garrett, and Hoffman 2006; Cook and Harrison 1996). Such price controls in a semi-private marketplace are like squeezing on a balloon, and the size of the bulge at the other end depends on the relative market size of the public sector. According to Johnathan Gruber, MIT Economics Professor and member of the oversight board in Massachusetts, this private-market distortion has clearly been observed in the private insurance market in Massachusetts (Economist 2007b).

Lost in the current discussion about healthcare and the nature of health insurance in the United States is the fact that someone will have to pay for whatever coverage is provided, and despite the best intentions often the payer is quite different than intended. Much labor economics literature notes that government mandated benefits increases, such as maternity coverage, minimum wages, business taxes, unemployment insurance, etc., usually come at the expense of employee wages via reduced wages, protracted promotion timelines and increases in unemployment and eventually on customers in terms of price increases (Klerman and Goldman 1994; Currie and Madrian 1999; Pauly 1997). This takes decisions about the nature of compensation out of the hands of both employers and employees, and poses a disproportionate burden on small employers (Damberg 1996; Klerman and Goldman 1994). While large scale, persistent unemployment may seem

like a distant nightmare, adopting policies which adversely affect employers has the potential to throw not only more workers into unemployment but into a situation where health insurance is no longer available. This may be particularly acute for the difficult to employ: those with low skill levels and poor job habits.

For many years, small firms have been a dominant employer, but in recent years they have also become agents of economic change (Acs et al. 2003; Audretsch and Acs 1994; Audretsch 1995). As the following table illustrates, small firms make up the vast majority of firms and employee roughly half the workforce. 79.0% of firms in the United States in 2002 (62.4% of establishments) had fewer than 10 employees accounting for 11% of employees. 89.3% of firms in the United States in 2002 (71.5% of establishments) had fewer than 20 employees and accounted for 18.3% of the workforce. Thus, policies which disproportionately and adversely affect small firms have the potential not only to adversely affect employment, but also communities and worker-citizens in the very disadvantaged groups the proponents of these measures seek to positively affect by providing health insurance coverage (Sobel 2006, 2007; Wilson 1996).

Table 1. Employers by employment size distribution

	Employment Size of Firm (2002)							
	Total	0*	1-4	5-9	10-19	20-99	100-499	500+
				United States				
Firms	5,697,759	770,041	2,695,606	1,010,804	613,880	508,249	82,334	16,845
Establishments	7,200,770	771,135	2,699,380	1,024,081	652,930	692,775	332,508	1,027,961
Employment	112,400,654	0	5,697,652	6,639,666	8,246,053	19,874,069	15,908,852	56,034,362
				Massachusetts				
Firms	146,080	18,817	66,137	25,406	15,395	14,030	3,406	2,889
Establishments	175,991	18,831	66,212	25,702	16,114	17,242	8,784	23,106
Employment	3,023,126	0	141,555	165,893	205,289	523,599	445,139	1,541,651
				New Hampshire				
Firms	32,279	4,052	14,224	5,671	3,429	3,118	715	1,070
Establishments	37,928	4,055	14,243	5,724	3,579	3,804	1,710	4,813
Employment	550,725	0	30,619	37,171	45,522	109,044	79,305	249,064

* Employment is measured in March, thus some firms (start-ups after March, closures before March, and seasonal firms) will have zero employment and some annual payroll.
Notes: For state data, a firm is defined as an aggregation of all establishments owned by a parent company within a
Establishments are nonfarm locations with active payroll in any quarter.
Source: U.S. Small Business Administration, Office of Advocacy, based on data provided by the U.S. Census Bure

Damberg (1996) observed that the Clinton plan of the mid-90s would have fallen most heavily on the poor, small business and low wage sectors of the economy with potentially disastrous results both for individuals and for businesses. Klerman and Goldman (1994) attempted to assess its impact on employers, estimating that as many as 100,000 jobs would have been lost based on an employer mandate to provide up to 80% of the insurance premiums, but this analysis was largely theoretical, based on extrapolations due to job losses resulting from minimum wage increases. These analyses also consider only the impact on currently existing businesses, and assume that there are no barriers to downward movements in wages such as minimum wage rates. In these analyses, the impact of downward wage pressure on marginal workers is higher rates of unemployment

and slower increases in pay once employed. At present, no exploration has occurred on the impact of insurance mandates be they employer or individual on entrepreneurs and entrepreneurship.

The relationship between health insurance and the propensity to become an entrepreneur has been explored (Holtz-Eakin, Penrod, and Rosen 1996) as well as the potential absence of health insurance as a mechanism for job-lock (Wellington 2001), and surveys have repeatedly suggested that small employers will whenever possible bare the cost of insurance (Morrisey 2003). Labor market economics treats health insurance as a form of compensation and therefore employers should absorb increases in costs of labor by adjusting salaries downward over time, but this option is not available for low income workers and thus would have the same affects as an increase in the minimum wage (Currie and Madrian 1999). Pauly (1997) observes that employers often see health insurance costs as an expense and not an alternate form of wages, and the increased expenditure in the insurance market should help to mitigate adverse selection and reduce the overall costs of insurance (Kronick 1991) .

Does the market believe the logic? If Pauly (1997) is correct, that employers see health insurance as an expense, then they would respond to the added requirement by deferring their entry into entrepreneurial activity or by arbitrage between jurisdictions where possible in order to avoid the additional costs. In essence, the requirement would create a barrier to entry and suppress the entry of new firms. In a distorted labor market, one

where a minimum wage requirement exists, employers of affected workers would be unable to make the theoretical downward adjustment in wages and thus be required to either slow wage increases, raise additional capital to cover workers or hire more productive higher value workers, essentially adversely affecting low skilled workers, but what is actually observed? Is the new law affecting the behavior of entrepreneurs? Is compliance with the new law causing fewer entrepreneurs to start new businesses due to increased capitalization costs or are entrepreneurs fleeing Massachusetts to neighboring states to start their enterprises. If not, then are the Massachusetts firms more productive due to their better compensated workforce, which no longer has to concern itself with the absence of health insurance?

The remainder of this dissertation will explore the empirical impact of Massachusetts' Health Reform Law of 2006 on entrepreneurship as measured by new firm or new organization formation activity. The subsequent chapters will provide a description of the relevant academic research on the relationship between health and self-employment or entrepreneurship, a statement of the research questions and hypotheses, a description of the data and appropriate analytical caveats and then address each hypothesis individually. The dominate technique used in this analysis is random effects modeling, and therefore, a brief discussion of the technique is provided in the methodology section of chapter 6, augmented by subsections in each subsequent chapter describing additions or extension. These chapters cover the impact on overall new organization formation, the impact when controlling for gender, organization size and the SIC category of the

particular organization. Following these chapters is a discussion of organizational productivity in 2007 using a Cobb-Douglas approach, followed by a discussion of policy implications and directions for future research.

Chapter 2. Literature Review

2.1. Firms, health and place

A considerable body of literature has been directed to the study of the entrepreneur, his decision making process, the ecology of entrepreneurship and about the environment's influence on the entrepreneur's ability and decision to exploit discovered opportunities (Shane 2003); however, almost all of this research has used either the individual unit of analysis or very large geographies. Acs and Armington (2006) have noted that a much more natural geography would be the city, MSA or labor market area. Schumpeter (1947) noted that the entrepreneur's motivation for pursuing his venture was the entrepreneurial profit which was defined somewhat differently depending on whether the good in question is a new product or service or a new process, but in each case is the difference in the value of inputs relative to outputs for other competing uses. These profits are short term and are the entrepreneur's compensation for assuming the risk of his innovation (Schumpeter 1947). Regulation imposes a deadweight loss on the economy by requiring resources to be devoted to activities which the market would not otherwise support. In some cases, this may improve overall social welfare when it is in

response to a market failure of which the classic example is pollution (Baumol and Oates 1975; Wolf 1997). To the extent that these regulations diminish the entrepreneurial profit, they reduce the incentive to engage in the perceived market opportunity or may eliminate it altogether depending on the magnitude of the disincentive effects.

Under Massachusetts plan, employers with 11 or more employees are required to adopt a cafeteria plan "which permits workers' purchase of health care with pre-tax dollars." (Legislature 2006b, 15) Failure to provide will subject the employer to a "FAIR SHARE contribution" and potentially a "free rider surcharge" (Legislature 2006b, 15-16). Employers with fewer than 11 employees are not subject to the provision, and they and their employees are required to purchase individual insurance. In effect, this causes a substantial increase in the marginal costs for the 11th and subsequent employees. Small firms may utilize the state agency, the Connector, to locate "high value and good quality" insurance plans in the private sector (Legislature 2006d, 6). Given that firms which start larger have a higher probability for success (Shane 2003), this cost requirement puts downward pressure on start-up size, in essence favoring failure, as well as, creating a barrier to entry for new firms (Bain 1956). To the extent that certain industries are disproportionately comprised of relatively small firms, this puts those industries and industries such as pharmaceuticals which depend on small firms to utilize knowledge spillovers effectively at a disadvantage (Audretsch 1991; Audretsch and Acs 1994; Carree and Thurik 1996).

Morrisey (2003) found that nationally, 41% of firms with fewer than 10 employees versus 78% of those with 20 or more offered health insurance to their employees; thus, reforms which have employer mandates will fall disproportionate on small firms and organizations. In Massachusetts' plan very small firms (<11 employees) are required to at a minimum provide access to an insurance plan which meets the minimum requirements and set up tax deferred savings accounts, and employees are required to purchase a plan. In circumstances where employees are not currently provided health insurance (i.e. low wage, entry level markets), this has the effect of diminishing the worker's discretionary income. Workers preferring a more income rich compensation mix may seek employment with a higher salary to benefits ratio. This will put upward pressure on wages in Massachusetts, diminishing entrepreneurial profit and as with a minimum wage likely create some level of unemployment (Brown, Gilroy, and Kohen 1982). Since small firms are more footloose than a large industrial manufacturer, they may choose instead to move or initially locate in a jurisdiction within the same labor shed but without the benefits constraint – i.e. New Hampshire.

According to the U.S. Department of Labor, New Hampshire's minimum wage increased from $5.85 to $6.50 on September 1st, 2007, and Massachusetts minimum wage increased from $7.50 to $8.00 per hour on January 1st, 2008. Thus, the minimum wage between the two states narrowed from $1.65/hour to $1.50/hour further weakening Massachusetts monetary incentive for entry level workers (US_DoL 2007). Given its close physical proximity, employees of very small firms which are now mandated to buy their own

insurance may relocate, as may their employers. If so, the increased labor competition will put upward pressure on Massachusetts wages and diminish the entrepreneurial profit of the venture. In addition, the extra bureaucratic burden of providing the additional benefits may require additional technical, human resource expertise and thus create a procedural barrier to entry (Bain 1956). In some cases, this may entirely eliminate certain opportunities; those typically available to minimum wage workers.

For larger small employers, those with 11 or more workers, this will increase their labor costs directly. In the short run this should suppress hiring, create short term inflationary pressure on prices in the service and hospitality sectors especially, and in some cases make the firms no longer viable. It may even create pressures to use non-employment means (i.e. contracting) to avoid the extra cost of the 11th worker. However, in the longer term it may prove a competitive advantage for these firms at attracting older more experienced workers and diminishing job lock resulting from health insurance (Wellington 2001; Kronick 1991). While the requirement does not directly affect the overall wage rate, it affects the perceived wage rate by the worker, affecting the ratio between compensation and benefits. This has the effect of altering the effective wage rate for individuals in jurisdiction x versus jurisdiction y respectively (Baum 1987). Because of the small physical geography, labor can be said to be mobile and the capital/labor ratio for a given industry constant in the short term as well as many of the other theoretically important variables (Acs and Armington 2006).

While an extensive body of literature exists on the effects of various public policy interventions to encourage firm formation (Bartik 1991; Wasylenko 1997) and a growing body of literature on the effect of health insurance on the decision to enter self employment. This literature is in conflict, some suggesting that there is a lock-in effect on labor based on the non-portability of health insurance/care, and others suggesting that the availability of or portability of health care appears to have no affect at all on the decision to exploit (Brunetti et al. 2000; Buchmueller and Valletta 1996; Gurley-Calvez 2006; Holtz-Eakin, Penrod, and Rosen 1996; Wellington 2001). The contribution of this research will be to speak to this debate at the level of a specific labor market and thus to effectively control for variations in labor and capital markets that confound results at higher levels of aggregation.

2.2. Barriers to Entry

As Siegfried and Evans (1994) note, there are two basic schools associated with entry impediments those imposed by the advantages of incumbency (Bain 1956, 3) and production costs borne by the firm which were not borne by incumbents at their entry (Stigler 1968, 67) or which inhibit mobility within industry (Caves and Porter 1977). The Massachusetts Health Reform law may constitute an “absolute cost barrier” (Seigfried and Evans 1994, 130) in that all Massachusetts industries will require higher startup costs

for new entrants than was faced by incumbents as a result of the new legislation and "such incumbent cost advantages are perceived as critical influences on market entry decisions by business executives (Karakaya and Stahl 1989)." (Seigfried and Evans 1994, 130). In addition to impacts on entry, increased cost pressure may adversely affect firm survival and this may affect specific industries such as manufacturing which tends to require higher growth rates to ensure survival (Audretsch et al. 2004, 315). This may be especially true as firm survival tends to increase with firm age (Geroski 1995, 434). Audretsch, et. al. (2004) also notes that much of the entry/exit literature is found in the manufacturing sector and that other sectors may not be comparable.

Geroski (1995) lists seven stylized facts and eight stylized results related to what we know about firm entry from a theoretical perspective. Small scale, de novo entry is relatively common, but such firms have a short life span. Most entrants will take 5-10 years to be on par with incumbent firms from a size perspective, and one study estimated that 61.5% exited within 5 years and 79.6% within 10 years (Geroski 1995, 424). Differences in entry rates between industries do not persist over long periods of time (Geroski 1995, 424), are relatively small compared with gross entry, and entry and exit are highly correlated (Geroski 1995, 423). Entry comes in waves comprised of different types of entrants (Geroski 1995, 425) and costs of adjustment seem to penalize large-scale initial entry and very rapid post-entry penetration rates (Geroski 1995, 426). This agrees with Caves and Porter (1977) characterization of barriers to mobility. Geroski (1995) also observes that empirical results suggest that entrants are slow to react to high

profit margins (Geroski 1995, 427), barriers are resistant to measurement using conventional techniques (Geroski 1995, 430), but measurement does suggest that these barriers are high (Geroski 1995, 429). Entry generally has modest affects on price-cost margins within an industry (Geroski 1995, 430), but high rates are associated with innovation and increases in efficiency (Geroski 1995, 431). Incumbent firms do not universally react to new entrants and may not use prices to block entry (Geroski 1995, 431-3), and firm size and age are positively correlated with survival (Geroski 1995, 434). He points out that one way to view barriers to entry is not simply to consider their impact on firm entry into the market but also to consider their impact on survivability. Advertising and capital-raising requirements are important barriers to entry (Geroski 1995, 429). Entry and exit rates may also act as signals about the health of the marketplace to potential entrepreneurs (Carree and Thurik 1996; Shane 1996) as lagged effects of entry or exit impact firm formation rates.

Early theories in location include Francois Perroux's (1983) Growth Poles, Gunnar Myrdal's (1957) cumulative causation, and Freidman and Weaver's (1979) core-periphery model (Blakely and Bradshaw 2002, 63). These theories focus on whether regional disparities will persist over time. The more appropriate question, however, is to ask what causes firms or more precisely entrepreneurs to locate where they are (Pennings 1982). Since entrepreneurs will likely start firms relatively close to their source of innovation and professional experience, these theories might explain current endowments of potentially entrepreneurial individuals and thus by coincidence correlate to the level of

entrepreneurial activity and have a significant impact on the level and type of entrepreneurship. They may also speak to new firm formation as an important mechanism for innovation implementation (Acs and Audretsch 1989, 256; Shane 2003, 118), but may not correlate to geography's endowment of individuals with sufficient will to transform "invention into innovation" (Audretsch et al. 2002, 157).

2.3. The impact of health insurance theoretically on the decision to exploit

Most often considerations of healthcare or health insurance flow from a concern for either the health of the entrepreneur, his family or his employees. It is clear that providing special tax treatment to insurance premiums will affect the level of insurance purchased by individuals, including the self employed and employers (Gurley-Calvez 2006; Moon, Nichols, and Wall 1996; Perry and Rosen 2004) by effecting the valuation of health insurance and lowering the effective price (Gruber and Poterba 1994; Monheit and Harvey 1993) . Several related studies addressing the link between health insurance and health outcomes, however, find little or no affect of insurance on health outcomes (Perry and Rosen 2004, 25).

How might the provision of health insurance affect the propensity to start a new firm? Rationally, portable insurance coverage might cause the would-be entrepreneur to more

readily engage in entrepreneurial activity, to reduce job lock (Wellington 2001), by essentially reducing the risk premium, lowering opportunity costs and thus influencing their willingness to exploit opportunities, but the evidence for this is mixed (Brunetti et al. 2000; Buchmueller and Valletta 1996; Holtz-Eakin, Penrod, and Rosen 1996; Wellington 2001). One mechanism encouraging entrepreneurship would be spousal insurance. Marriage increases the likelihood of pursuing self employment (Bates 1995; Butler and Herring 1991; Evans and Leighton 1989; Schiller and Crewson 1997) because spousal income enables the pursuit of self employment (Bernhardt 1994; Blanchflower and Oswald 1998; Shane 2003, 68), as does health insurance provided by a spouse's employer (Damberg 1996, xv; Devine 1994) which is an alternate form of wages. It does this by lowering the risk premium of self employment (Blanchflower and Oswald 1998). Programs designed to provide coverage may also encourage entrepreneurial activity through this same mechanism, but Perry and Rosen (2004, 47) found that "health status does not appear systematically to influence decisions to enter or leave self-employment" and similarly "that self-employment transitions are not significantly affected by children's health". (Perry and Rosen 2004, 49) However, Gurley-Calvez (2006) found the health insurance deduction lowered the probability of an exit from self employment by 10.52 – 65% for single and married filers respectively due in part to single entrepreneurs need for supplemental income and increases in the deductibility "likely led to higher levels of entrepreneurship than otherwise would have been observed." (Gurley-Calvez 2006, 22). One international study by Ilmakunnas and Kanniainen (2001, 214) found that the "welfare state creates detrimental incentive effects on risk-taking in the

form of private entrepreneurship;" thus, the mechanism for provision could affect the outcome with regard to entrepreneurship. Since requiring a benefit, like health insurance, is essentially raising the wage level, its affects should parallel those of raising the minimum wage which tends to reduce entrepreneurial activity in poorer regions (Garrett and Wall 2006, 10). How might a mandatory insurance requirement affect the decision to start a new firm?

The other very important question related to the entrepreneur, however, is whether and how the provision of health insurance affects the competitive landscape. Health insurance coverage may be perceived as a competitive advantage in the war for talent. In surveys of small business owners, Morrisey (2003) found that 63% of small employers who provided health insurance coverage did so to aid in recruitment, 48% to reduce turnover and 41% in response to employee demand. This suggests that among these employers health insurance was viewed as a strategic tool to compete effectively for or retain talent. Health care coverage, depending on how it is provided, may be a benefit or a burdensome expense for entrepreneurs in small firms but remove from consideration health insurance as a competitive advantage for medium size or fast growing, gazelle firms. If health coverage is universal or mandatory, then providing it as a benefit is no longer a competitive advantage for a firm and removes it from the competitive tools available to a firm for attracting employees.

Damberg (1996) suggested that the Clinton plan of the mid-90s in fact fell most heavily on the poor, small business and low wage sectors of the economy with potentially disastrous results both for individuals and for businesses. Klerman and Goldman (1994) attempted to assess the impact on employers of both individual and employer mandates on jobs of the proposed Clinton initiative, estimating that as many as 100,000 jobs would be lost based on an employer mandate to provide up to 80% of the insurance premiums, but this analysis was largely theoretical, based on extrapolations due to job losses resulting from minimum wage increases. Kronick (1991) argued that a similar proposal enacted in Massachusetts in the early 1990s would pay for itself, and though it would force some small businesses out of business, he suggests that the institution of universal healthcare would make the survivors more productive and draw businesses to Massachusetts, particularly entrepreneurs. While politically enticing, his arguments hinge on very optimistic assumptions about the impact of the state system on prices, its robustness in times of economic downturn and its inability to control or affect demand in all but an inflationary manner, but most importantly, it is based on a micro-simulation drawn from the Current Population Survey and he neglects any real world analysis on entrepreneurs. Since nearly all previous attempts at universal healthcare have met with limited success (Oliver 2005), policy analyses for universal healthcare proposals have utilized some form of simulation based on either a Monte Carlo approach (Kronick 1991) or a more ab initio analysis (Damberg 1996). The present analysis will be the first attempt to evaluate an actual public policy regarding the health financing system in terms of its impact on the formation of new organizations, primarily new businesses

empirically. It is the first attempt to elucidate meaningful explanatory variables for entrepreneurship within a single labor market area or MSA (Acs and Armington 2006). It will attempt to address to what extent social policy either facilitates or impedes entrepreneurial entry in the form of new organization foundation behavior, and consider possible encouragement or discouragement of new firm formation in the form of displacement or suppression.

Chapter 3. Research Question

This leads to the focus of the inquiry, whether the mandatory insurance law will put sufficient upward pressure on wages or diminish the entrepreneurial profit sufficiently to affect the number of new firms started in Massachusetts and whether this difference will vary by sector and firm size. One would expect such differential affects in recognition of work showing profound differences in the response of different industries to different inputs with regard to capital and labor (Acs and Audretsch 1987; Audretsch et al. 2004; Carree and Thurik 1996; Geroski 1995), and that these effects might persist affecting firm survivability (Audretsch et al. 2004).

The purpose of the research is to empirically evaluate the impact of various environmental factors on the level of firm formations in an effort to determine if the new law has a positive, negative or neutral affect on the formation of new firms. In order to address this question, this analysis will be conducted on simulated panel data spanning the timeframe from 2000 to 2007. It will examine those elements which vary within a coherent geographic element the New England Cities and Town Areas (NECTA) and NECTA Divisions across the boundary between Massachusetts and New Hampshire but remain within the Boston-Cambridge-Quincy, MA-NH NECTA.

Chapter 4. Hypotheses

Building on the previous body of literature related to economic development initiatives and entrepreneurial choice this study will examine the following hypotheses.

Hypothesis 1: The Massachusetts Health Reform Law of 2006 will affect the level of new firm formation activity, negatively in Massachusetts. The proportion of new firms in each state over time will shift in coordination with the new law and these proportions will be statistically significant.

Hypothesis 2: The Massachusetts Health Reform Law of 2006 will have differential effects based on the type of business. The correlation coefficients for industry type will be statistically significant and significantly different before and after the policy frontier. This will be particularly important for healthcare resulting from the infusion of capital into the sector by increasing levels of insurance, and for industries which use large amounts of minimum wage labor such as retail and hospitality by increasing labor costs. This should result in a positive and statistically significant correlation coefficient for healthcare, and a negative and statistically significant correlation coefficient for retail and hospitality.

Hypothesis 3: The Massachusetts Health Reform Law of 2006 will have different affects in Massachusetts on firm formations for firms of different sizes, particularly for firms between 11 - 19 employees because of the statutorily different treatment for firms of 11 employees or less. The correlation coefficients will be significantly different for firms with < 11 employees and for those with 11-19 employees before and after the policy frontier.

Hypothesis 4: To the extent that job-lock affects the decision of women to prefer self-employment and that self-employment and entrepreneurship are synonymous (Brunetti et al. 2000; Buchmueller and Valletta 1996; Gurley-Calvez 2006; Wellington 2001), the Massachusetts Health Reform Law of 2006 should have a positive effect at encouraging firm formation activity among women. Thus, the correlation coefficient for gender will be positive and statistically significant for firms formed in Massachusetts.

Hypothesis 5: Firms should be more productive when workers are more satisfied. Having health insurance coverage should positively affect worker affect and thus improve output. Therefore, the output of firms in Massachusetts versus firms in New Hampshire should be greater. The correlation coefficient for state should be positive and significant for Massachusetts when considering output for the period affected by the new regulation.

Hypothesis 6: The tendency to arbitrage the Massachusetts Health law should not only be a function of firm type but also distance to the state line. The closer to the state line in the greater the ability to draw customers from Massachusetts. This feature, however, would only be present for organizations that choose to locate in New Hampshire, and thus, the coefficient for distance to the state line in New Hampshire should be negative after the policy frontier. As you move away from the border, the propensity for locating in New Hampshire should diminish. Thus, the coefficient for distance to the state line should be negative and significant for New Hampshire organizations.

Chapter 5. Data and Information Base

5.1. Firm Level Data

> … entrepreneurship has two meanings. First, entrepreneurship refers to owning and managing a business on one's own account and risk. Within this concept of entrepreneurship, a dynamic perspective focuses on the creation of new businesses, while a static perspective relates to the number of business owners. Second, entrepreneurship refers to entrepreneurial behavior in the sense of seizing an economic opportunity. (Acs and Armington 2006, 7)

In the course of this analysis, the dynamic perspective is adapted to consider all those who start a new endeavor be it for-profit as in the case of firms listed in the database or not-for-profit which would cover the membership organizations, social service organizations as well as government entities. The data itself was obtained by downloading individual firm records from the InfoUSA® business directories for new and existing businesses via the SalesGenie.com® interface. The current dataset represent a directory of organizations whose data has been verified via telephone interview by InfoUSA®. The second, new business directory consists of businesses which have been started in the past 12 months, gleaned from phone and civic records, but unprocessed in

terms of supplementary data. InfoUSA® consolidates data from multiple sources including phone directories, annual reports, 10Ks, and other SEC information sources, federal, state and municipal government data, business magazine, newsletters, postal service sources and internet research on individual firms on a bi-weekly basis. This data is compiled primarily for the purpose of direct marketing. Data from the new businesses database is migrated into the main directory regularly, but may take from 3-9 months from initial entry for final verification and migration. As such, some data in the new businesses directory represents duplication and relative to the current business directory less information is available (InfoUSA 2007).

In New England, while county level jurisdictions technically exist, they have no practical meaning. All local government operations are carried out by cities and towns and all physical space in these states are assigned to cities or towns. Metropolitan Statistical Area definitions, by contrast, are typically in terms of counties. As a result of this peculiarity, in 2000 the Office of Management and Budget also provided Metropolitan Statistical Areas specified using cities and towns in addition to counties for New England. These city based divisions are referred to as New England Cities and Town Areas (NECTAs), and very large NECTAs with a population exceeding 2.5 million may be subdivided into smaller NECTA divisions (OMB 2007).

The specific data consists of towns, drawn from four NECTA divisions within the Boston-Cambridge-Quincy, MA-NH Metropolitan NECTA. It includes parts of the

Boston-Cambridge-Quincy, MA NECTA Division, the Haverhill-North Andover-Amesbury, MA-NH NECTA Division, the Lawrence-Methuen-Salem, MA-NH NECTA Division, the Lowell-Billerica-Chelmsford, MA-NH NECTA Division and the Nashua, NH-MA NECTA Division and the towns listed in Table 2 (Census 2006).

Table 2. Cities and Towns of the Study Region

Division	City	State
BOS	Andover, Boxford, Groton, Newbury, Newburyport and Rowley	MA
HNS	Amesbury, Georgetown, Groveland, Haverhill, Merrimac, North Andover, Salisbury and West Newbury	MA
	Atkinson, Brentwood, Danville, East Kingston, Epping, Exeter, Fremont, Hampstead, Hampton Falls, Kensington, Kingston, Newfields, Newton, Plaistow, Sandown, Seabrook and South Hampton	NH
LBC	Billerica, Chelmsford, Dracut, Dunstable, Lowell, Tewksbury, Tyngsborough and Westford	MA
	Pelham	NH
LMS	Lawrence and Methuen	MA
	Salem	NH
NAS	Pepperell and Townsend	MA
	Amherst, Brookline, Chester, Derry, Greenfield, Greenville, Hollis, Hudson, Litchfield, Londonderry, Lyndeborough, Mason, Merrimack, Milford, Mont Vernon, Nashua, Raymond, Wilton and Windham	NH

The towns whose southern and/or southeastern edges constitute the state line are Mason, Brookline, Hollis, Nashua, Hudson, Pelham, Salem, Atkinson, Plaistow, Newton, South Hampton and Seabrook, New Hampshire respectively. These communities are depicted below as part of their respective NECTA Divisions.

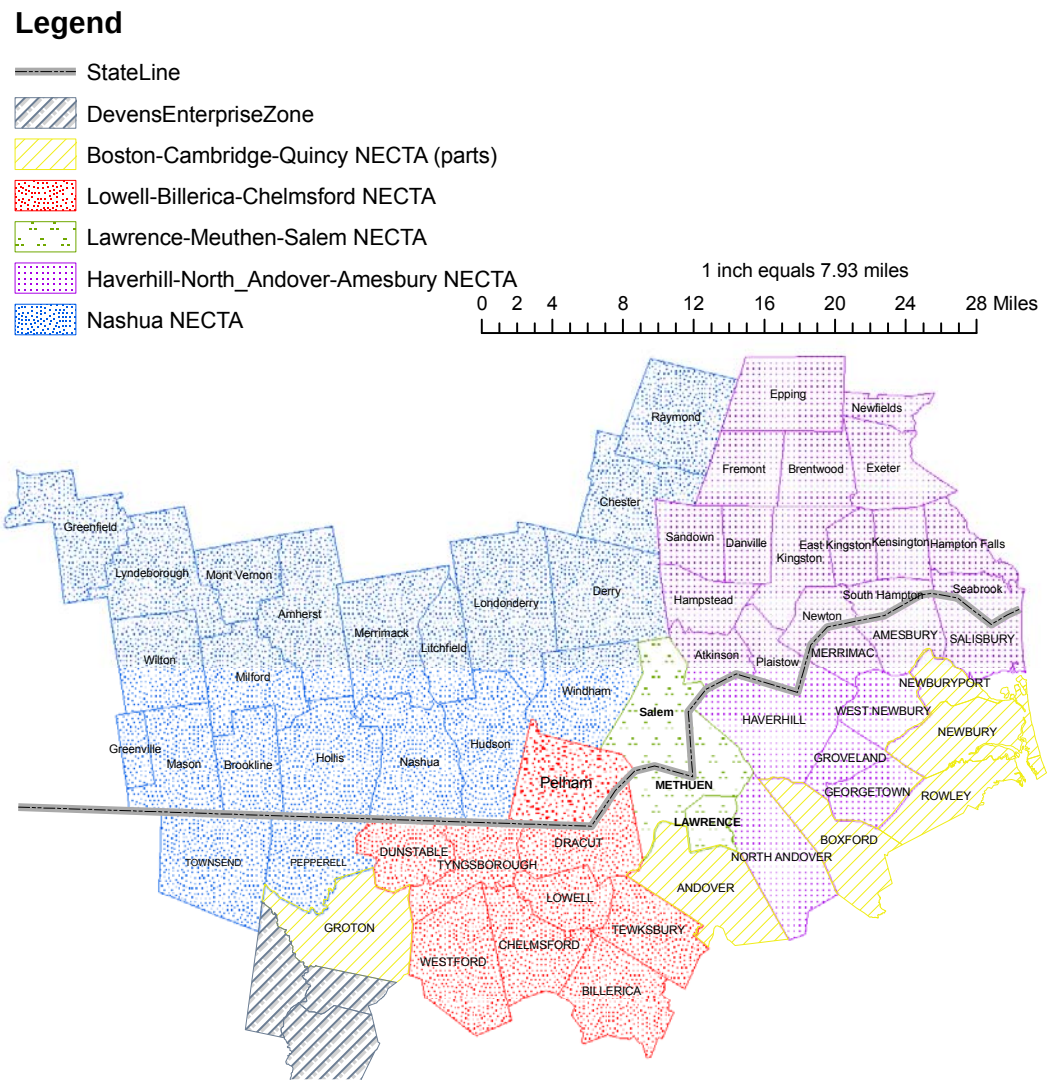

Figure 1. Study Region

While somewhat the judgment of the researcher, the specific elements of the Boston-Cambridge-Quincy, MA NECTA Division were selected in order to provide additional

coverage and data within Massachusetts. This has the added effect of providing a greater array of physical distances from the state line in Massachusetts to test the relationship of physical distance to the state line and probability of locating a new firm. The straight line distances from the state line to the farthest boundaries in New Hampshire range from 13 to 20 miles; the comparable distances in Massachusetts range from 4 to 16 miles. The entire map geography is 60 miles east-west and 20 miles north-south. Each of these dimensions is well inside the functional spillover region of 75 miles identified by Acs and Armington (2006) as are the University of Massachusetts at Lowell, the University of New Hampshire at Durham, Harvard University and the Massachusetts Institute of Technology as well as numerous other smaller institutions of higher education. The specific geographies are apportioned within the study area as follows.

Table 3. Geographic Apportionment by State and NECTA Division

Geography	% of Total Area
New Hampshire	59.81%
Massachusetts	40.19%
Boston-Cambridge-Quincy, MA NECTA Division	10.58%
Nashua, NH-MA NECTA Division	42.62%
Lowell-Billerica-Chelmsford, MA-NH NECTA Division	14.86%
Lawrence-Methuen-Salem, MA-NH NECTA Division	4.22%
Haverhill-North Andover-Amesbury, MA-NH NECTA Division	27.72%

While there is clearly more land mass in New Hampshire than Massachusetts these NECTA divisions are similar to Metropolitan Statistical Areas and are thus coherent

labor markets within the large labor market of the Boston-Cambridge-Quincy, MA NECTA. It was not the intention to apportion the geographies with more similar land masses but to maintain the coherence and interdependency of the geographies and thus ensure a certain economic interconnectedness to facilitate the assumption of geographically specific labor market variables to be essentially constant.

Data was downloaded on three occasions: June 30th, October 19th and December 22nd, 2007. December 22nd was the last update of data in the database for the calendar year of 2007. While new firms which have started in 2007 will be added to the dataset after this period, it was judged that the majority of firms which would eventually be incorporated were already present and sufficient to begin the analysis. This assessment was made by comparing the record production dates in the New Business database for businesses started in the Jun-December time window and specifically by day for December. 100 firms or 20% of December's entries were entered after the 22nd; however, this represented only 3.2% of the total number of entrants for the second half of 2006 or 1.79% for the period Jun-2006 to Jun-2007.

Since this data represents two databases which overlap each other temporally, it was necessary to clean the data. This operation was performed using standard duplicate evaluation routines present in the statistical package STATA 9.2© in a two step process. The first step eliminated duplicate records based on a unique record identifier (INFOUSAID). The second step repeated the process removing records which shared the

same name and address information. When combining both the new and existing business datasets and processing them using this procedure, the resulting, final dataset contained 50,630 unique observations. In general, descriptive statistics were generated from this dataset, as was the dataset for the random effects models employed in the analysis.

Since fields in the two datasets did not necessarily have a one-to-one correspondence, judgment was used to assign similar fields from the new business dataset to categories in the current business dataset. One field in particular, the Record Production Date, contained data in the form YYYYMMDD and for the new firms represents the closest approximation of firm formation date. This field was used to determine the starting year of the firm. The geographic distribution of the final dataset is described in the following table.

Table 4 - Frequency Distribution Final Dataset by MSA

MSA	NECTA Division	Freq.	Percent	Cum. %
BOS	Boston-Cambridge-Quincy	4,358	8.61	8.61
HNA	Haverhill-North Andover-Amesbury	11,410	22.54	31.14
LBC	Lowell-Billerica-Chelmsford	10,495	20.73	51.87
LMS	Lawrence-Methuen-Salem	6,428	12.7	64.57
NAS	Nashua	17,939	35.43	100
Total		50,629	100	

Geocoding was performed on the final dataset using the physical address of the businesses. Missing observations were reiterated by relaxing the matching rules on street names and then by individually matching the address to a closest approximation of neighboring addresses. For the roughly 4,000 observations that remained, the average of the business latitude and longitude coordinates for the five digit zip code was used: this average latitude and longitude constitutes what is essentially a commercially weighted centroid for each five-digit zip code. This approach assumes clustering and the co-location of establishments, organizations or firms. This is considered a reasonable assumption given that in most communities zoning laws restrict the location of firms to specific areas of the community. Once complete, the geocoding was used to compute the distance to the state line using a methodology outlined in Appendix C where the shortest distance to the state line of each firm was computed and retained as the variable dmin.

5.2. Regional data

Some geographic level or regional level data can be aggregated upward from the individual level data. An example of this might be firm entry rates. Other data must be imported from other sources.

Population data was obtained from American Fact Finder (Census 2007). Values for 2007 population were estimated using a straight-line interpolation via MS Excel®. Population and density data in the analysis was used as a surrogate for endogenous demand. Patent data was obtained from the U.S. Patent and Trademark Office's public search area for each jurisdiction. Patents were aggregated to the level of town and thus represent a measure of endogenous knowledge. Patents were also lagged one year and the percent change in patents computed and analyzed to determine its impact. Protestant work ethic is measured using the proportion of churches in the communities which are protestant both in the current year and cumulatively. The total number of churches in the study region was 555 (Shane 1996).

Much literature stresses the importance of institutions (e.g. Baumol 1990; Sobel 2006, 2007). The theory is that good governance is important for protecting private property and ensuring that the returns from fruitful activities can be appropriated to the entrepreneur. In the operation of a community, there is a certain basic level of services necessary for public safety: fire, police, communications, etc. As a community grows, more services are added to some optimal point and then presumably beyond that point the principles of non-market failure come into play (Sobel 2006, 2007; Wolf 1997). As a proxy for institutional efficiency or as a measure of the relative size of local government, data on taxes received by local governments was obtained from the state of Massachusetts website including transfers in to the city from the state. Since New Hampshire does not have a sales tax, and since local property taxes are assessed and

valued based on the budget requirement of the jurisdiction; data on total assessed value was solicited from the affected jurisdictions in southern New Hampshire. In both cases, data was obtained from 1999-2007. The per capita tax burden was then computed for the jurisdiction and this value was also lagged so that the impact of previous years' taxation might be evaluated as a signal to entrepreneurs of the business friendliness of the community. Finally, this data was logged in order to account for an expected u-shaped quality to the relationship.

Area data was extracted from the GIS software to consider the talent-density hypothesis of Florida (2005) and create alternate institutional measures incorporating population, size of jurisdiction and government expenditure. Density also provides many other signals to the entrepreneur about the suitability of the environment (Aldrich 1990). Area in this context is expressed in GIS units and not particularly in any standard area unit measurement such as square miles or square kilometers.

School district ranking data was obtained from http://www.psk12.com/rating/index.php. The specific data is the performance level of tenth graders expressed specifically as the proportion of tenth graders who achieved a rating of advanced on state wide annual assessments in English and Mathematics. A total score was also computed using the sum of these two proportions; and thus, the total score could range from 0.000 – 2.000. Because of the nature of school districts, some districts incorporate multiple towns, others are dedicated to a single town or community and still others, fragments of a community.

High school data was chosen because of its somewhat less granular nature and thus its ability to incorporate more than one jurisdiction. Only one jurisdiction in the study region had more than one public high school within the same city: Nashua, New Hampshire.

5.3. Data Assumptions and Caveats

Since the InfoUSA® data is from a directory; firms which started in previous periods but which have failed are not included in it. No record of deleted, inactive or purged data is maintained by InfoUSA®. Since firm failure rates have been shown to be important as a signal to entrepreneurs (Acs and Audretsch 2003; Aldrich 1990), this represents a non trivial omission in the analysis. Therefore, the reliability of this data source for measuring new entrants is limited to relatively short periods of time (e.g. < 5 years). Since as many as 40% of new business will fail in the first six year (Phillips and Kirchoff 1989), and because of the overall negative effect on the economy of September 11th in terms of job losses and firm failure, it is prudent to consider an abbreviated time period. Acs et. al. makes a distinction between firms which are less than 42 months old (Acs et al. 2004; Levie and Autio 2007) dividing them into the nascent entrepreneurs, those who have yet to start an organization and new (or early-stage) entrepreneurs whose organizations are less than 42 months old. Other evidence of the perishable nature of the

data in terms of new firms may be seen in figure 2 which shows the total number of entrants in the dataset based on their first year in business based on the preliminary data downloaded in June of 2007. The curvature after 2000 is consistent with the notion of a rapid die-off of entrants over time or an increase in survival with firm age which is also consistent with the literature (Geroski 1995).

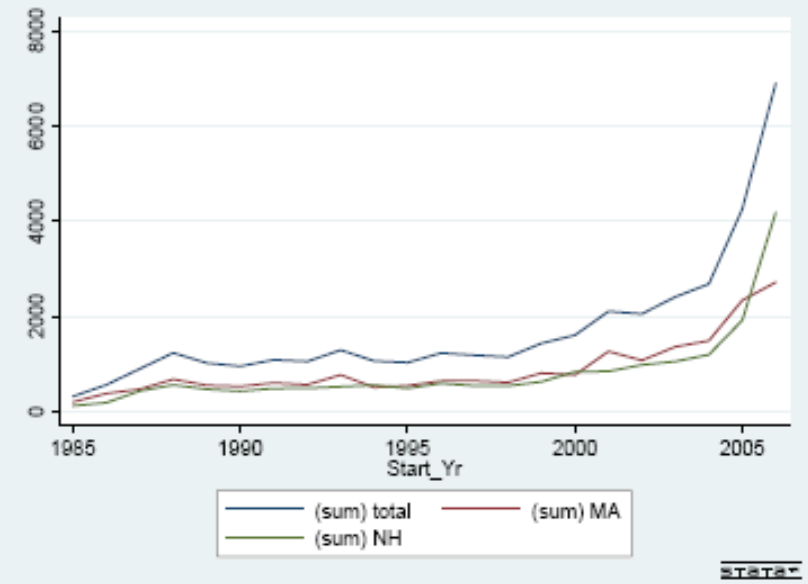

Figure 2. Firms listed in datasource by First Year of Business (Jun-07 data)

Several authors also note the general stability of the firm formation/exit rates over time, punctuated by periods of change (Acs and Audretsch 1987, 1989, 2003; Acs and Armington 2006). The geographies in question also appear to track together as one would expect in a single labor market as illustrated in figure 3.

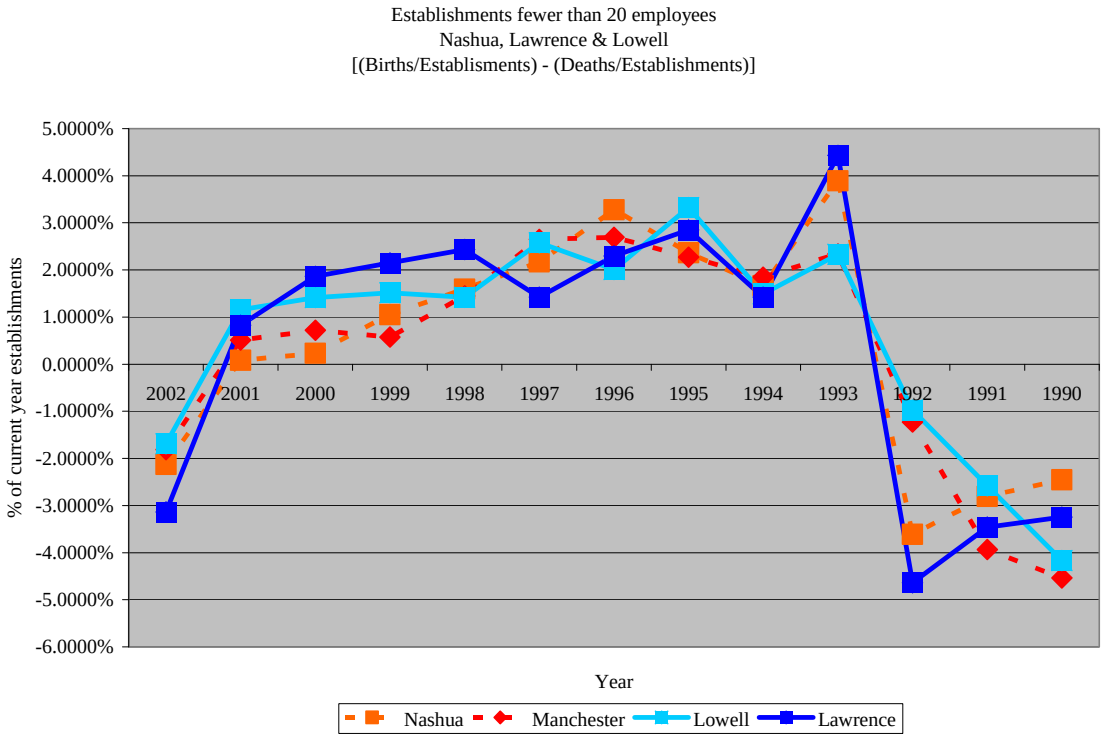

Figure 3. Change in birth to death ratio over time in study region

Source: Dynamic Establishment Data 1989-2002, Office of Advocacy, U.S. Small Business Administration, from data provided by the U.S. Bureau of the Census, Statistics of U.S. Business.

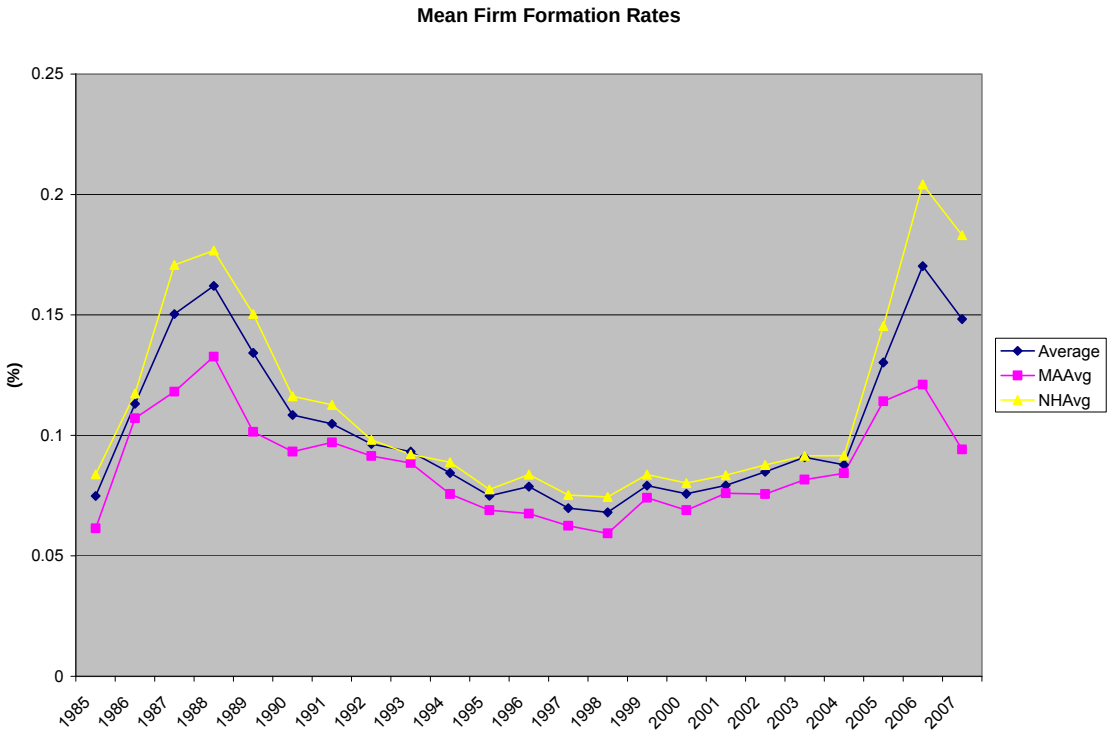

Figure 4. Mean Firm Formation Rates by Current Year (source: InfoUSA® Data)

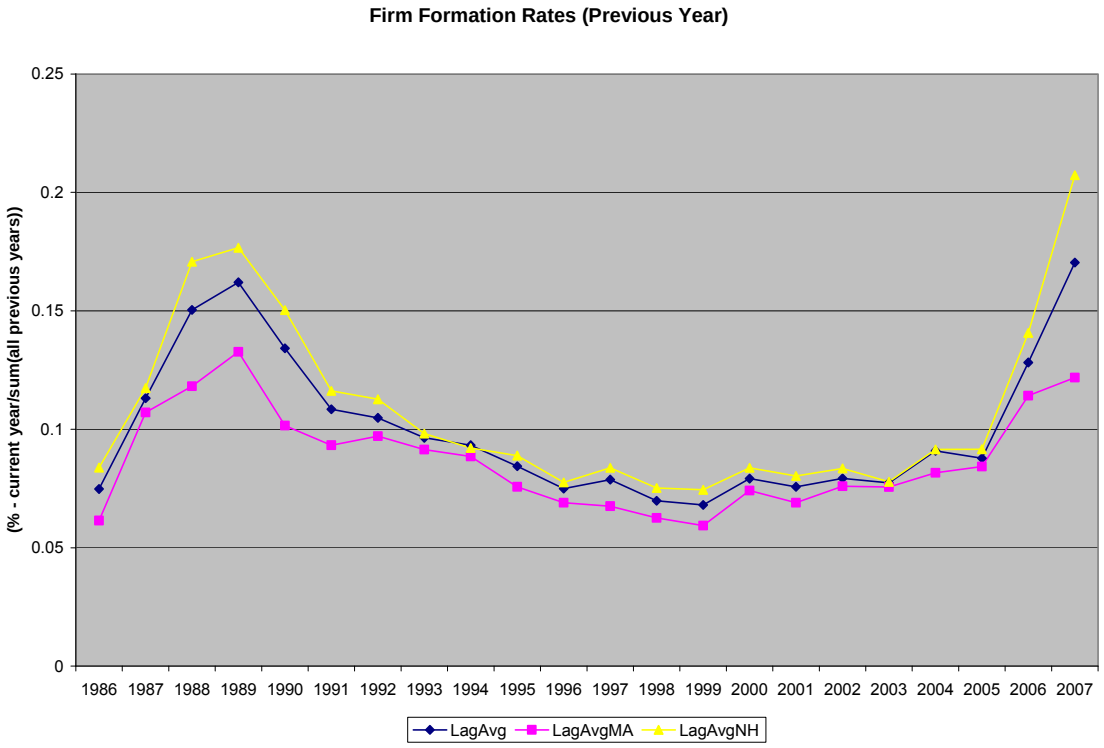

Figure 5. Previous Year Firm Formation Rate (source: InfoUSA® data)

Given the general trend for firm formation to be stable over time and within an associated region to track together, one assumption critical in the analysis is that at least in the short run, the policy will not affect the survivability of firms. While this is clearly a proposition to be tested empirically, given the relatively short time of onset of the policy, it is unlikely that a theorized higher or lower failure rate (Kronick 1991) of firms resulting from the policy will have had time to become manifest.

Employed throughout this analysis is a dataset which because it is comprised of the union of two datasets is limited by the paucity of data in the new business directory which contains 24 variables versus 52 for the existing business directory. Much of the firm specific or individual data of interest is only found in the existing business list. As a result of this the use of individual firm characteristics has the potential to bias the results with the exception of location, primary Standard Industrial Classification (SIC) grouping, gender of the owner and worksite type (i.e. firm, individual, home or commercial). The bias results from the data cleaning schedule employed by InfoUSA® and SalesGenie.com™. One might hypothesize that the larger communities who may have an advantage in firm attraction would be cleaned first. This bias will be only as important as the difference between the new business and existing business directories and would only affect observations for the years 2006 and 2007.

Table 5. New Business Database Variable List

Date List Produced	SALUTATION
Record Obsolescence Date	LAST NAME
Source	FIRST NAME
COMPANY NAME	TITLE
STREET ADDRESS	GENDER
CITY	SIC CODE
STATE	SIC DESCRIPTION
ZIP CODE	WORKSITE TYPE
CARRIER ROUTE	BUSINESS TYPE
DELIVERY POINT BAR CODE	BRANCH CODE
COUNTY	Record Production Date
BUSINESS PHONE	

Table 6. Existing Business Database Variable List

Date List Produced	ACTUAL EMPLOYEE SIZE
Record Obsolescence Date	EMPLOYEE SIZE RANGE
Source	ACTUAL SALES VOLUME
COMPANY NAME	SALES VOLUME RANGE
MAILING ADDRESS	PRIMARY SIC
CITY	PRIMARY SIC DESCRIPTION
STATE	SECONDARY SIC #1
ZIP CODE	SECONDARY SIC DESCRIPTION #1
MAILING CARRIER ROUTE	SECONDARY SIC #2
MAILING DELIVERY POINT BAR CODE	SECONDARY SIC DESCRIPTION #2
STREET ADDRESS	CREDIT ALPHA SCORE
STREET ADDRESS CITY	CREDIT NUMERIC SCORE
STREET ADDRESS STATE	HEADQUARTERS/BRANCH
STREET ADDRESS ZIP	YEAR 1ST APPEARED
STREET ADDRESS DELIVERY POINT BAR CODE	OFFICE SIZE
STREET ADDRESS CARRIER ROUTE	SQUARE FOOTAGE
STREET ADDRESS ZIP + 4	FIRM/INDIVIDUAL
COUNTY	PUBLIC/PRIVATE FLAG
PHONE NUMBER	PC CODE
FAX NUMBER	FRANCHISE/SPECIALTY #1
WEB ADDRESS	FRANCHISE/SPECIALTY #2
LAST NAME	INDUSTRY SPECIFIC CODES
FIRST NAME	ADSIZE IN YELLOW PAGES
CONTACT TITLE	YP SPEND
CONTACT GENDER	METRO AREA
	INFOUSA ID

In order to evaluate the impact of this difference in datasets, the proportion in each state before and after the change and for the years of interest is examined. This provides an indication as to not only the general impact of the legislation but also on the magnitude of the differences when considering the two datasets.

Table 7. Impact of data omissions on dataset

	Total		Non-missing variables only*		% dif
Period	MA	NH	MA	NH	
before 2006	55.85	44.15	55.85	44.15	0.0%
2005	55.95	45.05	55.95	45.05	0.0%
2006-2007	38.24	61.78	50.55	49.45	-20.0%
2006	42.14	57.86	52.65	47.35	-18.2%
2007	34.26	65.74	47.47	52.53	-20.1%

* computed using "actualemployeesize variable"

As is illustrated in the table above, the overall trend is for an increase in the proportion of all new organizations being formed in New Hampshire relative to Massachusetts. The analysis will focus on the significance and magnitude of this shift. What can be observed here is that the differences in the two datasets, after data cleaning has been completed is substantial. While it is possible that some double counting has occurred because of incompleteness in the phone and community records utilized, one would not expect any particular systematic bias in the less complete observations favoring one state over the other. Thus, one might reasonably expect the proportion of New Hampshire versus Massachusetts to persist; however, given the economic importance of Boston versus the smaller jurisdictions one might expect a bias in terms of the more complete records and this would effectively explain the difference in the relative completeness of the two datasets. Therefore, analyses incorporating variables found only in the more complete dataset would incorporate this bias, but those utilizing the first year in business or start date, a primary SIC and the gender of the organizations' owner/manager would not. The bias would be expected to affect the model's estimates therefore biasing the estimators.

Chapter 6. Shifting sands: the impact on overall firm formation

6.1. Methodology

In addition to general descriptive statistics, this portion of the analysis employs three methodologies to explore the impact of Massachusetts' health reform law of 2006 on firm formation activity: a binomial probability test, a very simple time series regression and a random effects regression model. Each methodology is described in detail in the relevant subsection preceding the analysis results. As these methodologies are subsequently extended, in later chapters, a brief section describing the extension is included in that chapter.

6.2. Analytical Results

Before beginning the analysis, it is helpful to explore the data with respect to dates. As has already been mentioned, the initial Massachusetts health reform law was passed in

April of 2006. Depending to some extent on the amount of public discourse surrounding this piece of legislation, would-be entrepreneurs may have been calculating their start decisions with this in mind. Baumol (1990; Baumol, Litan, and Schramm 2006) has noted that institutions create an environment which enables entrepreneurship, and this implies that institutional indecision might suppress the entrepreneurial decision as well as particular decisions impacting the final outcome of opportunity calculations.

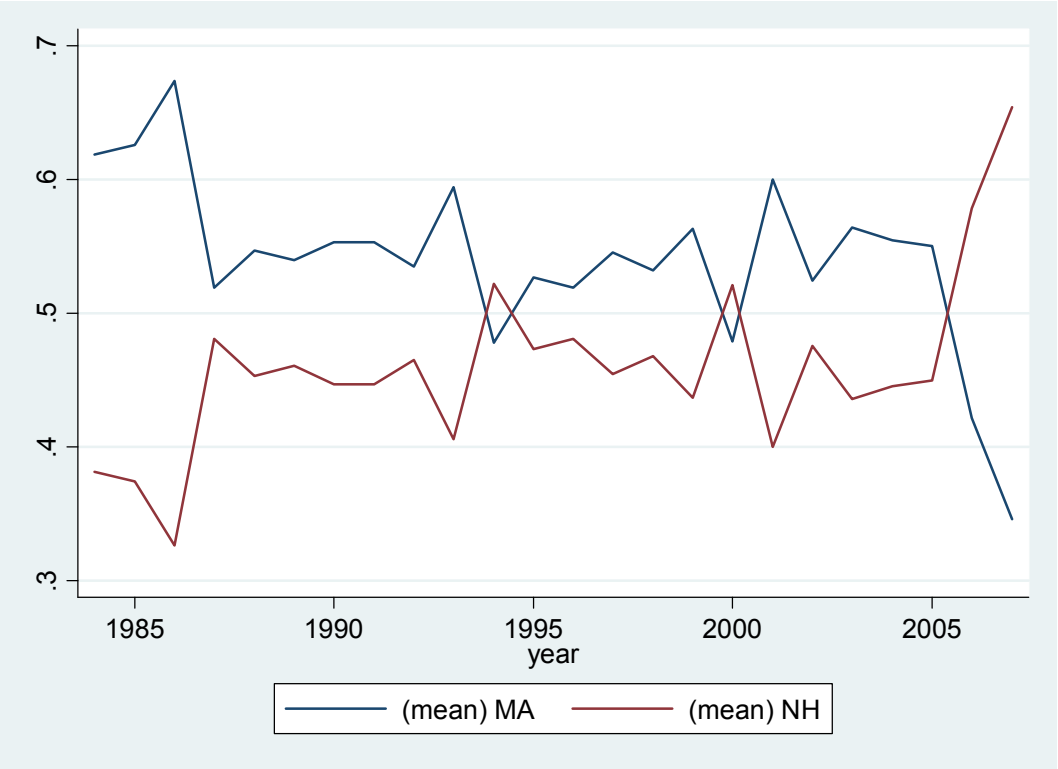

Figure 6 - Proportion of Firms by State and Establishment Year within Study Region

Inspection of a plot of the proportion of firms by year is presented above indicates a marked change in the environment beginning in 2006. Underlying this sort of representation are two assumptions: that the proportion of new firms contributed by each state in the study region is relatively constant over time, and that the survivability of firms produced in each state is not appreciably different. The first assumption appears borne out by this plot and the following table shows a generally stable proportion of firms formed in Massachusetts after 1990 at 50-60%. Given that the directory was computerized and launched in 1984, the date variable, "1st Year in Business", for the first few years may represent a default value during the data entry and cleaning process. While there are periodic shifts in the proportion of firms by year with shifts in 1994 and 1999, the relative magnitude of these shifts are quite small with the exception of the recent period after 2005. In addition, the earlier changes appear to be quite transient lasting only a year whereas the shift after 2005 seems to be more persistent at least to the extent there is data.

Table 8. Percent of Organizations by State and Year

		NH	MA
Year	(n)	%	
2000	1,603	52.09	47.91
2001	2,102	39.96	60.04
2002	2,051	47.64	52.36
2003	2,408	43.56	56.44
2004	2,675	44.56	55.44
2005	4,249	45.05	54.95
2006	7,430	57.86	42.14
2007	7,285	65.74	34.26
Mean Before 2006 (MHRL)		45.48	54.52
Mean After 2005 (MHRL)		61.80	38.20
Total Organizations	29,803	15,895	13,908
2006 Study Region Population	2,902,030	699,056	2,202,974
Population Denisty (people/GIS area units)	0.0008	0.0003	0.0016

Since the law was passed early in 2006, most firms established in 2006 would have the benefit of the knowledge that the law would become a requirement in 2007, and thus, may have adjusted their opportunity calculation with any new cost implications accordingly. While it is also possible, entrepreneurs in 2004 and 2005 may have made this same calculation, uncertainty about the final outcome may have simply delayed the initiation of their endeavor, and at least to the extent these decisions are time sensitive, suppressed firm formation activity in Massachusetts. The assumption that each jurisdiction produces equally survivable firms initially cannot be addressed by this data and will remain an assumption of the analysis from this point forward. The plot illustrates a clear change in the firm formation ecology subsequent to 2005, and therefore, the 2005/2006 boundary will become the primary time benchmark or policy frontier. The

remaining question is whether or not this apparent shift is statistically significant, particularly when controlling for organization size and sector.

6.2.1. Binomial probability tests

Since the data for the analysis is comprised of individual observations which are binary with regard to firm location by state, we can compute the probability that a firm will locate in Massachusetts or New Hampshire using a binomial variable for state. As a discrete variable the data will follow a Bernoulli probability distribution.

Table 9. Probability of Y for Bernouli Distribution (Gujarati 2003, 583)

Y_i	probability
0	$1-P_i$
1	P_i
Total	1

The prtest function in Stata® performs a two-sample test of proportions as described in the equation 1, where n_1 and n_2 are the number of observations in the respective samples,

p_1 and p_2 are the proportions in the respective samples and p_c is the pooled proportion possessing the trait (Lind, Marchal, and Mason 2001, 390).

$$z = \frac{p_1 - p_2}{\sqrt{\frac{p_c(1-p_c)}{n_1} + \frac{p_c(1-p_c)}{n_2}}}$$

Equation 1. Two-sample test of proportions (Lind, Marchal, and Mason 2001, 390)

While this test cannot control for other influences, it addresses the issue of the data being binomially distributed and provides an initial evaluation of the possibility of a shift in firm formation activity resulting from the policy. To test the graphical observation that the period subsequent to 2005 appears to represent an important shift in the local firm formation ecology, a binomial t-test is employed comparing the new firms established in Massachusetts before (MAB4) and after (MAAF) the policy frontier. Because of the prevalence of shocks to the economy and other long term trends, we consider the proportion in segments beginning with the full dataset, then in smaller subsets of time to gain a better picture of what may be happening in the overall firm formation landscape.

Table 10. Proportion by State (MA=1) about the Policy Frontier

MA	after05 0	after05 1	Total
0	15,855	9,088	24,943
	44.15	61.76	49.27
1	20,060	5,627	25,687
	55.85	38.24	50.73
Total	35,915	14,715	50,630
	100.00	100.00	100.00

The shift associated with the 2005 date is clearly statistically significant when considering the full dataset. The null hypothesis in this case is that the difference of the proportions between the two samples is zero: that the proportions are equal. Since the theoretical arguments are divergent, some suggesting support and others suppression of entrepreneurial activity, we focus on the first and third alternate hypotheses as one-tailed tests. The first alternate hypothesis is that the difference is negative; requiring the proportion created after the frontier to be greater than the proportion before. The third alternate hypothesis is that the difference in the proportions is positive, that the proportion created before the frontier exceeds the proportion created after. The second alternate hypothesis is a two-tailed test, that the proportions are not equal, would falsify the assertion that no change had occurred, and was in fact statistically significant in all cases examined. This indicates that in all cases we can reject the null hypothesis that the difference is zero and the proportions the same before and after the policy frontier.

Table 11. Test of Proportions (all years)

```
Two-sample test of proportion                     MAB4: Number of obs =    35915
                                                  MAAF: Number of obs =    14715
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        MAB4 |    .558541   .0026202                      .5534055    .5636765
        MAAF |   .3823989   .0040062                      .3745469    .3902509
-------------+----------------------------------------------------------------
        diff |   .1761421    .004787                      .1667598    .1855244
             |  under Ho:   .0048934    36.00   0.000
------------------------------------------------------------------------------
        diff = prop(MAB4) - prop(MAAF)                               z =  35.9960
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| < |z|) = 0.0000          Pr(Z > z) = 0.0000
```

The results of this test and subsequent tests on smaller subsets of firms indicate that a significant difference exists between these two groups of firms and that this difference is statistically significant for the third alternate hypothesis indicating that the proportion of organizations created before the legislation was passed is significantly larger than that created subsequent to the passage of the legislation (see Appendix A).

Table 12. Test of Proportions (year>2004)

```
MAB4=MAAF if year>2004

Two-sample test of proportion                     MAB4: Number of obs =     4249
                                                  MAAF: Number of obs =    14715
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        MAB4 |   .5495411   .0076328                       .534581    .5645011
        MAAF |   .3823989   .0040062                      .3745469    .3902509
-------------+----------------------------------------------------------------
        diff |   .1671422   .0086203                      .1502467    .1840376
             |  under Ho:   .0085952    19.45   0.000
------------------------------------------------------------------------------
        diff = prop(MAB4) - prop(MAAF)                           z =  19.4459
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| < |z|) = 0.0000          Pr(Z > z) = 0.0000
```

Table 13. Affect of policy on Organizations by Size

			Overall	Between		Overall	
						MA	NH
MHRL	Employees	(n)	(%)	(%)	(n)	(%)	(%)
Before	<11	13485	87.95	88.78	11972	56.01	43.99
After	<11	14715	48.38	45.63	6714	51.55	48.45
Before	11-19	13485	5.85	5.55	748	56.62	43.38
After	11-19	14715	2.47	2.41	355	50.18	49.82
Before	>19	13485	6.2	5.67	765	55.42	44.58
After	>19	14715	49.15	51.96	260	52.69	47.31
Before	size unknown						
After	size unknown				7386	26.37	73.63
Before	19>x<=50				479	54.76	45.24
After	19>x<=50				178	46.31	53.69
Computation for missing size values						Revised Percentages	
After		n(base)	n(comp)	MA(comp)	NH(comp)	MA	NH
	<11	6714	6496.0	1713.0	4783.0	39.17%	60.83%
	11-19	355	432.1	113.9	318.1	37.11%	62.89%
	>19	260	457.9	120.8	337.2	35.90%	64.10%

As Geroski (1995) and Shane (2003) observe, firms which start larger tend to have a greater probability of survival. One observation from the previous table is that the legislation appears to have an indiscernible affect on firms by size to the extent to which size is know. However, computationally accounting for the organizations of unknown size of which 73.6% have chosen to locate in New Hampshire by assuming that the distribution between sizes is historically constant and then adding these values back into the proportion computation suggests a dramatic impact. This is even true for larger small firms between 19 and 50 employees. What appears to have been an historic advantage in locating in Massachusetts seems to have been reversed by the measure.

Similar, results for the proportion of female entrepreneurs in Massachusetts before the policy change also can be observed. It has been suggested that female entrepreneurs in particular may be sensitive to health insurance and healthcare issues. Prior to the policy, the proportion of Massachusetts entrepreneurs who were female was 32.46%; whereas, after policy the proportion fell to 29.41%. However, the allocation of female entrepreneurs between Massachusetts and New Hampshire changed from 56.9% to 58.4% in Massachusetts. Thus, Massachusetts seemed to reduce its production of entrepreneurs and only slightly favoring female entrepreneurs versus New Hampshire confirming Wellington's hypothesis (2001). This may also suggest that the new cost constraints imposed on new organizations both discourages entrepreneurship while conferring a slight advantage on Massachusetts with regard to women entrepreneurs. This tentative result will be explored more completely in Chapter 9.

6.2.2. Simple time series regression

A very simple backward stepwise regression was performed using an aggregate of the dataset where the proportion of firms created in Massachusetts was a function of time and the proportion in previous periods and a dummy variable for the proportions in 2006 and 2007. While this regression would clearly suffer from omitted variable bias such as the impact of changes in aggregate interest rates, previous year new firm formation activity, etc., however, it is only intended to test the significance of a shift. The importance of the two year lag may be the result from the time required to gain financial and other inputs for the new firm. These results also confirm that the proportion created in Massachusetts subsequent to the passage of the legislation is negative and statistically significant. Since the Durbin-Watson (d-statistic) is greater than the d_U (3, 19) of 1.685, there is no evidence of positive first-order serial auto-correlation (Gujarati 2003).

Table 14 - Simple backward stepwise time-series regression results

```
. stepwise, pr(.2): regress MA year MALag1 MALag2 MALag3 MALag4 MALag5  dum
```

Source	SS	df	MS	Number of obs	=	19
Model	0.047077	2	0.023538	F(2, 16)	=	21.65
Residual	0.017395	16	0.001087	Prob > F	=	0
Total	0.064472	18	0.003582	R-squared	=	0.7302
				Adj R-squared	=	0.6965
				Root MSE	=	0.03297

MA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dum	-0.16288	0.024863	-6.55	0.000	-0.21559	-0.11017
MALag2	0.371723	0.251959	1.48	0.160	-0.16241	0.905851
_cons	0.341307	0.136186	2.51	0.023	0.052606	0.630008

Durbin-Watson d-statistic(3, 19) = 2.68595

6.2.3. Random Effects regression models

Unfortunately, determining who is an entrepreneur from an aggregate vantage-point is a non-trivial exercise, but for the purpose of this research an entrepreneur is defined as someone who starts new organization, operationalized in the activity of being recognized as open for business by entry into a public format: a directory (Acs et al. 2003; Birley 1984). The directory data represents observations of an individual at a fixed point in time. Panel data can be simulated at the individual level of observation via “repeated observations on the same set of cross-sectional units” (Johnston and Dinardo 1997, 388), and employing a random effects model to estimate the parameters noting two extensions of a simple pooled estimator appropriate for each model. In this case, the data is first

cleaned removing observations not of interest such that consideration is given only to the years 2000-2007. Then records are amplified such that for each year there is a record for each individual and controlling for entry using a dummy variable exist.

This approach provides a very large number of individual observations and a relatively small number of time periods. For a random effects model, the error term is assumed to be uncorrelated with the independent variable (homoskedasticity), while for a fixed effect model the assumption is that the individual effect is correlated with the independent variable. Typically, both types of models are estimated and compared in order to test these two assumptions (Johnston and Dinardo 1997); however, the particular technique used to generate repeat observations, while valid for a short period renders a fixed effect model inestimable as all observations drop out of the estimation. The resulting random effects estimation has the effect of dropping out the effects of time on the resulting estimators.

The development of the random effects model proceeds first from the academic literature which suggests that the ability of an entrepreneur to pursue an opportunity is a function of certain, inherent traits such as cognitive ability, intrinsic to the entrepreneur and cannot be altered by society, and by characteristics of the opportunity and environment (Shane 1996, 2003).

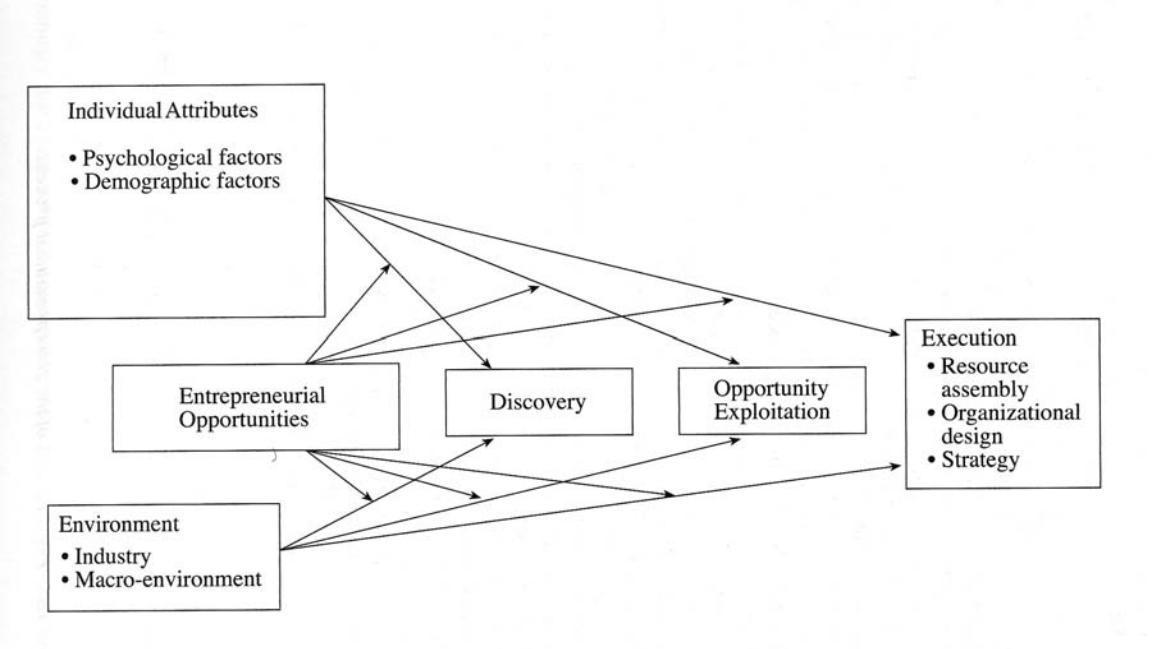

Figure 7. A model of the entrepreneurial process (Shane 2003, 11)

Environmental factors include the demand, exogenous knowledge and access to human capital, as well as access to financial capital in the current and previous periods (Shane 2003). Shane (1996, 773) found that rates of entrepreneurship in an aggregate geography were affected by "the Protestant Ethic, interest rates, prior rates of entrepreneurship, risk taking propensity, business failure rates, economic growth, immigration and the age distribution of the population," but what impact would this have on an individual entrepreneurs propensity to locate a venture in a jurisdiction. Are these features merely coincidental or do they illustrate some causality?

6.2.3.1. The Variables

The literature on firm location decisions indicate that the location of firms is essentially an optimization exercise between the costs of inputs and the cost of distribution to markets (Rubin and Zorn 1985), but recent work in entrepreneurship suggests that institutional factors also play a role (Baumol 1990; Baumol, Litan, and Schramm 2006) and may result from institutional arrangements (Bartik 1991). An effort was therefore made to account for the demand market, the knowledge environment and the institutional environment, and then control for characteristics of the firm and the entrepreneur in the subsequent analysis noting that use of individual characterizes may subject the analysis to particular types of bias already mentioned in chapter 5.

The literature suggests that the demand market and ecological characteristics can be important in new firm formation (Aldrich 1990; Shane 2003). Ecological variables of import would include infrastructure, cost of physical capital, access to human capital, previous year rates of entrepreneurship, exogenous knowledge present in the environment (Shane 2003). Such variables were gathered at the community level and used to address the demand market characteristics. The demand is a combination of local and export demand and is approximated here by local population and population density variables in the current and previous periods as employed in other institutional evaluations (Sobel 2006, 2007). Since the majority of firms in a given jurisdiction are retail and service

firms or small firms the majority of their demand is likely local (Kronick 1991), and thus, local demand may be assumed as an adequate proxy for overall demand. Other ecological variables include the measurement of crowding and spillovers. Crowding is important both in knowledge spillovers, assessing the existence of an opportunity and in access to capital, and measured here as new firm formation rates in the current and previous period (Caroll and Hannan 2000; Johnson 1986; Aldrich 1999; Horvath, Schivardi, and Woywode 2001). In addition, population density also serves as a measure of crowding and knowledge spillovers in both the current and previous period (Florida 2005).

In an effort to captures, Shane's (1996) protestant effect, a measure of protestant versus catholic churches was employed: no accounting was made for convents, monasteries or non-Christian institutions. This was measured as entrants in the current and previous periods and a cumulative measure in the current period. This particular measure was only able to predict the correct outcome 47% of the time.

Institutions have been identified as important in determining the level and type of entrepreneurial activity (Baumol 1990). Three institutional measures were employed in the development of the model to address the size and quality of the government. The first measure was aimed at assessing the size of the local government by looking at the total assessed taxes, the second measure was related to the level of civil litigation at the local level in Massachusetts at the district court level and in New Hampshire at the Superior

Court level, and the last metric considered the sum of the proportion of high school tenth graders in a school district who scored in the advanced rating on state proficiency exams. While the tax variable corresponds to a single community, both the court and education variables do not. The school variable can represent a single community, a grouping of multiple communities or a subset of a larger community. These measures follow conceptually from the work of Gwartney and Lawson (2003) whose index of economic freedom incorporated measurements of the size of government with bureaucratic and trade restrictions. In the current case trade restrictions are a function of the federal government and as such uniform across the MSA while bureaucratic restrictions are a function of the local legal environment. As such their affects would be muted or provide no variation across the geography in question.

The size of the local government is measured using the total tax burden with total receipts in Massachusetts including state-city transfers and total assessed in New Hampshire. This results from the different tax structures in each state. In the later case the data was provided by the town clerks of the various jurisdictions and in Massachusetts via the state department of revenue website. New Hampshire, unlike Massachusetts has no sales tax, and income taxes are constrained to portion of capital gains. Massachusetts however employs sales, property and income taxes. No evidence was found of major changes to the tax codes in either state, and this would be consistent with the empirical literature as states seek to minimize such differences (Wasylenko 1997);. Some property tax relief measures were implemented in New Hampshire in 2003 focused primarily at the elderly,

but such measures do not typically affect the aggregate taxes assessed. Since property taxes in particular are determined by the projected budget of the municipality and typically compose the majority of revenue for a community (Mikesell 1999), they represent a good proxy for the first measure of institutional effectiveness: relative size of the local government (Gottlob 2006). This is in keeping with other measures of government effectiveness such as the Index of Economic Freedom which also uses the size of government (Gwartney and Lawson 2003). One would expect this measure to be influenced by the size of the population and thus should be computed in a per capita manner. One might also expect that as a community increases in size more opportunities for rent seeking by administrative personnel would present themselves and thus the overall efficiency of the government might suffer. As such, the shape of per capita tax revenues might also be expected to be somewhat of an inverted u-shape. In order to compensate for this behavior the log of per capita tax revenues was utilized. Both per capita and total tax revenues were also statistically significant.

With regard to the legal environment, typically dramatic departures are uncommon. In this period two substantial departures occurred, the first, at a national level which would equally affect property owners in both states was the Kelo v. New London decision (Kelo v. New London, CT 2005); which prompted rapid reaction in many states including New Hampshire and Massachusetts (Brnovich 2005). New Hampshire's reaction to Kelo was to pass an amendment to the state constitution specifically prohibiting takings for economic development purposes in November of 2006 (NH 2006). The second, more

specific to Massachusetts was the affirmation by the Massachusetts state supreme court of a right to marriage for homosexual couples in Goodridge v. Mass Department of Health (Goodridge v. Mass. Department of Public Health 2003). Inspection of the data presented does not suggest an inflection associated with the year 2003 implying no observable impact of the gay marriage decision.

Counts of civil litigation were tested both in the current period and in the previous period as a proxy for the litigiousness of the specific communities in Massachusetts and New Hampshire. These measures could be viewed as a measure of business climate as well as institutional quality in terms of decision clarity. In both cases, high levels of civil litigation would be expected to reduce firm formation activity. As with taxes, civil litigation would be expected to have a positive relationship to population, and as such, per capita civil litigation should be substituted. As with taxes, litigation may also be expected to have somewhat of an inverted u-shaped behavior decreasing uncertainty with regard to institutions to a point, but then increasing uncertainty with regard to property rights as the level of litigiousness increases. Thus, to compensate for this expected tendency the log of per capita civil litigation was employed. In this instance litigation counts were supplied via court districts and apportioned to the various communities on a per capita basis based on the population of the district in the current and previous periods. This should prevented confounding errors in the estimation process, but having a slightly different geographical nature than other more natural geographic units such as towns.

The last measure of institutional quality is the achievement metric of local tenth grade students in English, Math and a combined score. This would reflect not only on the human capital available to local employers, but also on the relative commitment of the community to education and the relative income of the community. In addition, this measure might also reflect endogenous knowledge in the population and therefore a potential surrogate for the admittedly weak measure presented in patent (Audretsch et al. 2002).

Individual data was also initially considered covering the credit worthiness of the firm, the gender of the entrepreneur or manager, capital in terms of square footage of the office, labor force or size of the organization, the expected entrepreneurial wage or profit or actual sales, industrial sector, technology intensiveness, human capital and marketing costs all of which have been included in some manner in explaining the tendency to entrepreneurial activity. These individual level data however pose a substantial problem in estimating models for the current period resulting from the bias outlined in chapter 5 related to the completeness of the dataset and its being non-representative.

Table 15. Listing of variables (excl. sector specific dummy variables)

Variable Name	Description	Ranges	Measurement of
exist	dummy	0, 1	entry of the organization , 1 for all years present
Act_Tx_Rec	continuous	$218,600 - $577,000,000	institutional quality, size of government
actualemployeesize	continuous	0 - 114,200	organization size
actualsalesvolume	continuous	$0 - $4,270,000,000	entrepreneurial wage
advertising	modified-ordinal	$150.50 - $50,001	marketing costs
After2005	dummy	0,1	policy affect
CivilLit	continuous	298 - 2,599	institutional quality, litigiousness
curyr_entryrate	continuous	0.011628 - 0.550725 new orgs/year	rate of entrepreneurship
density	continuous	0.0000179 - 0.0037528 people/unit GIS area	congestion & demand, lagged
dmin	continuous	0.0002818 - 0.2939883 degrees	distance to border
female	dummy	0,1	women entrepreneurs
HSTot	continuous	1.1 - 126	institutional quality, human capital
lag_entryrate	continuous	0.011628 - 0.550725 new orgs/previous year	rate of entrepreneurship, lagged
lagdens	continuous	0.0000179 - 0.0037528 people/unit GIS area	congestion & demand
lagpatents	continuous	0 - 714	exogenous knowledge, lagged
lglagpcCvLt	log continuous	1.006413 - 6.983697	institutional quality, litigiousness
lgpctxrev	log continuous	4.716703 - 11.71553	institutional quality, efficiency
midszfirm	ordinal	0,1	organization size
NH / MA	dummy	0,1	State
patents	continuous	1 - 714	exogenous knowledge
pc_Tax_Rev	continuous	$111.80 - $122,459	institutional quality, size of government
pcCivLit	continuous	2.73577 - 1078.9	institutional quality, litigiousness
PCs	modified-ordinal	1 - 30	technical knowledge
poplag1	continuous	845 - 105,258	demand market, lagged
population	continuous	844 - 105,258	demand market
primarysic	quasi-continuous	013901 - 999999	industry sector
Professional	modified-ordinal	1 - 10	human capital
smallfirm	ordinal	0,1	organization size
sqft	modified-ordinal	1,249 - 59,992	physical capital
twodigitsic	ordinal	01 - 99	industry sector
propprotestant	continuous	0.00 - 1.00	protestant work ethic (prop. Institutions)
pprotlag	continuous	0.00 - 1.00	protestant work ethic (prop. Institutions)
cumpprot	continuous	0.00 - 1.00	protestant work ethic (cummulative prop. Institutions)
creditnumericscore	continuous	0 - 100	entrepreneurial access to capital

6.2.3.2. Model Form

Moving from the variables to the development of an appropriate model form, and considering that the concern is with the probability of an organization locating in Massachusetts, the appropriate model form is a logistic regression. Logistic regressions measure the log of the odds ratio, or the log of the probability of observing one of two outcomes, where one outcome is expressed as P_i and the other as $(1-P_i)$. The proportion P_i can be expressed as a function of e^z $P_i = E(Y = 1|X_i) = \frac{1}{1+e^{-(\beta_1+\beta_2 X_i)}}$, where $P_i = \frac{e^{z_i}}{1+e^{z_i}}$ and $Z_i = \beta_1 + \beta_2 X_i$. This then forms the basis for the log likelihood calculation L_i, where L_i is the natural log of the odds ratio and is equal to the regression equation depicted below.

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \beta_1 + \beta_2 X_i + u_i$$

Equation 2. General form LOGIT model (Gujarati 2003, 595)

Given the preceding literature discussion, variables were initially selected from the available data to represent four primary theoretical categories: demand, knowledge conditions, institutional conditions and conditions of the entrepreneur and firm.

$$L_i = f(demand, knowledge, institutions, firm, entrepreneur)$$
Equation 3. General form LOGIT model for present case

The process of developing the basic model involved a series of regression analyses using various techniques, including a combined backward and forward stepwise regression and a series of bivariate regressions to ascertain variables which might be significant in predicting the outcome.

The backward stepwise techniques tended to create models prone to dramatically overestimate the location of organizations in Massachusetts a problem we will refer to as poor fidelity: correct prediction of the location outcome. Ideally, the model should do well at correctly predicting the correct outcome in each state, both the positive outcome, Massachusetts and the alternative outcome, New Hampshire, without being prone to overstate one outcome over another – i.e. a relatively balanced failure rate. This tendency or fidelity problem was so prevalent that often the proportion of the alternate outcome ($1\text{-}P_i$) was about 50% correct making the model slightly worse than random chance at correct prediction. These models typically predicted the outcome correctly 55-65% of the time. The property likely results from variance-covariance interactions between the several population dependant variables litigation, patents, density, and the biases introduced by using individual firm level data in the backward stepwise process already addressed in Chapter 5. Poor fidelity has the potential to result both in bias

predictors as well as inverted signs in coefficients as the model would predict incorrectly the location of the organization and grossly distort the sign of the coefficient.

Population and population dependant variables such as patents, civil litigation and tax collection were particularly poor at predicting correct outcomes. This results from severe differences in the population of the two states within the study area versus their physical proportion and contribution to activity. The population of the study area for 2006 in New Hampshire was 699,056 versus 2,202,974 in Massachusetts, but in the study region the physical space of New Hampshire is 149% that of Massachusetts. This results in a population density roughly 433% greater for Massachusetts. Despite this population advantage, within the study area New Hampshire accounts form between 40% and 60% of the new organizations before and after the policy implementation respectively. This disparity may account fully for both the issues in covariance and the general poor performance of the backward stepwise models. Conceptually, were population and population density alone sufficient to describe entrepreneurial activity, then this activity would be largely confined to the largest cities and within the central business districts of those cities in a given metro area: this is not, however, the case (Saxenian 1994). The rather mixed affects of density are outlined in Aldrich's (1990) discussion of the ecological perspective on rates of entrepreneurship. The following table compares the backward/forward stepwise models (1, 2 and 3) with the forward stepwise models built from bivariate regression analysis (4 and 5).

Table 16. Comparison of Models by Technique of Development

	(1) MA	(2) MA	(3) MA	(4) MA	(5) MA
exist	0.026	0.09	0.071	0.392	0.221
	-0.09	-0.32	-0.26	(5.59)**	(2.55)*
population	0.062	0.07	0.071		
	(12.06)**	(13.93)**	(13.56)**		
previous year populaton	-0.063	-0.071	-0.073		
	(12.18)**	(14.05)**	(13.69)**		
previous year population density	3360017	3710527.8	3768369.2		
	(13.37)**	(15.38)**	(14.80)**		
population density	-3360198.8	-3709786.2	-3766829.2	10,674.29	15,766.67
	(13.40)**	(15.41)**	(14.83)**	(60.99)**	(49.79)**
endogenous knowledge	0.155	0.175	0.159		
	(10.41)**	(11.42)**	(9.42)**		
1 yr lag endogenous knowledge	0.093	0.095	0.118		
	(5.15)**	(5.77)**	(6.51)**		
log 1yr lag per capita civ lit	30.658	32.198	33.328		
	(23.34)**	(24.89)**	(25.01)**		
log of per capita taxes	-43.023	-45.52	-46.948		
	(19.51)**	(20.78)**	(20.66)**		
actualsalesvolume	0	0			
	(4.02)**	(4.11)**			
new orgs previous year	-21.201	-16.95	-29.131	-98.149	-46.779
	(2.43)*	-1.94	(3.42)**	(44.91)**	(17.67)**
new orgs current year		33.608	21.572		
		(5.79)**	(2.74)**		
lagged HS Math				1.057	1.844
				(82.20)**	(52.84)**
After2005	4.262		1.987		-16.049
	(4.80)**		-1.89		(34.68)**
Constant	149.089	155.474	161.626	-15.863	-31.052
	(16.84)**	(17.95)**	(18.05)**	(58.52)**	(51.55)**
Observations	91432	91432	108480	201248	201248
Number of infousaid	11429	11429	13560	25156	25156
Absolute value of z statistics in parentheses					
* significant at 5%; ** significant at 1%					
Performance					
pr 0, 0	27,545	27,616	38,608	114736	114,782
pr 0, 1	112	112	112	3288	2,808
pr 1, 0	99,615	99,544	88,552	12424	12,378
pr 1, 1	111,152	111,152	111,152	107976	108,456
% correct total	58.17%	58.20%	62.81%	93.41%	93.63%
% correct NH	21.75%	21.81%	30.45%	92.82%	92.47%
% correct MA	189.43%	189.37%	179.49%	108.21%	108.60%

$$L_i = \log\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 \bullet LagHSMat + \beta_2 \bullet populationdensity + \beta_3 \bullet lag\_entryrate + \varepsilon$$

Equation 4. Final specification model for Massachusetts

The final model used an alternate specification of the institutional variable which accounts for institutional quality and endogenous knowledge of the workforce. This particular model resulted from a series of bivariate regressions. Variables for the final model were selected based on their individual fidelity, as defined by correctly predicting both location choices, and for their theoretical significance with a cautious eye towards final model fidelity. The final model was built around high school mathematics performance which correctly predicted new firm location 83% of the time alone, the highest of any single bivariate regression with high fidelity – the lowest performing bivariate regression was previous year protestant churches at 47%. Adding in population density and lagged new organization entry rate because of their theoretical importance improved the models explanatory power to 93% though somewhat adversely affected model fidelity (Shane 1996; Johnson 1986). The addition of patents and cumulative proportion of protestant institutions were explored; however, both diminished the models' fidelity and explanatory power, suggesting possible specification errors. The three terms account for institutional fitness, endogenous knowledge or human capital, the demand market, the propensity for knowledge spillover and the relative entrepreneurial crowdedness of the market.

6.2.3.3. The final model and new organization formation

The power of school performance as an explanatory variable may be validated from the literature on entrepreneurship because of its relationship to the proximity of knowledge spillovers, the age demographic of entrepreneurs and the selection criteria of entrepreneurs to their home locations (Cooper 2003; Cooper and Dunkelberg 1987) though it is somewhat in disagreement with Pennings (1982) who found little support for quality of life affecting firm foundings. Acs and Armington (2006) have noted that knowledge spillovers occur in relatively close proximity to the source of the innovation, and other researchers have noted that entrepreneurs tend to come from within the same industry as their professional experience and be between the ages of 28-44 (Shane 2003; Aldrich 1990). Thus, entrepreneurs within a given MSA may be prone to start ventures within relative close proximity to their current residences (Cooper and Dunkelberg 1987), and the location of residence may have more to do with certain amenities than with other more traditional variables. Given that the 28-44 age group has a higher propensity for amenities related to children, school performance may be of importance and the later would give New Hampshire's lower density communities more of an advantage. In addition, the curvilinear nature of age and its relationship to entrepreneurship (Freeman 1982) might suggest that High School performance versus elementary school performance would be of particular import.

The primary institutional variable employed was school performance, and the use of either the variable for school performance based on combined English and mathematics scores or the mathematics score alone produced models with very similar predictive power 80% and 83% respectively. The most powerful models used the previous year percentage of tenth graders scoring advanced on standardized mathematics tests. When combined with the demand and competition variables the predictive power rose to 92% and 93% respectively. A similar process was followed for developing a model for New Hampshire, while that model was not used in the analysis; the most powerful institutional predictor that emerged was per capita taxes. The fact that this variable was not very powerful in the case of Massachusetts may result from the very complicated tax system in Massachusetts which negatively affects the link between taxes and public services of interest to business and promoting a general inability for the average entrepreneur to account for the likely tax consequences of the decision to locate in Massachusetts. A similar situation occurs with regard to zoning which will be briefly mentioned in the chapter on New Hampshire.

In the education based models, the policy variable, After2005 is statistically significant in all cases, and the variance covariance matrix shows very little interaction between terms; however, as terms are added the explanatory power of the model diminishes particularly in the case of gender and to a lesser degree for the actual firm size. This may result from the relatively small number of organizations in each SIC category for which gender data is available and to a lesser degree given that actual employee size relies on the biased

element of the combined dataset. This bias also impacts the dummy variables for firm size corresponding to small firms with fewer than 11 employees and more middle sized small firms with 11 to 19 employees because the actual employee size data is what is used to determine the dummy variable values.

Table 17. Organization Location based on Education as Institutional Measure

	(1) MA	(2) MA	(3) MA	(4) MA	(5) MA
exist	0.266	0.186	0.392	0.221	0.172
	(7.88)**	(2.92)**	(5.59)**	(2.55)*	-1.32
Constant	-7.459	-21.158	-15.863	-31.052	-30.826
	(168.74)**	(63.97)**	(58.52)**	(51.55)**	(34.37)**
lagged HS Math	0.393		1.057	1.844	1.788
	(135.72)**		(82.20)**	(52.84)**	(38.47)**
population density		13,784.74	10,674.29	15,766.67	15,045.00
		(55.82)**	(60.99)**	(49.79)**	(34.42)**
new orgs previous year		-92.111	-98.149	-46.779	-14.724
		(53.66)**	(44.91)**	(17.67)**	(3.07)**
lagged HS Total		0.625			
		(94.63)**			
After2005				-16.049	-15.025
				(34.68)**	(22.15)**
women owned firm					-0.246
					-0.99
primarysic					0
					(3.05)**
firms with 11 to 19 employees					
firm with less than 11 employees					
actualemployeesize					-0.004
					(5.65)**
Observations	201248	201248	201248	201248	62400
Number of infousaid	25156	25156	25156	25156	7800
Absolute value of z statistics in parentheses					
* significant at 5%; ** significant at 1%					
pr 0, 0	108,830	114,216	114736	114,782	33,616
pr 1, 0	18,330	12,944	12424	12,378	93,544
pr 0, 1	23,056	5,536	3288	2,808	1,344
pr 1, 1	88,208	105,728	107976	108,456	109,920
% correct	82.64%	92.25%	93.41%	93.63%	60.20%
% correct NH	103.72%	94.17%	92.82%	92.47%	27.49%
% correct MA	95.75%	106.66%	108.21%	108.60%	182.87%

Table 18. Organization Location based on Education as Institutional Measure (con't)

	(6) MA	(7) MA	(8) MA	(9) MA	(10) MA
exist	0.166	0.221	0.23	0.223	0.22
	-1.3	(2.55)*	(2.56)*	(2.57)*	(2.54)*
Constant	-31.454	-30.211	-30.478	-31.583	-31.104
	(37.28)**	(48.23)**	(51.11)**	(50.82)**	(51.63)**
lagged HS Math	1.81	1.85	1.764	1.836	1.845
	(38.82)**	(52.77)**	(52.25)**	(52.75)**	(52.88)**
population density	15,282.37	15,885.82	14,647.85	15,694.42	15,771.67
	(34.67)**	(49.65)**	(48.49)**	(49.64)**	(49.83)**
new orgs previous year	-23.939	-46.68	-31.995	-45.916	-46.808
	(5.23)**	(17.66)**	(10.14)**	(17.24)**	(17.67)**
lagged HS Total					
After2005	-14.721	-16.051	-14.446	-15.724	-16.034
	(22.84)**	(34.56)**	(30.99)**	(33.46)**	(34.64)**
women owned firm	-0.488				
	(2.06)*				
primarysic		-1.60E-06			
		(5.43)**			
actualemployeesize			-0.004		
			(4.53)**		
firm with less than 11 employees				0.694	
				(3.44)**	
firms with 11 to 19 employees					0.651
					(2.04)*
Observations	71616	201216	147432	201248	201248
Number of infousaid	8952	25152	18429	25156	25156
Absolute value of z statistics in parentheses					
* significant at 5%; ** significant at 1%					
pr 0, 0	35,624	114,293	75,576	114,788	114,636
pr 1, 0	91,536	12,867	51,584	12,372	12,524
pr 0, 1	1,264	2,676	2,808	2,808	2,792
pr 1, 1	110,000	108,588	108,456	108,456	108,472
% correct	61.08%	93.48%	77.19%	93.63%	93.58%
% correct NH	29.01%	91.99%	61.64%	92.48%	92.35%
% correct MA	181.13%	109.16%	143.84%	108.60%	108.75%

Table 19. Variance-Covariance matrix, Education based models

lnsig2u_cons	_cons	midszfirm	smallfirm	actualemployees	primarysic	female	After2005	lag_entryrate	poplag1	LagHSMat	exist	MA e(V)
9.26E-06	-0.00486209	-0.0000446	0.00011048	1.07E-07	1.20E-10	0.00001374	0.00174254	0.00786747	6.69E-09	0.00002635	0.00616371	exist
0.00006542	-0.00236233	0.00003848	-3.08E-06	1.47E-08	-2.04E-11	-0.00003743	-0.00047718	0.0000504	1.73E-08	0.00014804		LagHSMat
1.37E-08	-4.62E-07	2.87E-08	1.10E-08	1.24E-12	-8.26E-14	4.54E-09	-6.27E-08	-5.47E-07	6.91E-12			poplag1
-0.00131531	-0.46419516	-0.02969222	-0.02074532	-0.00001105	-1.25E-08	-0.00212324	-0.41043162	6.4663363				lag_entrate
0.0000293	0.03478088	0.00241757	0.00037695	5.82E-06	-2.67E-09	-0.00013266	0.05068081					After2005
9.24E-06	0.00080763	-0.00217934	-0.00112699	5.23E-07	-9.64E-09	0.02110688						female
-1.87E-11	-6.00E-08	8.78E-10	9.13E-10	-5.14E-12	1.09E-13							primarysic
5.69E-08	-0.00012124	0.00009358	0.00011631	2.22E-06								actualemployees
-0.00003026	-0.05728048	0.05682067	0.06315687									smallfirm
5.23E-06	-0.05674308	0.12791383										midszfirm
-0.00136488	0.18419819											_cons

The base model thus far presented was also used to develop a large dummy variable version of the model beginning with variables for education, population density, lag entry rate, the policy variables for actual employee size, the policy frontier, gender and dummy variables based on two-digit sic codes. This model was reduced in a backward stepwise manner. Gender was eliminated during this process. The coefficient for the policy variable is negative indicating a negative relationship between it and the log odds ratio, which suggests that after the policy was enacted the ratio of new organization starts between Massachusetts to New Hampshire decreased significantly: Massachusetts became less prominent. Gender was not only removed by this process but was also insignificant when added back into the regression, though firm size was statistically significant. The drop in explanatory power associated with the models which included actual employee size and gender may be explained by the presence of the bias sample, noted earlier, that we are essentially examining a sample which is not entirely representative and shows a trend in the opposite direction of the overall trend, and this is supported by a slight increase in the coefficient for the policy variable regardless of which of these terms is employed. When employee size is removed from the root equation, the explanatory power is increased by 16% and the ratio of false positives to false negatives diminishes from 25:1 to 6.5:1 largely resulting from a greater ability to correctly predict location in New Hampshire. The dummy variable for organizations with 11-19 employees is also not significant: organization size is only significant when measured in a continuous form suggesting no arbitrage effect by entrepreneurs.

Table 20. Organization Location - Education Model with Sector Dummies

	(1) MA	(2) MA	(3) MA	(4) MA	(5) MA
exist	0.235	0.226	0.17	0.174	0.226
	(2.58)**	(2.59)**	-1.32	-1.33	(2.59)**
Constant	-30.533	-31.097	-31.631	-31.838	-31.088
	(49.95)**	(50.79)**	(36.54)**	(36.28)**	(50.74)**
population density	14,917.30	16,003.04	15,466.37	15,186.99	16,001.73
	(48.45)**	(49.75)**	(34.40)**	(34.22)**	(49.74)**
new orgs previous year	-32.176	-46.474	-24.229	-15.482	-46.461
	(10.12)**	(17.51)**	(5.24)**	(3.18)**	(17.51)**
lagged HS Math	1.792	1.869	1.829	1.808	1.869
	(51.94)**	(52.93)**	(38.58)**	(38.18)**	(52.91)**
heavy constructon	2.846	2.895	7.304	7.274	2.886
	(2.34)*	(2.37)*	(2.94)**	(2.96)**	(2.36)*
homefurniture stores	-2.166	-2.237	-1.43	-1.475	-2.237
	(4.77)**	(5.20)**	(2.34)*	(2.38)*	(5.21)**
eating n drinking	1.473	1.581	2.468	2.476	1.667
	(3.67)**	(4.02)**	(4.43)**	(4.42)**	(3.89)**
misc retail	-1.285	-1.447	-0.955	-0.934	-1.447
	(3.53)**	(4.14)**	-1.95	-1.9	(4.14)**
securties/commodities brokers	-3.841	-3.048	-3.792	-5.25	-3.055
	(3.25)**	(2.86)**	(2.26)*	(2.38)*	(2.87)**
ins agents brokers servs	-1.938	-2.29	-1.58	-1.504	-2.297
	(2.05)*	(2.65)**	-1.25	-1.18	(2.66)**
real estate	-1.097	-1.315	-1.06	-0.862	-1.317
	(2.64)**	(3.52)**	-1.67	-1.28	(3.52)**
busn services	-1.129	-1.162	-0.472	-0.481	-1.167
	(3.69)**	(3.93)**	-1.02	-1.03	(3.94)**
membership orgs	-2.182	-1.869	-0.774	-1.309	-1.876
	(3.63)**	(3.31)**	-0.79	-1.25	(3.32)**
eng accnt mgm servs	-1.004	-1.125	-1.594	-1.421	-1.119
	(2.61)**	(3.15)**	(3.23)**	(2.73)**	(3.14)**
non-classified	-2.153	-1.74	-0.161	-2.517	-1.747
	(7.19)**	(6.59)**	-0.21	(2.41)*	(6.61)**
After2005	-14.789	-16.151	-14.836	-15.279	-16.158
	(30.95)**	(34.50)**	(22.53)**	(22.01)**	(34.49)**
actualemployeesize	-0.004			-0.004	
	(6.35)**			(6.40)**	
firms with 11 to 19 employees					-0.178
					-0.53
women owned firm			-0.434	-0.363	
			-1.82	-1.49	
Observations	147400	201216	71608	62400	201216
Number of infousaid	18425	25152	8951	7800	25152
Absolute value of z statistics in parentheses					
* significant at 5%; ** significant at 1%					
pr 0, 0	75,267	113,342	35,761	33,572	113,377
pr 0, 1	2,482	2,456	1,241	1,195	2,464
pr 1, 0	51,893	13,818	91,399	93,588	13,783
pr 1, 1	108,782	108,808	110,023	110,069	108,800
% correct	77.19%	93.17%	61.14%	60.25%	93.19%
% correct MA	144.41%	110.21%	181.03%	183.04%	110.17%
% correct NH	61.14%	91.06%	29.10%	27.34%	91.10%

Table 21. Variance-Covariance Matrix - Education Model with Sector Dummies

MA e(V)	exist	density	lag_entrate	LagHSMat	SIC_16	SIC_57	SIC_58	SIC_59	SIC_62	SIC_64	SIC_65	SIC_73	SIC_86	SIC_87	SIC_99	After2005	actualemployeesize	female	_cons	lnsig2u_cons
exist	0.0172																			
density	3.9047	196988.5100																		
lag_entryrate	0.0218	-108.4736	23.7028																	
LagHSMat	0.0006	17.0073	-0.0233	0.0022																
SIC_16	0.0017	89.0005	-0.1304	0.0101	6.0251															
SIC_57	-0.0004	-10.7614	-0.1128	-0.0004	0.0169	0.3849														
SIC_58	-0.0002	11.0009	-0.0016	0.0016	0.0275	0.0199	0.3136													
SIC_59	-0.0003	-6.2922	0.1099	-0.0005	0.0127	0.0174	0.0170	0.2410												
SIC_62	-0.0002	-95.2397	0.1640	-0.0039	-0.0079	0.0291	0.0206	0.0206	4.8745											
SIC_64	0.0002	-29.4847	-0.0183	-0.0011	0.0151	0.0189	0.0156	0.0192	0.0362	1.6351										
SIC_65	-0.0003	-14.7626	-0.1009	-0.0002	0.0141	0.0202	0.0181	0.0186	0.0304	0.0222	0.4516									
SIC_73	0.0000	1.8450	0.0502	0.0006	0.0213	0.0191	0.0198	0.0181	0.0222	0.0177	0.0184	0.2174								
SIC_86	0.0003	-19.2769	0.1003	-0.0016	0.0086	0.0189	0.0172	0.0194	0.0285	0.0208	0.0195	0.0183	1.1004							
SIC_87	-0.0001	7.9370	0.0332	-0.0004	0.0194	0.0179	0.0189	0.0176	0.0108	0.0139	0.0160	0.0183	0.0175	0.2700						
SIC_99	-0.0001	-1.0627	0.1542	-0.0017	0.0076	0.0143	0.0141	0.0204	0.0058	0.0170	0.0160	0.0164	0.0190	0.0192	1.0903					
After2005	-0.0008	-172.4442	-0.7062	-0.0235	-0.1432	0.0144	-0.0113	0.0038	0.0415	-0.0259	0.0069	-0.0054	0.0158	0.0084	0.0127	0.4817				
actualemployeesize	0.0000	-0.0476	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000			
female	0.0002	1.9626	-0.0050	0.0001	0.0206	0.0084	0.0105	-0.0061	0.0173	-0.0052	-0.0021	0.0049	-0.0012	0.0055	-0.0149	-0.0023	0.0000	0.0592		
_cons	-0.0208	-317.5730	-1.4461	-0.0359	-0.1886	-0.0019	-0.0481	-0.0145	0.0670	0.0182	0.0010	-0.0324	0.0051	-0.0233	-0.0035	0.4269	0.0001	-0.0210	0.7702	
lnsig2u_cons	0.0000	2.8967	-0.0054	0.0003	0.0011	-0.0004	0.0001	-0.0001	-0.0014	-0.0002	-0.0003	0.0001	-0.0002	0.0002	0.0001	-0.0025	0.0000	0.0001	-0.0055	0.0011

Chapter 7. Maybe the better paying jobs stay: the impact of sector

7.1 Methodology

In most models in the literature, controlling for industry is achieved by considering the model only for a narrow set of industries such as with Audretsch and Keilback (2004) who considered manufacturing value added, or by considering each industry specifically (Fritsch, Brixy, and Falck 2006). In the current analysis two quite different approaches are employed. In the first, the modified Standard Industrial Classification (SIC) code (primarysic) is treated as a continuous variable. This modification is intended to convey much of the firm level characteristics present in the NASICs codes employed in contemporary public data sources and the treatment as a continuous variable is based on the assumption that SIC codes increase numerically in value as knowledge intensity increases. While this assumption is a poor proxy as service sector jobs can be low skill, such as hotels or very highly skilled such as physicians and surgeons, and manufacturing jobs can be very trade oriented or highly professional, but in this analysis, the treatment as continuous is merely to control for and thereby account for any bias resulting from omitted variables.

The second approach is to generate dummy variables based on the two digit SIC classifications effectively testing the model for discrete sets of observations. This approach has similar pitfalls to the continuous variable approach as within a 2-digit SIC code considerable variation may occur, but it assumes that a 2-digit grouping is made because of shared commonalities in the sector. For example, business services can include elements as divergent as advertising to equipment rental.

7.2. Analytical Results

As with the earlier approach at assessing the impact of the time variable, the base model is extended using a continuous form variable for sector based on the 6-digit SIC coding provided in the dataset and on a large dummy variable set model. In the case of the large dummy variable set, the base model from the earlier regression was augmented with dummy variables for each of the 81, 2-digit SIC groups and groups were eliminated based on significance in a backward stepwise fashion.

In the initial model where primary SIC coding was employed, sector was statistically significant, though its coefficient very small at -1.6×10^{-6}, and the policy variable After2005 was negative and significant when controlling for sector. Primary SIC was also significant when controlling for gender of the owner/manager, which was not

significant in the combined equation nor was organization size, whether measured in a continuous or discrete form, though inclusion of firm size adversely affected equation fidelity.

Table 22. Impact of Sector on Policy Variable

	(1) MA	(2) MA	(3) MA	(4) MA	(5) MA	(6) MA
exist	0.221	0.167	0.23	0.223	0.221	0.172
	(2.55)*	-1.31	(2.55)*	(2.57)*	(2.54)*	-1.32
lagged HS Math	1.85	1.813	1.769	1.843	1.851	1.788
	(52.77)**	(38.75)**	(52.01)**	(52.67)**	(52.84)**	(38.47)**
population density	15,885.82	15,364.54	14,754.80	15,817.92	15,892.22	15,045.00
	(49.65)**	(34.50)**	(48.33)**	(49.50)**	(49.68)**	(34.42)**
new orgs previous year	-46.677	-24.248	-32.178	-45.899	-46.71	-14.724
	(17.66)**	(5.29)**	(10.19)**	(17.26)**	(17.65)**	(3.07)**
After2005	-16.051	-14.656	-14.512	-15.751	-16.032	-15.025
	(34.56)**	(22.71)**	(30.90)**	(33.39)**	(34.53)**	(22.15)**
primarysic	0	0	0	0	0	0
	(5.43)**	(2.49)*	(5.43)**	(5.28)**	(5.43)**	(3.05)**
women owned firm		-0.348				-0.246
		-1.43				-0.99
actualemployeesize			-0.004			-0.004
			(4.65)**			(5.65)**
Constant	-30.211	-30.807	-29.536	-30.73	-30.264	-30.826
	(48.23)**	(34.78)**	(47.20)**	(47.53)**	(48.32)**	(34.37)**
firms with 11 to 19 employees					0.646	
					(2.06)*	
firm with less than 11 employees				0.646		
				(3.20)**		
Observations	201216	71608	147400	201216	201216	62400
Number of infousaid	25152	8951	18425	25152	25152	7800
Absolute value of *z* statistics in parentheses						
* significant at 5%; ** significant at 1%						
pr 0, 0	114,293	35,691	75,371	114,255	114,257	33,616
pr 0, 1	2,676	1,336	2,664	2,664	2,668	1,344
pr 1, 0	12,867	91,469	51,789	12,905	12,903	93,544
pr 1, 1	108,588	109,928	108,600	108,600	108,596	109,920
% correct	93.48%	61.08%	77.16%	93.47%	93.47%	60.20%
% correct NH	91.99%	29.12%	61.37%	91.95%	91.95%	27.49%
% correct MA	109.16%	181.01%	144.15%	109.20%	109.20%	182.87%

The large dummy variable model yielded an equation where heavy construction, home furniture stores, eating and drinking places, miscellaneous retail, securities and commodities brokers, insurance agents and broker services, real estate, business services, membership organizations, engineering, accounting and management services and non-classified establishments were all statistically significant. Of these, only heavy construction and eating and drinking establishments had positive coefficients, and were significant at the 95% and 99% levels respectively; suggesting that new heavy construction and restaurants were more likely to be located in Massachusetts but the other sectors less likely. While heavy construction is clearly a high value adding industry, it cannot be said that the remaining variables with negative coefficients represent low value added because they include securities brokers, business services, and engineering, accounting and management services all of which tend to be more high value and are significant at the 99% confidence level. Even Insurance Agents and Brokers which one might expect to increase in Massachusetts as a result of legislation compelling an increase in resources devoted to insurance is negative and statistically significant though at the 95% confidence level. This may result in part from the state certifying insurance carriers in Massachusetts essentially picking winners and thus reducing employer and consumer choice and essentially crowding out alternative providers. The base explanatory model with the large dummy variable set had an explanatory power of 93%, when actual employee size was added that power slipped to 77% and 60% when gender and organizations size were included. In addition, when the large dummy variable set

was employed the dummy variable for mid-size organizations, those with 11 to 19 employees, became statistically insignificant.

Chapter 8. Allowances for small firms: the impact of firm size

To this point, the term organization has been used to indicate firm, public or private entity and essentially is referring to establishments discriminated by unique location. The analysis is based primarily on this unit of observation, without particular consideration on specific groupings such as membership organizations, a potential area for future research.

As illustrated in the following tables, 90% of the organizations are single establishments, 77% of these establishments have fewer than 20 employees and 65% have more than 1 employee. While roughly half of all establishments are in Massachusetts, Massachusetts share of those started after 2005 has dropped to 38% of 14,715. This is in stark contrast to establishments in the database with start dates in 2005 or earlier where Massachusetts has 56% of the entries. Since establishments tend to growth with time, a determination cannot be made of the past propensity of each state to generate new small firms from this data.

Table 23. Single vs. Multi-Establishments

headquarters-branch	Freq.	Percent	Cum. %
Single Loc	38,859	89.86	89.86
Branch	4,201	9.71	99.57
Headquarter	92	0.21	99.78
Subsidiary	92	0.21	99.99

Table 24. Organization Type: Firm, Home business or Individual establishment

Firm of Individual	Freq.	Percent	Cum. %
Firm/Business	41,202	81.38	81.38
Home	4,133	8.16	89.54
Commercial	3,253	6.43	95.97
Individual	2,042	4.03	100

Table 25. Establishments by Size Grouping

Size Group	Freq.	Percent	Cum. %	MA Only	% Total	MA Only After 2005	% Total After 2005
0 employees	86	0.17	0.17	50	0.10%	9	0.06%
1 employee	6188	12.22	12.39	3267	6.45%	239	1.62%
< 11 Employees	36,058	71.22	71.22	19,891	39.29%	3,401	23.10%
11-19 Employees	2,947	5.82	77.04	1,579	3.12%	180	1.22%
>19 Employees	11,625	22.96	100	4,217	8.33%	2,046	13.89%
Total	50,630			25,687	50.73%	5,627	38.21%

8.1. Methodology

Accounting for the influence of organization size in the regression analysis was approached in two ways via the use of actual employee size as a continuous variable and through the construction of dummy variables for two size groupings: organizations with less than 11 employees, which is referred to as small firms, and organizations with 11-19 employees, which are referred to as mid-size firms or mid size small firms. It should be noted that the literature on small and medium size enterprises would however consider both of these size groupings small firms. The selection of 19 employees as the upper bound is based primarily on the use of 19 an upper bound for a size class in routine Census bureau class – see Chapter 1, and 11 as the lower bound from an exemption in the law which creates a step-up in costs to the extent employers consider health insurance a cost (Pauly 1997).

Table 26. Impact of Organization Size Floor on Marginal Expenses

No. of Employees	Min Wage Compensation ($7.50/hr, 2,000 hrs/year)	Health Insr. ($403/ind/mo)	Employer Contribution (100% of HIns)	HIns as % total comp	Marginal Incr.
1	$15,000	$4,836	$0	0.00%	-
5	$75,000	$24,180	$0	0.00%	0.00%
10	$150,000	$48,360	$0	0.00%	0.00%
11	$165,000	$53,196	$585,156	268.18%	268.18%
12	$180,000	$58,032	$696,384	292.56%	9.09%
13	$195,000	$62,868	$817,284	316.94%	8.33%
14	$210,000	$67,704	$947,856	341.32%	7.69%
15	$225,000	$72,540	$1,088,100	365.70%	7.14%
19	$285,000	$91,884	$1,745,796	463.22%	26.67%
20	$300,000	$96,720	$1,934,400	487.60%	5.26%
21	$315,000	$101,556	$2,132,676	511.98%	5.00%
22	$330,000	$106,392	$2,340,624	536.36%	4.76%
23	$345,000	$111,228	$2,558,244	560.74%	4.55%
24	$360,000	$116,064	$2,785,536	585.12%	4.35%
25	$375,000	$120,900	$3,022,500	609.50%	4.17%

As noted earlier, the inclusion of firm size biases the results in a particular direction. 85% of the data provided contains entries for actual number of employees at the organization; however, only 50% of the data available after 2005 includes values for actual employee size. 14,715 organizations are listed with a start year of 2006 or 2007 and 7,329 of those have actual employee information. A comparison of all observations by SIC versus only those observations where actual employee size was available found that only 3 categories differed in the two groups, for observations where year was 2006 or 2007 by more than 1 percentage point. No categories in the full dataset differed by more than 1 percentage point – note here that 1% of 50,630 is a rather substantial number versus 1% of 14,715. Given the large number of observations, however, it is unlikely that the missing data will affect the outcome of the regression with regard to degrees of

freedom. The most significant area of differences is in the area of nonclassified establishments which tend to diminish with time as organizations are classified during routine follow up by InfoUSA® and not because a larger number of formally nonclassified establishment are actually initiated. However, the use of this data will bias the parameter estimate and underestimate the impact of sector on location due to the differences already outlined. In this case, statistical significance is the most reasonable outcome to consider.

8.2. Analytical Results

Since most observations included actual employee size, firm size could be treated as both a continuous variable and as a discrete, dummy variable to consider differential impact on certain size groupings based on the parameters of the law. While the law does not apply in a continuous fashion, exempting firms below 11 employees, these two treatments allow us to explore two aspects of the laws impact. If the continuous form is significant, then this suggests that employers are not arbitraging their location decision based on the law but that the law's impact while important to firm size is not necessarily affecting what firms of various sizes do in terms of location decisions; thus, it may suggest an alternate effect. If the dummy variables are statistically significant, then this suggests

that organizations may in fact be arbitraging their location based upon the differential impact of the law.

As noted earlier, when considering only the impact of firm size all forms are statistically significant, this also holds true when accounting for industrial sector using primary SIC as the variable of interest. When the large dummy variable set model is employed, neither of the discrete variables for small or mid-sized firms are statistically significant and explanatory power diminishes. While this result is somewhat mixed, it suggests that entrepreneurs are not taking into consideration costs for only their current operation but for longer term operations which may impact their ability to expand and compete.

Chapter 9. Women entrepreneurs: the impact of Gender

The literature on entrepreneurship illustrates a dramatic difference in the proportion of entrepreneurs who are women; however, in recent years the proportion of women choosing entrepreneurship is on the increase. In 2004, 30% of businesses were majority-owned by women, and in the period from 1997-2002 women started roughly 55% of all new venture start-ups. Despite this impressive growth, the majority of women owned firms typically are smaller, never growing beyond 10 employees and women are creating sole proprietorships at a faster rate than men (Morris et al. 2006). Women however face unique challenges posed by gender stereotypes and the home-work division of labor which men do not typically confront and which affect their pursuit of maximal growth versus other rewards of entrepreneurship such as employment flexibility (Morris et al. 2006).

Table 27. Dataset by Gender and Year

	NH			MA			Total (reported)			Total (ALL)
	♂	♀	total	♂	♀	total	♂	♀	total	Total
Total (all years)	9,120	3,501	12,621	11,556	4,530	16,086	20,676	8,031	28,707	50,630
2000	332	149	481	358	159	517	690	308	998	1,603
2001	351	167	518	487	213	700	838	380	1,218	2,102
2002	404	160	564	432	211	643	836	371	1,207	2,051
2003	459	189	648	507	247	754	966	436	1,402	2,408
2004	514	160	674	523	244	767	1,037	404	1,441	2,675
2005	532	248	780	546	309	855	1,078	557	1,635	4,249
2006	490	235	725	858	344	1,202	1,348	579	1,927	7,430
2007	438	210	648	574	266	840	1,012	476	1,488	7,285

Of the 50,630 organizations in the dataset, approximately 57% or 28,707 reported owner/manager gender. 8,031 or 28.0% of these are owned or managed by women, and 1,055 or 13.1% were founded after 2005. The proportion of organizations owned/managed by women started between 2000 and 2006 was 31.1% versus 30.9% for organizations started in 2006 and 2007. The proportion of women entrepreneurs does not appear to be particularly volatile remaining in a window of 27.7% to 32.8% for both jurisdictions. Thus, the proportion of women owned/managed organizations before and after the policy implementation does not appear to have markedly changed and appears largely stable over time with notable exceptions of 2004 in New Hampshire and 2005 in Massachusetts.

Table 28. Dataset Proportion Gender by Year

	NH		MA		Total			
	ρ♂	ρ♀	ρ♂	ρ♀	ρ♂	ρ♀	ρNH	ρMA
Total (all years)	72.3%	27.7%	71.8%	28.2%	72.0%	28.0%	56.0%	44.0%
2000	69.0%	31.0%	69.2%	30.8%	69.1%	30.9%	51.8%	48.2%
2001	67.8%	32.2%	69.6%	30.4%	68.8%	31.2%	57.5%	42.5%
2002	71.6%	28.4%	67.2%	32.8%	69.3%	30.7%	53.3%	46.7%
2003	70.8%	29.2%	67.2%	32.8%	68.9%	31.1%	53.8%	46.2%
2004	76.3%	23.7%	68.2%	31.8%	72.0%	28.0%	53.2%	46.8%
2005	68.2%	31.8%	63.9%	36.1%	65.9%	34.1%	52.3%	47.7%
2006	67.6%	32.4%	71.4%	28.6%	70.0%	30.0%	62.4%	37.6%
2007	67.6%	32.4%	68.3%	31.7%	68.0%	32.0%	56.5%	43.5%

While unclear what may have caused these spikes, they do not appear to coincide with the shift in the overall formation proportions between the two states. The spike in 2004 for New Hampshire may be the result of a property tax relief package in 2003 which disproportionately benefited business owners due to New Hampshire's dependency on property and business profits tax regimes, and would have injected additional capital into the marketplace. While no clear cause is available, there was a large shift in proportion of women entrepreneurs in Massachusetts in 2005 following by a considerable numeric increase in Massachusetts' male entrepreneurs in 2006 though this merely returned the proportion to historic averages, and therefore, appears to be more an artifact of reporting than a notable increase of one gender versus another. While the 2005 spike may have created a slight, transient advantage for Massachusetts, it appears to have completely disintegrated in 2006 and 2007 with the proportion of entrepreneurs in Massachusetts area of the study region falling well below historical averages. But is the shift significant when controlling for gender?

Given a growing number of new enterprises are started or managed by women, (Morris et al. 2006) and that women appear to be somewhat more sensitive to the availability of health insurance in their decision to seek self employment (Wellington 2001) due in part to risk mitigation and the role of spousal health insurance coverage (Blanchflower and Oswald 1998), to the extent that those seeking self employment are also entrepreneurs one would expect Massachusetts' experiment in mandatory health insurance to have a long term, potential positive impact on women entrepreneurship.

9.1. Methodology

In order to investigate this more precisely, the random effects model of organization location was expanded to consider the impact of gender using a dummy variable and interaction terms to account for the impact of gender on specific industries. Since entrepreneurs typically pursue ventures in the industries in which they have experience (Shane 2003) and women may be more or less well represented in certain industries, one might expect industrial sector to be an important consideration in evaluating the impact of gender (Minniti and Arenius 2003).

9.2. Analytical Results

In the gender modified regression, the coefficient for owner gender was negative and statically significant at the 95% level, suggesting that organizations owned or managed by women were less likely to locate in Massachusetts; however, when primary SIC and organization size were included in the model gender became insignificant. These models explained roughly 60% of the variation when considered along with the policy variable, though they suffer from low fidelity tending to predict a location in Massachusetts erroneously. This may result from a greater propensity for MA organizations to have reported a value for the gender variable. In 2006 and 2007 the proportion of Massachusetts organizations to have reported gender is 155% that of NH and 130% in 2007. Inclusion of gender in this instance may overstate the impact of gender in and bias the results effectively in the direction of a location in Massachusetts which is consistent with the regression results. Its significance, however, does suggest that relative to men, women owned firms may not have benefited. If women owned firms may be more likely to provide health insurance and to employ women, then the mandatory insurance requirement may have removed a competitive advantage for women entrepreneurs and thus adversely affected their competitiveness versus organizations which previously had not offered health insurance (Wellington 2001).

Before dismissing the impact, however, of the legislation on gender, and considering the differential impact by SIC the dataset was further expanded, in this instance in a backward-forward stepwise process by using interaction terms for gender and SIC. At the conclusion of this process, insurance agents and brokers, real estate and membership organizations fell from the equation and were replaced by interaction terms for women owned agricultural services, women owned building materials and hardware stores, women owned apparel stores, women owned business services and women owned educational services each being significant at the 95% confidence level with explanatory power ranging between 60% and 77%. The only positive coefficient for the interaction terms is women owned business services. The remaining coefficients are negative and with the exception of educational services represent industries largely dependent on a low wage workforce.

Table 29. Location controling for Gender and SIC interactions with Ed model

	(1) MA	(2) MA	(3) MA
exist	0.235	0.175	0.175
	(2.58)**	-1.33	-1.33
population density	14,917.30	15,366.00	15,299.95
	(48.45)**	(34.03)**	(34.13)**
new orgs previous year	-32.176	-15.659	-15.669
	(10.12)**	(3.20)**	(3.20)**
lagged HS Math	1.792	1.83	1.829
	(51.94)**	(38.30)**	(38.22)**
After2005	-14.789	-15.572	-15.582
	(30.95)**	(22.24)**	(22.20)**
heavy constructon	2.846	7.38	7.454
	(2.34)*	(2.98)**	(3.01)**
homefurniture stores	-2.166	-1.554	-1.462
	(4.77)**	(2.49)*	(2.35)*
eating n drinking	1.473	2.428	2.514
	(3.67)**	(4.34)**	(4.51)**
misc retail	-1.285	-1.106	-1.016
	(3.53)**	(2.25)*	(2.07)*
securties/commodities brokers	-3.841	-5.314	-5.172
	(3.25)**	(2.39)*	(2.34)*
ins agents brokers servs	-1.938	-1.655	
	(2.05)*	-1.28	
real estate	-1.097	-1.004	
	(2.64)**	-1.49	
busn services	-1.129	-1.162	-1.071
	(3.69)**	(2.23)*	(2.07)*
membership orgs	-2.182	-1.471	
	(3.63)**	-1.41	
eng accnt mgm servs	-1.004	-1.512	-1.432
	(2.61)**	(2.90)**	(2.75)**
non-classified	-2.153	-2.721	-2.641
	(7.19)**	(2.57)*	(2.49)*
actualemployeesize	-0.004	-0.004	-0.004
	(6.35)**	(6.25)**	(6.16)**
female, ag services		-3.408	-3.316
		(2.46)*	(2.40)*
female, bldg mat. hardware		-9.351	-9.278
		(2.56)*	(2.54)*
female, apparel stores		-4.25	-4.137
		(2.23)*	(2.17)*
female business services		2.913	2.907
		(2.50)*	(2.49)*
female, educ servs		-3.243	-3.152
		(2.57)*	(2.50)*
Constant	-30.533	-32.188	-32.216
	(49.95)**	(36.45)**	(36.58)**
Observations	147400	62400	62400
Number of infousaid	18425	7800	7800
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			
pr 0, 0	75,267	33,509	33,422
pr 0, 1	2,482	1,152	1,136
pr 1, 0	51,893	93,651	93,738
pr 1, 1	108,782	110,112	110,128
% correct	77.19%	60.24%	60.21%
% correct NH	61.14%	27.26%	27.18%
% correct MA	144.41%	183.13%	183.23%

In an alternate analysis detailed in the statistical appendix, a backward stepwise approach was employed. Despite problems with the dataset outlined in previous sections which make this particular technique problematic, the results suggest that gender is statistically significant in nearly all instances though for a slightly different group of industries, and in the presence of gender the policy variable remains statistically significant. This lends additional support to the idea that the reform may fall disproportionately hard on women entrepreneurs, who may already confront difficulties and outright gender bias in terms of entrepreneurship from the perspective of raising capital, having adequate human capital networks and a more narrow representation in terms of industrial sectors (Minniti and Arenius 2003; Morris et al. 2006).

Chapter 10. Productivity

The literature on labor markets, health and productivity are typically unclear. Advocates of some form of national health systems visa vi a single payer system argue that the provision of health insurance would reduce uncertainty for employees and make them more productive. Economist argue that health insurance is a component of employee compensation in the form of wages whereas employers contend that health insurance is an expense (Pauly 1997). The occupational health literature on the impact of health and healthcare on productivity is typically focused on individual level observations and particular employee performance and suffer from significant data limitations in this regard (Burton et al. 1999; Muchmore et al. 2003). The labor economics literature typically does not explore the question of whether the provision of a health benefit contributes to firm productivity, due to confounding issues as firms which provide greater health insurance benefits typically also pay higher wages and employ more productive workers (Currie and Madrian 1999). Thus, we utilize the present data in an effort to address whether the provision of greater overall healthcare benefits have actually improved the productivity of firms in Massachusetts.

10.1. Methodology: The Cobb-Douglas model and firm productivity

In order to address productivity we note that the policy requires a substantial number of firms to in one measure or another provide or provide access to health insurance for their workers. This should attract workers who are more risk averse to health risk. As such, whether this causes a form of adverse selection for less productive workers with higher healthcare burdens or whether it provides a reduction in overall stress related to the uncertainty around insurance, it should result in a notable difference between Massachusetts and New Hampshire. Since firm productivity differs across industry, sector is controlled for using both the continuous variable based on the primary SIC code as well as by employing a large dummy variable set based on the 2-digit SIC. Given earlier questions about the impact of the policy on gender and firm size, this will also be explored.

With regard to model form, the original Cobb-Douglas equation which has been used to describe regions, was conceptualized for the individual firm (Cobb and Douglas 1928). This upward aggregation to region follows the logic of what Robert Solow has described as the pleasant fiction of "an aggregate production function" (Solow 1957, 312). This analysis is concerned, however, with firm level observations, and as such an equation designed to account for firm level output appears appropriate. The use of the Cobb-

Douglas function is consistent with and similar in approach to analyses of this type in the management literature (Black and Lynch 1996; Brynjolfsson and Hitt 1996, 2003).

The use of the random effects model proved to be problematic computationally and conceptually. Computationally, since the panel nature of the data is simulated, firm level data such as sales and inputs are problematic, they do not vary over time, rendering the Cobb-Douglas equation inestimable by the random effects technique. Conceptually, however, the rationale is more straightforward. The results of the data collection exercise stem from phone surveys. This data is by nature perishable; therefore, in order to maintain the most current data and to address the question of productivity in the most straightforward manner, we need only consider a single year: the first year in which the policy was in-force or more precisely, when entrepreneurs were acting as though the policy was implemented. If we constrain the analysis to data provided for the organizations whose first year in business was 2007 we have not only the most recent survey data, but are able to test the productivity hypothesis with the least interference from confounding errors. In essence, we are controlling for other variables not related to the impact of the policy.

The first step is to reduce the dataset to a single year, cross-section for 2007 containing 7,285 organizations of which 2,970 have data on current year sales, employment and capital in the form of plant size square-footage. In addition, the assumption is made that firms within a given industry will have an average capital/labor ratio, specific to the

industry and that sales generated in the current year are the result of capital and labor used in the current period. In other words, there are no inventory costs.

$$Y = K^{\alpha} L^{\beta}$$

Equation 5. Basic Cobb-Douglas Production Function

Output (Y) is measured in terms of actual sales volume in the current year. Capital (K) is measured as the square-footage of the office or plant, and the labor (L) is measured by actual employees. In order to estimate this function we adopt the log transform form of the equation.

$$\log(Y) = \alpha \bullet \log(K) + \beta \bullet \log(L) + \gamma_i(i) + \gamma_j(j)$$

Equation 6. Transformed Cobb-Douglas Function

Where *i* is the industry coding either SIC or industry specific dummy variable and *j* represents the jurisdictional dummy (1=MA, 0=NH). If *j* is negative and statistically significant then the productivity of firms in Massachusetts is less than the average productivity of firms in the overall region. Since the data is from 2007 this would describe the situation after the policy frontier and might suggest that the regulation has

negatively impacted firm productivity. Comparison with an earlier set prior to the policy frontier would then be necessary.

10.2. Analytical Results

Table 30. Cobb-Douglas Regress (continuous)

lgY	(1)	(2)	(3)	(4)	(5)	(6)	(7)
lgK	0.229	0.158	0.142	0.159	0.157	0.143	0.140
	(15.86)**	(7.37)**	(6.56)**	(7.46)**	(7.35)**	(6.64)**	(6.52)**
lgL	0.846	0.895	0.906	0.926	0.986	0.939	1.001
	(40.84)**	(33.87)**	(34.40)**	(33.42)**	(27.72)**	(33.98)**	(28.28)**
MA	-0.028						
	(0.99)						
female		-0.314	-0.283	-0.307	-0.298	-0.275	-0.264
		(7.20)**	(6.44)**	(7.08)**	(6.84)**	(6.30)**	(6.04)**
primarysic			-0.000			-0.000	-0.000
			(4.06)**			(4.19)**	(4.25)**
smallfirm					0.383		0.401
					(3.76)**		(3.97)**
midszfirm				-0.365		-0.378	
				(3.49)**		(3.64)**	
Constant	10.281	10.894	11.256	10.864	10.447	11.234	10.803
	(91.77)**	(65.51)**	(60.06)**	(65.65)**	(51.34)**	(60.32)**	(49.50)**
Observations	2663	894	894	894	894	894	894
R-squared	0.55	0.69	0.70	0.70	0.70	0.70	0.71

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Table 31. Correlation Table (Cobb-Douglas)

	lgY	lgK	lgL	female	MA	smallfirm	midszfirm	primarysic
lgY	1							
lgK	0.5284	1						
lgL	0.8077	0.486	1					
female	-0.2279	-0.1605	-0.0939	1				
MA	-0.0216	-0.0336	-0.0134	0.0401	1			
smallfirm	-0.5162	-0.3284	-0.7144	-0.0044	-0.0031	1		
midszfirm	0.2286	0.1838	0.3624	0.0065	0.0312	-0.694	1	
primarysic	-0.1281	-0.1788	-0.0022	0.1957	0.0491	0.0126	-0.0206	1

The basic Cobb-Douglas regressions explained between 55% and 71% of the variation in actual sales volume. There is no evidence of multicolinearity in the dataset. This may result from a non-monetary and an ordinal estimate of capital. In each case, gender was significant. The firm size dummy variables were also statistically significant: the coefficient for mid-size firms was negative and the coefficient for small firms was positive. This presents and interesting difference in size class given the measures taken to exclude small firms from the policy and thus impose the policy on more medium size small firms. Ironically, despite the expectation that employees of firms which provide access to health insurance might be more productive due to less stress than their uninsured rivals in New Hampshire (Kronick 1991), the regression results suggest that employees at medium size firms, again here defined as 11-19 employees, were less productive than the mean. Most important however is that the variable associated with the policy frontier, in this case the jurisdictional dummy was not statistically significant. We cannot conclude that the policy has significantly impacted productivity. Though not reported in the above table, the coefficient for primary SIC is -4e-07 and was statistically

significant. As has been mentioned earlier, despite this significance, the interpretation of this coefficient is problematic; therefore, an alternate regression model is employed, developed in a backward stepwise manner using a large set of dummy variables.

Turning to this second regression we observe that the explanatory power of the regressions increases to 92% of the variation in actual sales volume, but in this regression model while gender remains statistically significant and negative, firm size is not longer statistically significant and the policy frontier remains insignificant. Given the greater explanatory power of this later regression model, the earlier significant observation related to organization size may have been spurious or due to an ineffective measure of sector.

The results have intriguing implications for other similar reforms on worker productivity. The literature in labor economics suggests that organizations with better compensation packages tend to employ more productive workers, and that this may result for a reduced stress environment, though the causality is somewhat problematic in this regard (Currie and Madrian 1999). Nonetheless, the dummy variable for Massachusetts in this analysis while positive is not statistically significant; we cannot conclude that worker productivity is significantly different in Massachusetts versus New Hampshire, nor can we find statistically significant differences for firm size.

On the contrary, statistically significant coefficients were observed for specific industries. This is consistent with a vast literature in industrial organization and manufacturing as different capital/labor ratios exist for different sectors. Lastly, organizations managed or owned by women that were started in 2007 were statistically significantly less productive. While the analysis did not develop interaction terms for women owned enterprises, this finding may reflect gender bias in terms of the specific industries in which women are most likely to be engaged as entrepreneurs, and the limitations of the Cobb-Douglas model which relies on capital and labor as measures of productivity without considering human capital specifically and the limitations of the geographic space which leave certain sectors less well represented such as biotechnology, pharmaceuticals and manufacturing. Regardless, it may suggest that the reform falls disproportionately harder on women entrepreneurs in agreement with the findings of chapter 9.

Table 32. Cobb-Douglas Regression Results w/large dummy variable set

	(1)	(2)	(3)	(4)
lgY				
lgK	0.030	0.030	0.029	0.029
	(2.09)*	(2.09)*	(2.03)*	(2.03)*
lgL	0.984	0.984	1.006	0.979
	(66.37)**	(66.33)**	(50.85)**	(63.82)**
AgServices	-0.477	-0.476	-0.484	-0.476
	(6.71)**	(6.67)**	(6.81)**	(6.69)**
bldggencontracts	0.585	0.585	0.586	0.583
	(8.68)**	(8.67)**	(8.70)**	(8.65)**
heavyconstructon	0.552	0.552	0.548	0.551
	(2.43)*	(2.43)*	(2.42)*	(2.43)*
const_spcl_trade	-0.101	-0.101	-0.099	-0.102
	(1.99)*	(1.97)*	(1.94)	(2.01)*
food_mfg	1.141	1.139	1.166	1.147
	(5.03)**	(5.01)**	(5.13)**	(5.05)**
PrintPublishng	0.285	0.283	0.283	0.277
	(2.15)*	(2.14)*	(2.14)*	(2.10)*
meas_anal_inst	0.588	0.586	0.593	0.574
	(3.15)**	(3.13)**	(3.18)**	(3.06)**
LocSubHwyPassTrnst	-0.610	-0.608	-0.604	-0.617
	(5.30)**	(5.28)**	(5.26)**	(5.36)**
motorfreight	-0.311	-0.310	-0.302	-0.319
	(2.32)*	(2.32)*	(2.25)*	(2.38)*
transservices	-0.420	-0.422	-0.426	-0.419
	(3.43)**	(3.43)**	(3.48)**	(3.42)**
communcations	1.091	1.093	1.081	1.095
	(6.68)**	(6.68)**	(6.62)**	(6.70)**
wholesaledurablegoods	1.292	1.293	1.288	1.293
	(20.22)**	(20.20)**	(20.17)**	(20.23)**
NondurableGds	1.891	1.892	1.887	1.895
	(16.25)**	(16.24)**	(16.23)**	(16.28)**
autodealers	0.859	0.858	0.850	0.861
	(10.64)**	(10.63)**	(10.54)**	(10.68)**
FurnitureStores	0.332	0.332	0.326	0.331
	(4.20)**	(4.20)**	(4.13)**	(4.19)**
eating_n_drinking	-1.389	-1.389	-1.384	-1.405
	(24.66)**	(24.64)**	(24.55)**	(24.26)**
deposit_inst	0.641	0.641	0.621	0.645
	(7.02)**	(7.02)**	(6.76)**	(7.06)**
nondep_credit_inst	0.198	0.199	0.197	0.193
	(2.09)*	(2.09)*	(2.08)*	(2.03)*
secur_comm_broker	0.572	0.572	0.568	0.573
	(4.64)**	(4.64)**	(4.62)**	(4.65)**
holdinginvofcs	1.197	1.195	1.185	1.201
	(3.73)**	(3.72)**	(3.70)**	(3.74)**
persnlservices	-0.962	-0.962	-0.958	-0.965
	(17.21)**	(17.20)**	(17.14)**	(17.25)**
busnservices	-0.218	-0.217	-0.215	-0.220
	(4.50)**	(4.47)**	(4.44)**	(4.54)**
autorepairsrv	-0.374	-0.374	-0.370	-0.377
	(5.93)**	(5.93)**	(5.87)**	(5.98)**
miscrepairsrv	-0.406	-0.405	-0.401	-0.406
	(4.28)**	(4.27)**	(4.24)**	(4.28)**
amusementrecr	-0.789	-0.790	-0.794	-0.788
	(9.21)**	(9.21)**	(9.27)**	(9.20)**
healthserv	-0.108	-0.107	-0.115	-0.108
	(3.23)**	(3.23)**	(3.42)**	(3.25)**
educserv	-0.624	-0.624	-0.617	-0.626
	(3.86)**	(3.86)**	(3.82)**	(3.87)**
socialserv	-0.794	-0.794	-0.801	-0.789
	(11.47)**	(11.46)**	(11.56)**	(11.38)**
female	-0.126	-0.126	-0.120	-0.127
	(5.10)**	(5.10)**	(4.84)**	(5.16)**
MA		0.005		
		(0.21)		
smallfirm			0.094	
			(1.71)	
midszfirm				0.065
				(1.15)
Constant	11.863	11.860	11.759	11.874
	(105.75)**	(104.92)**	(92.27)**	(105.49)**
Observations	894	894	894	894
R-squared	0.92	0.92	0.92	0.92

Absolute value of t statistics in parentheses
* significant at 5%; ** significant at 1%

Chapter 11. Is it really displacement: the impact of distance?

As was mentioned in the discussion of the results from the binomial t-tests the results appear to suggest a suppression of firm formation activity in the period preceding passage of the bill. This is consistent with the theory related to the role of institutions, who with regard to entrepreneurial activity affect the uncertainty of the environment. Indecision in the environment would tend to suppress organization activity formation without selecting between "good" or "bad" alternatives (Baumol, Litan, and Schramm 2006). Noted earlier is the incentive for entrepreneurs whose potential locations of preference are clustered along the border to choose to locate in New Hampshire in order to avoid the cost consequences of Massachusetts' health reform law. An example of this might be an entrepreneur who lives in Dunstable, Massachusetts, but chooses to locate his business in Nashua, New Hampshire. While this propensity would not be noted in firms which locate in Massachusetts, it would be important in firms who locate in New Hampshire. An analysis of New Hampshire locations therefore provides a compliment to the thesis and a confirmatory analysis, but while the propensity to locate a firm in Massachusetts may be affected by gender, the passage of the legislation, industrial sector and firm size it may not in New Hampshire due to differences in business climate. In other words, it may suppress formation in Massachusetts without distorting proportions in New Hampshire

whose business climate may not particularly favor one type of firm in this regard versus another.

A shift in the formation of new organizations along the Massachusetts border with New Hampshire such that New Hampshire is now the dominant partner in terms of new firm formation activity when controlling for gender, industrial sector or establishment size has been observed, but this observation has relied on primarily considering the perspective of Massachusetts firm start activity. It remains unclear however whether this is the result of the suppression of firm formation activity in Massachusetts essentially in isolation or whether this has resulted from displacement and arbitrage of new firm formation activity.

The region has a history of predatory zoning, where certain New Hampshire communities have specifically placed commercial zoning along the border in an effort to entice consumers and retailers in particular into locating in New Hampshire (Schaffer 2007). In such an environment, the Massachusetts regulation may fall particularly heavily on retailers which typically employ at the lower end of the labor and wage scale and are particularly sensitive to wages and retail space availability (Carree and Thurik 1996) and disproportionately on women entrepreneurs who may have a greater presence in certain of these sectors. Thus, this should cause the distance to the border to be a significant factor in new firm formation activity in New Hampshire, and particularly so after the policy frontier.

11.1. Methodology

Beginning from the regression model developed for Massachusetts and consider its performance for New Hampshire.

$$L_i = \log\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 \bullet LagHSMat + \beta_2 \bullet populationdensity + \beta_3 \bullet lag\_entryrate + \beta_4 \bullet d\min + \beta_5 \bullet d\min\_af05 + \varepsilon$$

Equation 7. Extended education specification model for New Hampshire

The model was expanded first with a term for distance to the border (dmin, see Appendix C) and an interaction term for distance after the policy frontier (dmin_af05). These variables are both continuous in nature and based on the distance calculation method detailed in the appendix. In addition, in a forward stepwise fashion, terms were inserted to account for gender, sector and organization size. Subsequently, the model was further expanded to replace the continuous variable for sector with a large dummy variable set. Procedurally, this was accomplished by conducting a series of 81 individual regressions, identifying significant and near significant dummy variables, incorporating them into a single equation and then in a backward stepwise fashion removing insignificant terms; thus, combining forward and backward stepwise methods. By observing the impact of

these variables on the distance to the border and the distance after the policy frontier we might ascertain whether arbitrage is taking place versus or in addition to firm formation suppression.

11.2. Analytical Results

First an examination of the regression equation developed for Massachusetts in predicting correct outcomes in New Hampshire in order to assess the relative suitability of this particular model was performed. The distance term was added to the model, and the results suggested that each of the analytical variables and the policy variable were statistically significant with the exception of the dummy variable for organizations with 11 to 19 employees. This model predicts correctly approximately 87% of the time with somewhat limited fidelity.

Table 33. Organizational Location in New Hampshire using LagHSMat model

	(1) MA	(2) NH	(3) NH	(4) NH	(5) NH	(6) NH	(7) NH	(8) NH
exist	0.392	-0.392	-0.219	-0.158	-0.219	-0.218	-0.226	-0.219
	(5.59)**	(5.59)**	(2.48)*	-1.21	(2.49)*	(2.48)*	(2.47)*	(2.48)*
Constant	-15.863	15.863	30.761	30.847	30.039	30.803	29.963	30.746
	(58.52)**	(58.52)**	(46.63)**	(32.48)**	(44.06)**	(46.73)**	(44.92)**	(46.77)**
lagged HS Math	1.057	-1.057	-1.956	-1.927	-1.956	-1.956	-1.865	-1.967
	(82.20)**	(82.20)**	(48.49)**	(33.78)**	(48.60)**	(48.57)**	(46.06)**	(48.93)**
population density	10,674.29	-10,674.29	-15,847.27	-15,305.24	-15,927.49	-15,850.95	-14,748.19	-15,876.48
	(60.99)**	(60.99)**	(49.28)**	(33.39)**	(49.11)**	(49.33)**	(47.32)**	(49.66)**
new orgs previous year	-98.149	98.149	49.984	27.442	49.721	50.022	36.233	50.99
	(44.91)**	(44.91)**	(18.33)**	(5.72)**	(18.26)**	(18.33)**	(11.08)**	(18.56)**
After2005			17.88	16.516	17.809	17.856	16.065	19.097
			(33.33)**	(20.90)**	(33.26)**	(33.31)**	(28.69)**	(28.61)**
Dmin			27.481	33.031	26.801	27.36	27.617	29.138
			(14.01)**	(12.41)**	(13.59)**	(13.96)**	(14.01)**	(14.64)**
dmin_af05								-30.332
								(3.07)**
actualemployeesize							0.004	
							(5.10)**	
firms with 11 to 19 employees						-0.55		
						-1.7		
primarysic					0			
					(4.42)**			
women owned firm				0.583				
				(2.37)*				
Observations	201248	201248	201248	71616	201216	201248	147432	201248
Number of infousaid	25156	25156	25156	8952	25152	25156	18429	25156
Absolute value of z statistics in parentheses								
* significant at 5%; ** significant at 1%								
pr 0, 0	114,736	82,144	83,017	33,501	82,950	82,993	67,864	83,025
pr 0, 1	3,288	1,080	1,862	1,131	2,024	1,894	1,900	1,650
pr 1, 0	12,424	29,120	28,247	77,763	28,314	28,271	43,400	28,239
pr 1, 1	107,976	126,080	125,298	126,029	125,136	125,266	125,260	125,510
% correct	93.41%	87.33%	87.37%	66.91%	87.28%	87.35%	81.00%	87.46%
% correct NH	92.82%	122.05%	120.75%	160.26%	120.67%	120.74%	132.64%	120.91%
% correct MA	108.21%	74.80%	76.29%	31.13%	76.37%	76.29%	62.70%	76.10%

The results, presented in the following table, suggest that a significant difference exists before and after the policy frontier for new organizations in close proximity to the border after 2005 (dmin_af05). While overall, increasing distance increases the probability of locating in New Hampshire, after the policy frontier, this relationship reversed: as distance increased the probability of locating in New Hampshire decreased. This suggests clustering about the border and reinforces the conclusion that jurisdictional arbitrage is taking place.

Table 34. Organizational Location in New Hampshire Jurisdictional Arbitrage

	(1) NH	(2) NH	(3) NH	(4) NH	(5) NH
exist	-0.219	-0.22	-0.218	-0.228	-0.159
	(2.48)*	(2.49)*	(2.48)*	(2.48)*	-1.21
lagged HS Math	-1.967	-1.967	-1.967	-1.876	-1.936
	(48.93)**	(49.08)**	(49.01)**	(46.68)**	(34.04)**
population density	-15,876.48	-15,957.46	-15,880.08	-14,799.42	-15,355.02
	(49.66)**	(49.51)**	(49.71)**	(47.81)**	(33.61)**
new orgs previous year	50.99	50.733	51.026	36.715	28.065
	(18.56)**	(18.51)**	(18.56)**	(11.24)**	(5.83)**
After2005	19.097	19.046	19.074	17.252	17.501
	(28.61)**	(28.59)**	(28.59)**	(22.10)**	(15.16)**
Dmin	29.138	28.486	29.015	28.505	33.715
	(14.64)**	(14.24)**	(14.59)**	(14.36)**	(12.56)**
dmin_af05	-30.332	-30.812	-30.365	-29.288	-23.502
	(3.07)**	(3.12)**	(3.07)**	(2.27)*	-1.2
primarysic		0			
		(4.45)**			
firms with 11 to 19 employees			-0.552		
			-1.71		
women owned firm					0.585
					(2.38)*
Constant	30.746	30.019	30.788	30.043	30.909
	(46.77)**	(44.21)**	(46.86)**	(45.34)**	(32.67)**
actualemployeesize				0.004	
				(5.13)**	
Observations	201248	201216	201248	147432	71616
Number of infousaid	25156	25152	25156	18429	8952
Absolute value of z statistics in parentheses					
* significant at 5%; ** significant at 1%					
pr 0, 0	83,025	82,958	83,025	67,867	33,501
pr 1, 0	1,650	1,838	1,690	1,951	1,130
pr 0, 1	28,239	28,306	28,239	43,397	77,763
pr 1, 1	125,510	125,322	125,470	125,209	126,030
% correct	87.46%	87.36%	87.45%	80.98%	66.91%
% correct NH	82.71%	82.77%	82.73%	75.42%	62.40%
% correct MA	131.40%	131.21%	131.34%	159.36%	321.28%

Given that it is possible that specification issues could affect these results, the model was expanded to consider the impact of SIC, gender and organization size using a large dummy variable set regression model. The statistically significant dummy variables are presented in the following table.

Table 35. Significant Sector Specific Dummy Variables for New Hampshire

Variable	Description
dmin_af05	interaction term distance with policy variable
SIC_7	Agricultural Services
SIC_16	Heavy Construction Except Building
SIC_17	Construction-Special Trade Contractors
SIC_24	Lumber & Wood Products Manufacturers (exc. furniture)
SIC_38	Measuring & Analyzing Instrument Manufacturers
SIC_55	Automotive Dealers & Services Stations
SIC_57	Home Furniture & Furnishing Stores
SIC_58	Eating & Drinking Places
SIC_59	Miscellaneous Retail
SIC_60	Depository Institutions
SIC_62	Security & Commodity Brokers
SIC_64	Insurance Agents Brokers & Services
SIC_65	Real Estate
SIC_72	Personal Services
SIC_73	Business Services
SIC_75	Auto repairs services and painting
SIC_81	Legal Services
SIC_86	Membership Organizations
SIC_89	Miscellaneous Services
SIC_97	National Security & International Affairs
SIC_99	Non-classified Establishments

In this model too, the term for distance is positive and the interaction term for distance after the passage of the Massachusetts health reform law was negative when controlling for organization size, but not when controlling for gender which itself is not statistically significant. Thus, when considering distance from the border after the policy frontier, the probability of locating in New Hampshire subsequent to the frontier diminishes with distance from the border. This suggests clustering to some degree along the border.

Table 36. Proximity to the Border in a Large Dummy Variable regression

	(1) NH	(2) NH	(3) NH	(4) NH
exist	-0.226	-0.165	-0.226	-0.232
	(2.52)*	-1.24	(2.52)*	(2.49)*
lagged HS Math	-1.985	-1.939	-1.985	-1.902
	(49.23)**	(34.15)**	(49.23)**	(46.88)**
population density	-16,162.71	-15,476.08	-16,162.73	-15,110.65
	(49.49)**	(33.34)**	(49.49)**	(47.16)**
new orgs previous year	50.612	28.494	50.612	36.965
	(18.22)**	(5.81)**	(18.21)**	(11.20)**
Ag Services	-1.115	0.232	-1.115	-1.083
	(2.58)*	-0.39	(2.57)*	(2.39)*
heavy constructon	-3.026	-8.479	-3.027	-2.931
	(2.37)*	(3.01)**	(2.37)*	(2.28)*
const specialty trades	-0.709	-0.579	-0.709	-0.576
	(2.18)*	-1.09	(2.17)*	-1.72
wood prods	4.52	0.807	4.52	12.603
	(1.97)*	-0.22	(1.97)*	-1.95
measurement anal inst	6.172	13.783	6.177	6.232
	(2.04)*	-0.06	(2.03)*	-1.93
auto dealers	-1.586	-0.809	-1.586	-1.749
	(2.52)*	-0.85	(2.52)*	(2.63)**
homefurniture stores	1.873	1.266	1.873	1.833
	(4.25)**	(2.01)*	(4.25)**	(3.93)**
eating n drinking	-1.807	-2.566	-1.804	-1.654
	(4.45)**	(4.67)**	(4.13)**	(3.98)**
misc retail	1.086	0.519	1.086	0.944
	(3.07)**	-1.09	(3.07)**	(2.56)*
deposit inst	-1.954	-1.361	-1.955	-1.62
	(2.36)*	-1.26	(2.36)*	-1.9
securties/commodities brokers	2.583	3.267	2.583	3.355
	(2.39)*	-1.92	(2.39)*	(2.81)**
ins agents brokers servs	1.909	1.047	1.908	1.544
	(2.12)*	-0.8	(2.12)*	-1.56
real estate	0.942	0.997	0.942	0.769
	(2.47)*	-1.54	(2.47)*	-1.82
personal services	-0.882	-0.608	-0.882	-0.795
	(2.32)*	-1.2	(2.32)*	(2.05)*
busn services	0.944	0.226	0.944	0.964
	(2.89)**	-0.43	(2.88)**	(2.84)**
auto repairsrv	-1.465	-1.203	-1.465	-1.605
	(2.81)**	-1.78	(2.81)**	(2.97)**
legal serv	-1.788	-1.88	-1.788	-1.602
	(3.57)**	(2.96)**	(3.56)**	(3.14)**
membership orgs	1.391	0.059	1.39	1.752
	(2.31)*	-0.06	(2.31)*	(2.71)**
misc servs	4.334	4.154	4.334	6.154
	(3.76)**	-1.18	(3.76)**	(3.88)**
natnl sec intntl aff	-5.728	-29.428	-5.728	-5.1
	(1.98)*	0	(1.98)*	-1.78
non-classified	1.218	-0.095	1.217	1.651
	(4.31)**	-0.11	(4.29)**	(5.11)**
Dmin	28.743	33.673	28.742	28.329
	(14.12)**	(12.22)**	(14.12)**	(13.90)**
After2005	19.192	17.304	19.192	17.51
	(28.48)**	(14.97)**	(28.47)**	(22.30)**
dmin_af05	-33.472	-19.742	-33.474	-28.792
	(3.38)**	-1	(3.38)**	(2.22)*
women owned firm		0.486		
		-1.86		
firms with 11 to 19 employees			-0.006	
			-0.02	
actualemployeesize				0.004
				(5.39)**
Constant	31.175	31.214	31.175	30.471
	(46.62)**	(32.23)**	(46.61)**	(44.74)**
Observations	201216	71608	201216	147400
Number of infousaid	25152	8951	25152	18425
Absolute value of z statistics in parentheses				
* significant at 5%; ** significant at 1%				
pr 0, 0	82,999	33,541	82,999	67,897
pr 1, 0	1,846	1,043	1,846	1,844
pr 0, 1	28,265	77,723	28,265	43,367
pr 1, 1	125,314	126,117	125,314	125,316
% Correct	87.37%	66.96%	87.37%	81.04%
% correct NH	82.80%	62.38%	82.80%	75.38%
% correct MA	131.14%	321.72%	131.14%	159.54%

How can both distance from the border (dmin) and distance from the border after the policy frontier be significant and have opposite signs? One possibility is merely a matter of scale, that the aggregate relationship swamps the period specific observation. Distance from the border generally should correlate with location within the state regardless of which state simply because as distance to the state line increase the more one is in the state; thus, one would expect a positive coefficient. Another more compelling answer however might be that overall; distance to the border remains a very important determiner of location, and is only subject to arbitrage in closer proximity to the border. This is consistent with the regression analysis where the distance after the policy frontier has a negative sign suggesting that smaller distances increase the probability of location in New Hampshire.

As the previous discussion has clearly pointed out, in addition to observing a shift in formation rates in New Hampshire and Massachusetts which persists when controlling for sector and size, it is also clear that in each of the New Hampshire models size is only significant when considered in the continuous form. Thus, we cannot conclude that firms or organizations particularly at risk in the sense of marginal cost increases from the legislation were disposed to consider it in their location decisions over other groupings of firms. What this implies is that business owners may not be arbitraging their location decision based on their current needs, but also considering their future needs for expansion. This also suggests that entrepreneurs do not believe that New Hampshire will

follow suite in the foreseeable future or that there will be any significant national initiative in this regard.

The results for owner gender are more mixed. As has been noted, in the job-lock literature it is posited that women may be more sensitive to the availability of health insurance than men in terms of pursuing self-employment (Blanchflower and Oswald 1998; Buchmueller and Valletta 1996; Wellington 2001), but the results of these tests suggest that women entrepreneurs were only statistically different from men in their location decision when sector and organization size were not controlled for and that when the proximity term (dmin_af05) was employed gender was not statistically significant.

If women were particularly prone to start home based businesses than men, then given the physical proximity of residential zoning in Massachusetts to the border, this might explain the lack of significance. However, as the following tables illustrate there does not appear to be a substantial difference in the proportion of women owners in home based versus commercially based businesses at 24.9% versus 23.8% respectively. Even when considering the prevalence in the specific states, the difference is quite small which comports with the finding of the insignificance of gender in this situation.

Table 37. New Business Type by Gender (ALL)

Business Type	Men		Women		Total
Commercial	407	76.22%	127	23.78%	534
Home-based	503	75.07%	167	24.93%	670
Total	910	75.58%	294	24.42%	1,204

Table 38. New Business type by Gender (Massachusetts only)

Business Type	Men		Women		Total
Commercial	320	75.83%	102	24.17%	422
Home-based	353	74.47%	121	25.53%	474
Total	673	75.11%	223	24.89%	896

Table 39. New Business Type by Gender (New Hampshire only)

Business type	Men		Women		Total
Commercial	87	77.68%	25	22.32%	112
Home-based	150	76.53%	46	23.47%	196
Total	237	76.95%	71	23.05%	308

Is there evidence of physical clustering in the analysis results? The following figure illustrates the location of organizations in the study region for 2007. Upon inspection, it seems clear that there are clusters of border concentration in the location of organizations, but also substantial groups of organizations quite distant from the border; though several communities Nashua, Hudson, Salem, Plaistow and Seabrook appear to have clusters of organizations or firms running parallel with the border in very close proximity. Nashua in particular has a major regional mall located immediately adjacent to the border which would act as an anchor-magnet for development in this area.

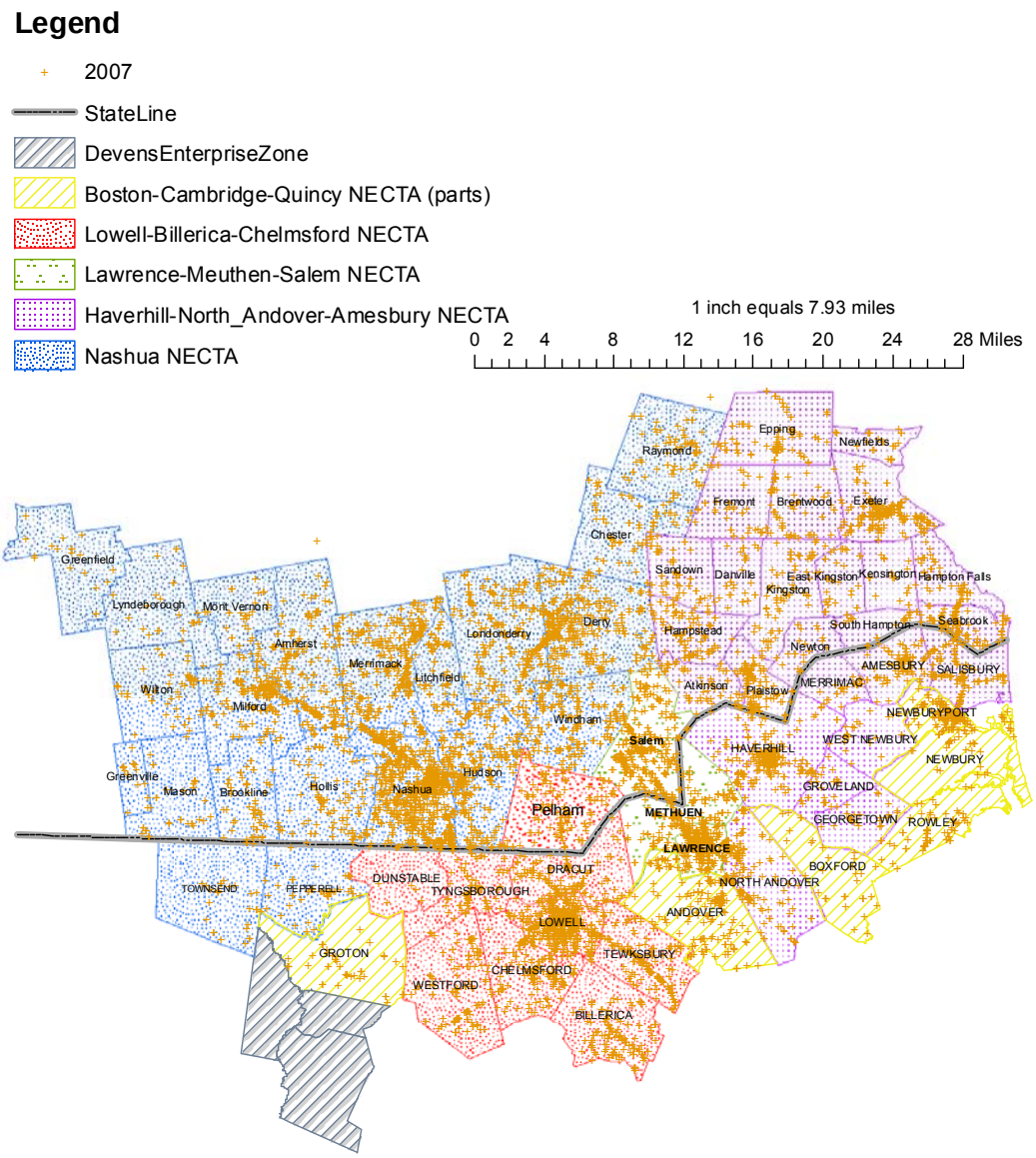

Figure 8. Location of New Organizations in 2007

One might expect that some of the location decision would be motivated by the availability of greenfield space. Zoning notwithstanding, inspection suggests that this is not apparently the case particularly when considering, with the exception of Nashua that

the larger communities actually lie inside Massachusetts – image source Google™ maps search.

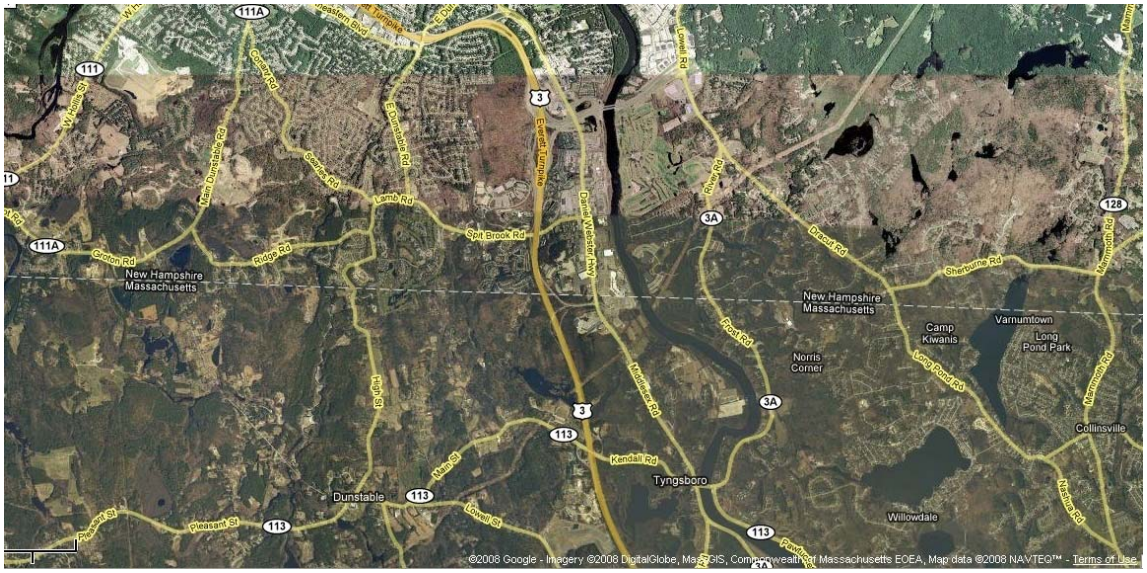

Figure 9. Satellite view Nashua-Hudson boundary with Massachusetts

As can be seen from this image, the New Hampshire border in this case is clearly denser commercially and this persists under closer inspection when considering the Pleasant Lane Mall location immediately across the state line and on a major thoroughfare. Much of the substantial commercial development in the area seems to fall on the New Hampshire side of the border with Massachusetts being largely residential.

Figure 10. Pleasant Lane Mall - Nashua-Hudson/Dunstable-Tyngsborough

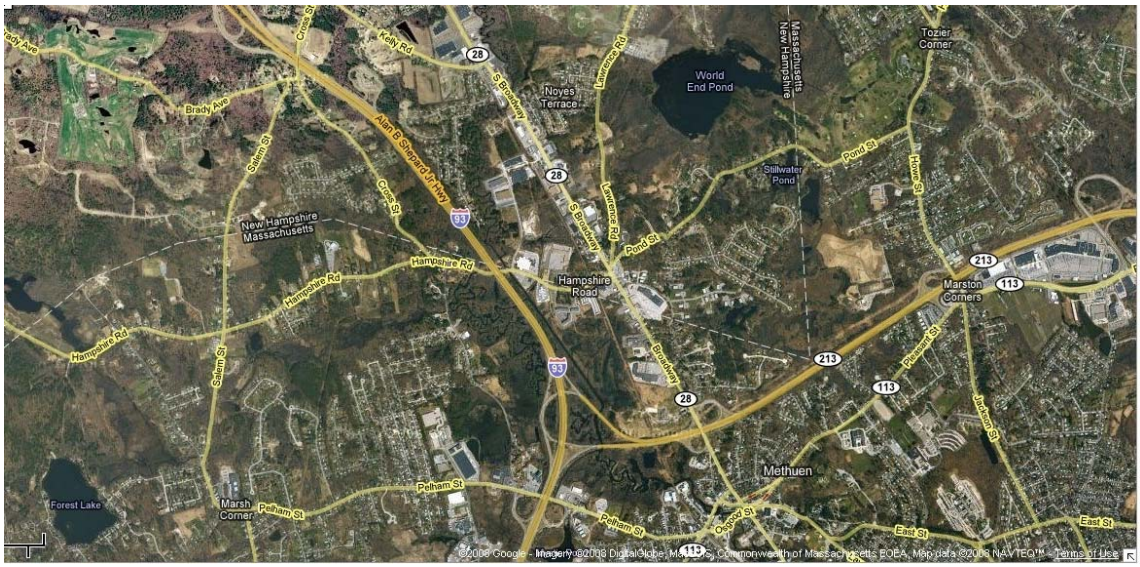

Figure 11. Salem NH - Methuen MA border area

Salem, New Hampshire, a much smaller town the Methuen too appears to have a substantial location advantage, but in this case there is clearly commercial space and greenspace close to the border. The most blatant border straddling development in 2007 appears to have occurred along the border in the town of Seabrook, New Hampshire. This greater development in Seabrook seems to proceed despite relatively comparable access to greenfield space with the adjacent Massachusetts jurisdictions and equally marginal access to I-95; though better access to east-west corridors such as New Hampshire 107. It appears that much of this growth may be associated with big box development in the immediate area including a Sam's Club.

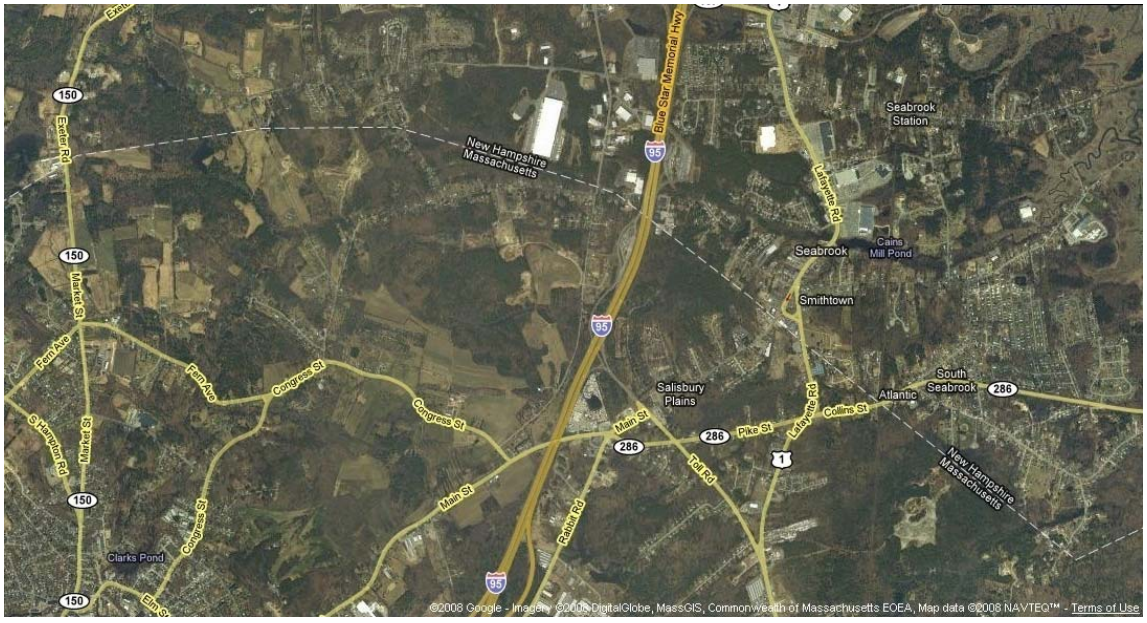

Figure 12. Seabrook-South Hampton NH/Amesbury-Salisbury MA Border

While outside the realm of any definitive consideration in this treatise, zoning cannot be insubstantial at the micro-level, and it does seem that more of the border is zoned for commercial use in New Hampshire than in Massachusetts. One reason zoning might not be important is the entrepreneur's inability to assess its individual impact. This may result from the complexity of the zoning along the border: in Hillsborough and Rockingham county New Hampshire there are only 237 zoning classifications whereas in Massachusetts there are 4,697 special zoning categories. This situation has persisted for many years, however, without apparently tipping the advantage in new firm/organization formation activity away from Massachusetts. It seems clear that something suddenly is different, and it does not appear to be merely coincidental that this shift has largely occurred subsequent to the passage of Chapter 58 of the Acts of 2006: An Act Providing Access to Affordable, Quality, Accountable Health Care or the Massachusetts health care reform law of 2006.

Chapter 12. Conclusions

There are several contributions of this work to the existing literature on health finance policy, entrepreneurship and labor economics. This analysis has been the first empirical attempt to assess a real world change in public policy related to universal healthcare via health finance and specifically requiring either individuals or employers to purchase health insurance. All previous research has been based entirely on simulations or ab initio calculations. This work has focused on the impact or theorized impact of such policies on existent small businesses, and therefore, has neglected the impact of such policies on entrepreneurs. While such policies may have varying affects on current businesses causing some to cease operations (Kronick 1991), the present study represents a clear contribution to the literature in entrepreneurship regarding the impact of social policies on new firm or organization formation, providing strong empirical evidence that a policy of mandatory employer health insurance provision does not attract entrepreneurs or compensate them with more productive workers but in fact deters the creation of new enterprises. It expands the literature on entrepreneurship, considering the most powerful institutional predictors of new firm location within probably the most natural economic geography, the labor market area or metropolitan statistical area (Acs and Armington 2006), and provides support for an earlier contentions in the literature that entrepreneurs run in place, starting their new enterprises where they live while refuting the conclusion

that local amenities do not affect location decisions (Pennings 1982). While it does not address the presence of own insurance or family insurance on the entrepreneurs' decision to exploit, it also refutes the claim that women are more sensitive to health insurance coverage and therefore more likely to provide health insurance to their employees (Blanchflower and Oswald 1998; Brunetti et al. 2000; Buchmueller and Valletta 1996; Wellington 2001), provides further evidence that employers view benefits as an expense not entirely substitutable with wages (Currie and Madrian 1999; Pauly 1997), and confirms the power of institutions to affect entrepreneurship (Baumol 1990; Baumol, Litan, and Schramm 2006) and suggests changes in the entrepreneurial wage imposed by public policy can materially impact entrepreneurship creating barriers to entry and resulting in formation displacement or suppression (Caves and Porter 1977).

The data shows a statistically significant shift in the proportion of new firms or organizations formed in the study region occurred following the passage of the Massachusetts health reform law of 2006, and this shift's significant persists when controlling for gender, organization size and industrial sector. The specific impact however is somewhat unclear. It remains to estimate the impact of this shift under two scenarios: suppression and displacement. While it is likely correct that the actual situation is a mixture of the two effects, for simplicity estimation requires assessing the two extremes. Under a displacement scenario, the entire loss if felt by Massachusetts as the total new firms or organizations in the region remains constant. Under a suppression scenario, the reduction is a loss to the total regional economy, firms simply do not start,

and they do not relocate their enterprises into New Hampshire. It is likely that for certain types of service firms, such as personal services where physical proximity to the customer or foot-traffic is the primary determinant of sales and success; this later scenario is likely the case.

Regression analyses thus far presented do not provide guidance into which mechanism substantially dominates, further study is required. The results of the analysis are consistent with the descriptive statistics which show a shift in the proportion of new organizations created by state from 60% in Massachusetts before the policy's passage to 40% after its passage and increasing as the policy has been implemented. It also appears that firm formation activity was suppressed by the indecision in the political environment as well as some limited arbitrage of the policy in close proximity to the border.

12.1. Assessing the overall impact on firm formation activity

In the initial analysis, which this analysis must be given that time and better data will falsify these results, it appears clear that a statistically significant shift has occurred. Historical data from U.S. Census and the Small Business Administration indicate that the mean number of establishment births between 1989 and 2002 was 2,015 and establishment deaths 1,894 for the MSAs containing the central cities of Lawrence, MA;

Lowell, MA, and Nashua, NH. The exact MSA definitions used for these calculations remains unclear because the source data provided by the SBA spans a time period where MSA definitions have changed.

Table 40. Average Firm births/death 1989-2002: Selected MSAs

	Births				Deaths		
	Total	<20	20-499	500+	Total	<20	20-499
United States - All MSA	588,214	454,614	59,371	74,229	526,006	414,197	49,001
Boston, MA-NH	9,292	7,032	982	1,277	8,481	6,533	849
Fitchburg-Leominster, MA	251	200	23	28	252	204	26
Lawrence, MA-NH	888	706	82	100	843	690	67
Lowell, MA-NH	603	476	57	70	556	444	52
Manchester, NH	561	408	59	94	524	392	55
Nashua, NH	524	402	54	68	495	389	48
All groups	12,118	9,224	1,257	1,637	11,151	8,651	1,096
Law-Low-Nash	2,015	1,584	193	238	1,894	1,522	166

Notes: Longitudinal data for establishments active (payroll) in the first quarter of the year. (Establishm no employment in the first quarter were excluded.)

Source: Office of Advocacy, U.S. Small Business Administration, from data provided by the U.S. Cens Bureau, Statistics of U.S. Business.

Unfortunately, no data is reported for Haverhill-North Andover-Amesbury, which is a substantial portion of the study regions population and geography. Assuming it is excluded from the reported values, and noting a very simple relationship between the proportion of the region's population in 2006 and the contribution to average new establishment births from 1989 to 2002 (correlation coefficient = -0.99), an approximate

contribution to average new establishment by Haverhill-North Andover-Amesbury was estimated at 660 new establishment births. This brings the expected total to 2,675 average new establishment births excluding the parts of Boston-Cambridge-Quincy included in the study area. Thus, to the extent that the period 1989-2002 is similar to the present, the study region might be expected to on average produce between 2,000 and 3,000 new establishment births per year. Note also the slight upsurge in new organization formation activity in the period 2000, 2001 and 2002.

Table 41. MSA Population within Study Area

MSA Pop Tabulation	2006 estimate	% Total	2000 Census	% Total
Lawrence-Methuen-Salem	144,501	13.61%	143,944	14.03%
Lowell-Billerica-Chelmsford	285,915	26.93%	280,997	27.40%
Haverhill-North Andover-Amesbury	241,503	22.75%	230,873	22.51%
Nashua	307,280	28.95%	291,674	28.44%
Boston (parts)	82,319	7.75%	78,121	7.62%
Total	1,061,518		1,025,609	

Source: US Census Bureau, Current Population Survey

Table 42. Average Firm births/deaths before/after 2001

	1989-1999		2000-2002	
	Total Births	Total Deaths	Total Births	Total Deaths
United States - All MSA	580,812	471,913	616,203	572,893
Boston, MA-NH	9,146	7,524	10,106	9,497
Fitchburg-Leominster, MA	248	227	263	270
Lawrence, MA-NH	891	759	908	878
Lowell, MA-NH	596	499	659	599
Manchester, NH	563	473	565	549
Nashua, NH	530	450	487	505
All groups	11,973	9,932	12,988	12,297
Law-Low-Nash	2,017	1,707	2,054	1,982

Notes: Longitudinal data for establishments active (payroll) in the first quarter of the year. (Establishments with no employment in the first quarter were excluded.)
Source: Office of Advocacy, U.S. Small Business Administration, from data provided by the U.S. Census Bureau, Statistics of U.S. Business.

This estimate is similar to the new establishment counts obtained from the InfoUSA® data 2-3 years after the current period, and suggests an approximately 2 year cleaning period. It should also be noted that the establishment counts based on the InfoUSA® dataset and directories in general, include establishments with no employees, which the SBA data does not include, and therefore, may overestimate new firms in the short run and underestimate them in the longer run to the extent that such firms are both easier to start and more likely to fail due to undercapitalization and ease of exit.

Table 43. Establishment by Year Groupings - source: InfoUSA®

Year (inclusive)	Average, Total Establishment
1989-2000	1,172
2000-2002	1,919
1989-2002	1,301
2000-2004	2,168
2000-2005	2,515
2006-2007	7,358
2000-2007	3,725

Under the displacement scenario and using the aforementioned assumptions about overall firm/organization production capacity of 2,000 – 3,000 new organizations, prior to the Massachusetts legislation, historic proportions were quite stable at approximately 54.5% in Massachusetts and 45.5% in New Hampshire or between 1,090 and 1,635 new establishment. Holding new establishments constant, Massachusetts would now be expected to contribute only 38.2% of the total or between 766 and 1,149 new establishments per year, while New Hampshire would contribute 1,236 to 1,854 new establishments to the study region, and therefore, an overall loss of between 324 to 486 new establishments, firms or organizations per year to Massachusetts.

Under a suppression scenario, the entire loss of Massachusetts would be lost to the regional economy and not compensated for by movement of entrepreneurs into New Hampshire. Under this scenario, New Hampshire which initially contributed between 910 to 1,364 new establishments to the regional economy would see its share shift to

61.8% without seeing any absolute increase in new establishment or organization creation activity. Using a simple algebraic expansion computation, the total new establishments produced by the region would range from 1, 472 to 2, 208 or a net loss of between 528 and 792 new organizations, establishments or firms.

$$newestablishments = \frac{Orgs_{NH}}{share_{NH}} = \frac{910}{0.618} = 1{,}472$$

Equation 8. Supression Calculation - Regional New Organizations

Table 44. Supression Results

Base Establishments	MA Before	Total MA	MA After	NH Before	Total NH	NH After	Total New Establishments
2000	54.52%	1090.4	38.20%	45.48%	909.6	61.80%	1471.8
3000	54.52%	1635.6	38.20%	45.48%	1364.4	61.80%	2207.8

So what does this translate to in terms of lost revenue to the State of Massachusetts, its citizens and entrepreneurs? In order to assess the impact, the historical average in terms of firms, their size and sales were examined. Using the more generous estimate of impact at between 324 and 486 new establishments and based on average employee size and sales volume from 2000-2005 this would translate to approximately 3,305 to 4,957 jobs and $583.2 - $874.8 M in sales (i.e. income tax base) lost to the state. Given a 5% sales tax in Massachusetts (MDR 2007) this translates into roughly M$ 29.7 - M$44.5 in lost

sales tax revenues alone from only the 26 Massachusetts cities encompassed by this study.

Table 45. Mean Employees per firm (Massachusetts only)

Period	Obs	Mean	Std. Dev.	Min	Max
All Years	23,765	18.57109	405.1319	0	52,600
2000-2005 (inclusive)	8,281	10.22026	157.4763	0	12,700
> 2005	3,705	5.673414	17.1444	0	800

Table 46. Mean Sales per Establishment (Massachusetts only)

	Actual Sales/Establishment (Massachusetts only)				
Period	Obs	Mean	Std. Dev.	Min	Max
All Years	23,765	$3,049,101	$47,400,000	$0	$4,270,000,000
2000-2005 (inclusive)	8,281	$1,831,296	$35,600,000	$0	$3,100,000,000
> 2005	3,705	$1,053,993	$3,457,092	$0	$97,400,000

Considering that prior to the legislation approximately 6% of Massachusetts population was without health insurance ostensibly due to high costs or free riding (Curtis, Curtis, and Neuschler 2006; Neuschler 2006), and accounting for the population in the study region of 1,061,518 people in 2006, 63,691 people in the study region did not have insurance. Expressing the cost of the reform in terms of lost sales per uninsured individual, an annual cost of $9,157/person in lost sales or $466/person in lost tax revenues or $763 and $39 per month respectively is computed. Thus, when using the

cost of insurance based on individual insurance cost as the measure of benefit and the loss in sales or income to the local economy as the measure of overall cost, the costs exceed the benefits by $360/person/month or 189% (Morrisey 2003). It should be noted than in nearly all public discourse on the rate to insure Massachusetts's citizens, the expected individual cost of mandatory health insurance has been dramatically below that found in Morrisey's (2003) survey. Even if this cost could be reduced to $100/person per month, essentially recouping $260/month of the benefit, there would still be a net loss relative to the cost, and thus, the legislation would not have resulted in a Pareto improvement. Given the statistical significance of distance to the state line and its theoretical application as a measure of the attractiveness of arbitraging the policy as well as the relative diminutive size of Massachusetts versus other states in the union, policies such as mandatory health insurance will likely create winners and losers in terms of states when employed on a state by state basis.

It is important to note that this is a preliminary analysis and utilizes a best-case approach in assessing the loss to the economy in terms of establishments and a displacement model of impact. If one were to further minimize the impact by estimating employment based on the average size of organizations with fewer than 50 employees which were started after 2005, the average employment would drop to 4.6 and annual sales to $952,291/establishment. Thus, 324 establishments would translate to a loss of 1,490 jobs and M$308.5 in sales and M$15 in sales tax revenues, or $4,844/person/year in lost revenue per uninsured individual or $404 per person per month or $24/person/month in

lost sales tax revenues. In other words, one would have to achieve the best case scenario possible in order to break even with the reform. This of course presupposes that firm size will not be further eroded by this reform, further weakening the long term survivability of small businesses in the study region. For the present, this appears to be the case for organizations with fewer than 50 employees as mean employee size appears to be unchanged over the 8 years. Under a suppression scenario, the costs would dramatically exceed the benefits.

12.2. Other impacts

It is clear as well that the impact varies based on sector and that the change associated with the policy front remains statistically significant when accounting for industry sector whether that accounting is done using the modified primary SIC categories as a continuous variable or when accounting for industry sector using a large set of dummy variables. By and large the coefficients have been negative and statistically significant suggesting that the policy has reduced the likelihood of a new establishment being located in Massachusetts subsequent to the policy; the only exceptions have been heavy construction and restaurants which may result from proximity to the larger population base.

The policy front has also remained stable, significant and negative when controlling for size. The impact of size itself is mixed with the continuous form being significant under all conditions, but the discrete forms losing their significance when the model is expanded using a large dummy variable set. This suggests that at the industry level, entrepreneurs do not particularly arbitrage their location based on the immediate cost considerations with respect to size, but more with regard to their overall potential for growth. As size increases, the coefficient is negative, reducing the probability of locating in Massachusetts. One might construe this to imply that growth entrepreneurs are avoiding Massachusetts in this border region.

Gender too produces mixed results in this analysis. While in the more continuous models gender was often significant, it lost significance as in the large dummy variable set models. This may result from the relatively small numbers of organizations reporting owner/manager gender by 2-digit SIC. The negative coefficient, however, does not support the conclusion of some earlier researchers that women entrepreneurs will likely respond more favorably to such initiatives as mandatory health insurance (Wellington 2001). However, as has been noted earlier, this finding may proceed from gender bias resulting from the absence of women entrepreneurs in certain high value added sectors.

The investigation of the impact of the policy on productivity considered only the most current data for 2007. This included 1,410 Massachusetts organizations and 1,560 organizations and utilizing a Cobb-Douglass approach. Two model approaches were

employed using a simplified equation and variables for gender and the specific size groupings of interest, and a more expanded equation with a large set of dummy variables. Contrary to the labor economics literature on health insurance (Buchmueller and Valletta 1996; Currie and Madrian 1999; Pauly 1997), there is no apparent increase in productivity of workers associated with coverage or anticipated health insurance coverage in Massachusetts as the dummy variable for MA was statistically insignificant in all cases and thus productivity between the two jurisdictions for all practical purposes is the same.

A confirmatory analysis on new organizations in New Hampshire supports the conclusions of the earlier findings, suggesting that some limited jurisdictional arbitrage is taking place, but that this is not likely the entirety of the impact. Some advantage appears to have also been created broadly for New Hampshire entrepreneurs versus Massachusetts entrepreneurs in these smaller, integrated local markets.

12.3. Policy Recommendations

Proceeding from this analysis is the inevitable conclusion that the costs of the use of a mandatory, employer based health insurance requirement is most likely to exceed the benefits in the intermediate term. In the long run, a new ecology of firm formation is likely to become established within the study area and this ecology may well be

dominated by New Hampshire. Early indications are that the jurisdictional advantage conveyed by the absence of the mandatory health insurance requirement in New Hampshire is persistent. Therefore, if states and municipalities wish to avoid this sort of suppression or displacement of creative activity inherent in the establishment of new organizations, then two broad scale remedies remain: a national insurance system based on (1) a single market for health insurance, namely the entire country, or (2) based on individual health insurance.

A national system might entail extremes ranging from requiring risk pooling and regulation of health insurance at the national level, which would likely result in the emergence of mammoth, national health insurance/care providers, to the adoption of a single payer, government or quasi-government institution with all the concomitant risks to patient care and long-term innovation resulting from the inevitable absence of a market price to aid in the allocation of resources. Given what has already been demonstrated from placing the burden primarily on employers, a national system based on employer provided insurance will likely suppress creative activity and economic growth throughout the country, and potentially make American labor in the aggregate less productive resulting in an increase in off-shoring for lower wage work in particular. Ironically, the very people the legislation was intended to help.

The other alternative is a national system of insurance based on individual provision of insurance. There is a copious and lively debate as to the nature and affects of this type of

insurance system, and there is insufficient space to address these nuances here. Such a system might well employ national risk pooling or other technique to mitigate the impacts of individual risks on both patients, who would likely face price discrimination either directly or in the form of uninsurability, and insurers who would likely confront moral hazard resulting from information asymmetries with patients or free riding. In an individual based system, which employed an effective individual mandate, subsidies can be very specifically targeted (Damberg 1996), and when combined with health savings accounts offer one mechanism for addressing catastrophic cost issues, placing downward price pressure on medical care providers, insurers and pharmaceuticals, as well as, encouraging patients to become better informed about their own care. Such a system might also dramatically diminish one element of the uninsured, those between employment by eliminating search costs and reducing the costs of the actual packages to more affordable levels – currently a major disadvantage of COBRAs (Moon, Nichols, and Wall 1996). In addition, this option does not place an undue burden on small employers who comprise the vast majority of employers and would create a uniform insurance market for all those seeking health insurance.

One last consideration is whether mandates offer any real solution for health insurance. It should not go unsaid that some workers are insufficiently skilled to generate sufficient value to compensate employers for the provision of health insurance which according to Pauly (1997) and others is an alternate form of wages. Under traditional Pigouvean calculation, an appropriate remedy for addressing this undersupply is to provide a wage

subsidy to decrease the cost of the benefit which would be targeted at the insurance purchaser. As Gurley-Calvez (2006) and many others have noted, subsidies increase the amount of health insurance purchased by individuals and employers (Helms 2001; Holtz-Eakin, Penrod, and Rosen 1996). Thus a less punitive and more supportive approach might be helpful if coverage is the issue and employer provision remains the primary means of providing insurance in the United States.

Chapter 13. Directions for Future Research

Many questions remain for future research including the persistence of the shift observed in this analysis or whether the results can be explained over time by inflation resulting from the data source or the inclusion of non-profit and non-employer entities in the dataset. The observed shift will only be anecdotal to the extent that the inflation in observations prefers one geography to another. If only those organizations that had been thoroughly verified and thus have actual employee size and actual sales volume data had been the focus of the analysis, a statistically significant shift would also have been observed though with a less dramatic impact as there would have been relative parity between the geographies: a state also quite different from the historical averages.

In addition to the persistence of the observed effect will be whether or not organization survival has been effected. As the literature notes, survival tends to favor organizations which start larger and are better capitalized, and given that the legislation may require greater capital to engage in entrepreneurship it may affect survival which is also noted to vary by gender and region (Boden and Nucci 2000; Fritsch, Brixy, and Falck 2006; Geroski 1995; Audretsch and Mahmood 1995; Shane 2003).

While not particularly a topic of entrepreneurship but noted in Damberg (1996), there may also be positive and negative health outcomes associated with the use of mandatory employer based insurance as the cost to employ individuals rises, increasing potential unemployment and with it urban blight, economic depression and anti-social behavior (Wilson 1996). While these effects may be marginal in a time of relative economic plenty, there is no guarantee that the country or specific regions within the country will not experience significant economic downturns in the future. What may from a health perspective be interesting would be to consider the impact of insurance between those who are individually insured and those who are insured through an employer to ascertain whether current observations about group insurance and the plight of the underinsured persist.

While not considered here, one important longer term question is whether in the absence of a market price, the socialized systems of much of the world, which base their price structure on the U.S. market price will survive the further socialization of the U.S. marketplace. Will efficient allocation either in an economic or medical sense be possible without the benefit of a valid market price to steer the allocation decision toward the most optimal outcomes.

Appendix A

Statistical Appendix – T-tests

Table 47. Test of Proportions (Year>1989)

```
MAB4=MAAF if year>1989

Two-sample test of proportion                     MAB4: Number of obs =    26530
                                                  MAAF: Number of obs =    14715
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        MAB4 |   .5457972   .0030568                      .5398059    .5517885
        MAAF |   .3823989   .0040062                      .3745469    .3902509
-------------+----------------------------------------------------------------
        diff |   .1633983   .0050392                      .1535216     .173275
             |  under Ho:   .0051377    31.80   0.000
------------------------------------------------------------------------------
        diff = prop(MAB4) - prop(MAAF)                           z =  31.8036
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| < |z|) = 0.0000          Pr(Z > z) = 0.0000
```

Table 48. Test of Proportions (Year>2000)

```
MAB4=MAAF if year>2000

Two-sample test of proportion                     MAB4: Number of obs =    13485
                                                  MAAF: Number of obs =    14715
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        MAB4 |   .5571376   .0042775                      .5487538    .5655213
        MAAF |   .3823989   .0040062                      .3745469    .3902509
-------------+----------------------------------------------------------------
        diff |   .1747386   .0058606                      .1632521    .1862252
             |  under Ho:   .0059468    29.38   0.000
------------------------------------------------------------------------------
        diff = prop(MAB4) - prop(MAAF)                           z =  29.3839
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| < |z|) = 0.0000          Pr(Z > z) = 0.0000
```

Table 49. Test of Proportions (Year>2002)

```
MAB4=MAAF if year>2002

Two-sample test of proportion                     MAB4: Number of obs =     9332
                                                  MAAF: Number of obs =    14715
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        MAB4 |   .5547578   .0051447                      .5446743    .5648413
        MAAF |   .3823989   .0040062                      .3745469    .3902509
-------------+----------------------------------------------------------------
        diff |   .1723589   .0065206                      .1595788     .185139
             |  under Ho:   .0065824    26.18   0.000
------------------------------------------------------------------------------
        diff = prop(MAB4) - prop(MAAF)                               z =  26.1846
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| < |z|) = 0.0000          Pr(Z > z) = 0.0000
```

Table 50. Test of Proportions, All Year (Alt. Method 1)

```
prtest MA, by(after)

Two-sample test of proportion                      0: Number of obs =    35915
                                                   1: Number of obs =    14715
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           0 |    .558541   .0026202                      .5534055    .5636765
           1 |   .3823989   .0040062                      .3745469    .3902509
-------------+----------------------------------------------------------------
        diff |   .1761421    .004787                      .1667598    .1855244
             |  under Ho:   .0048934    36.00   0.000
------------------------------------------------------------------------------
        diff = prop(0) - prop(1)                                     z =  35.9960
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| < |z|) = 0.0000          Pr(Z > z) = 0.0000
```

Table 51. Test of Proportions, All Years (Alt. Method 2)

```
prtest after, by(MA)

Two-sample test of proportion                      0: Number of obs =    24943
                                                   1: Number of obs =    25687
------------------------------------------------------------------------------
    Variable |       Mean   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           0 |   .3643507   .0030472                      .3583784     .370323
           1 |   .2190602   .0025807                      .2140022    .2241183
-------------+----------------------------------------------------------------
        diff |   .1452905   .0039931                      .1374641    .1531169
             |  under Ho:   .0040363    36.00   0.000
------------------------------------------------------------------------------
        diff = prop(0) - prop(1)                                      z =  35.9960
    Ho: diff = 0

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(Z < z) = 1.0000         Pr(|Z| < |z|) = 0.0000          Pr(Z > z) = 0.0000
```

Appendix B

Statistical Appendix - Alternate Random Effects Regression Models

The models are sensitive to the starting point. Beginning with all the variables of interest and thus starting from the biased sample, the resulting backward stepwise regression yields a final expression where the location of the new organization is a function of demand (population, lag population and actual sales volume), spillover efficiency/demand (density, lag density), exogenous knowledge (patents, lag patents), the availability of capital as measured by the entry of new organizations in the previous year, and the policy variable (After2005) is statistically significant. Using this model, adding back in the terms for gender, industry and organization size, gender is significant but organization size and SIC are not and depicted in the following table as model 1. Beginning with the same ecological variables but without the variables representing the hypothesis including the policy variable (After2005), gender, industrial classification and organization size, yields a slightly different model, depicted below as model 2, where the variables for entry of new firms in the current years are statistically significant. In the third approach, Models 4 and 5, beginning with only the variables which appear in both datasets, the policy variable After2005 is statistically insignificant. As we proceed however to test the other variables of interest the organization entry variable falls from the equation and the policy front variable After2005 is again statistically significant as is gender and actual employee size, though the specific policy dummy variable for organizations with 11-19 employees was not. As noted in the variance-covariance matrix, particular problems exist with the density, entry litigation and tax variables. This may explain the interaction between the entry variables and the date and gender variables as well as their rendering models containing the other institutional quality variables for education inestimable. In addition, the serial bias associated with the use of a directory on entry, not accounting for exit, may also render these two variables in particular significantly problematic. While density and lag density have opposite directional impacts on the policy variable After2005, current and previous year entry rates impacts are in the same direction though differing slightly in magnitude. Model fidelity as defined earlier is however a problem.

Table 52. State Location of Firm (backward stepwise model comparisons)

	(1) MA	(2) MA	(3) MA	(4) MA	(5) MA
exist	0.026	0.09	0.085	0.071	0.077
	-0.09	-0.32	-0.3	-0.26	-0.2
population	0.062	0.07	0.068	0.071	0.067
	(12.06)**	(13.93)**	(12.75)**	(13.56)**	(9.56)**
previous year populaton	-0.063	-0.071	-0.069	-0.073	-0.068
	(12.18)**	(14.05)**	(12.86)**	(13.69)**	(9.66)**
previous year population density	3360017	3710527.8	3597809.188	3768369.2	3512809.4
	(13.37)**	(15.38)**	(14.16)**	(14.80)**	(10.94)**
population density	-3360199	-3709786	-3597205.649	-3766829	-3512630
	(13.40)**	(15.41)**	(14.18)**	(14.83)**	(10.95)**
endogenous knowledge	0.155	0.175	0.168	0.159	0.112
	(10.41)**	(11.42)**	(10.41)**	(9.42)**	(4.98)**
1 yr lag endogenous knowledge	0.093	0.095	0.096	0.118	0.144
	(5.15)**	(5.77)**	(5.50)**	(6.51)**	(5.36)**
log 1yr lag per capita civ lit	30.658	32.198	31.843	33.328	32.447
	(23.34)**	(24.89)**	(23.66)**	(25.01)**	(17.70)**
log of per capita taxes	-43.023	-45.52	-45.14	-46.948	-46.601
	(19.51)**	(20.78)**	(19.87)**	(20.66)**	(13.78)**
actualsalesvolume	0	0	0		
	(4.02)**	(4.11)**	(4.09)**		
new orgs previous year	-21.201	-16.95	-21.397	-29.131	
	(2.43)*	-1.94	(2.41)*	(3.42)**	
new orgs current year		33.608	22.206	21.572	
		(5.79)**	(2.80)**	(2.74)**	
After2005	4.262		2.401	1.987	5.234
	(4.80)**		(2.12)*	-1.89	(4.43)**
women owned firm			155.408		1.844
			(17.41)**		(3.15)**
primarysic					
actualemployeesize					
firm with less than 11 employees					
firms with 11 to 19 employees					
Constant	149.089	155.474	91432	161.626	161.072
	(16.84)**	(17.95)**	11429	(18.05)**	(11.71)**
Observations	91432	91432		108480	44504
Number of infousaid	11429	11429		13560	5563
Absolute value of z statistics in parentheses					
* significant at 5%; ** significant at 1%					
pr 0, 0	27,545	27,616	27,616	38,608	13,136
pr 0, 1	112	112	112	112	80
pr 1, 0	99,615	99,544	99,544	88,552	114,024
pr 1, 1	111,152	111,152	111,152	111,152	111,184
% correct	58.17%	58.20%	58.20%	62.81%	52.14%
% correct MA	189.43%	189.37%	189.37%	179.49%	202.41%
% correct NH	21.75%	21.81%	21.81%	30.45%	10.39%

Table 53. Model 1 (new org prev. yr. & act. sales)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	MA	MA	MA	MA	MA	MA	MA	MA
exist	0.026	0.039	0.025	0.026	0.026	0.022	0.04	0.09
	-0.09	-0.1	-0.09	-0.09	-0.09	-0.08	-0.1	-0.32
population	0.062	0.069	0.063	0.062	0.062	0.062	0.071	0.07
	(12.06)**	(9.43)**	(12.04)**	(12.06)**	(12.06)**	(12.07)**	(9.33)**	(13.93)**
previous year populaton	-0.063	-0.071	-0.064	-0.063	-0.063	-0.063	-0.072	-0.071
	(12.18)**	(9.52)**	(12.16)**	(12.18)**	(12.18)**	(12.19)**	(9.42)**	(14.05)**
previous year population density	3360017	3663883	3422869	3361059	3362940	3377310	3718506	3710528
	(13.37)**	(10.73)**	(13.45)**	(13.37)**	(13.37)**	(13.38)**	(10.70)**	(15.38)**
population density	-3360199	-3662159	-3422971	-3361237	-3363105	-3377470	-3716688	-3709786
	(13.40)**	(10.75)**	(13.47)**	(13.40)**	(13.39)**	(13.41)**	(10.72)**	(15.41)**
endogenous knowledge	0.155	0.105	0.156	0.155	0.156	0.155	0.109	0.175
	(10.41)**	(4.52)**	(10.92)**	(10.39)**	(10.40)**	(10.35)**	(4.66)**	(11.42)**
1 yr lag endogenous knowledge	0.093	0.156	0.095	0.093	0.093	0.094	0.152	0.095
	(5.15)**	(5.28)**	(5.52)**	(5.15)**	(5.15)**	(5.16)**	(5.12)**	(5.77)**
log 1yr lag per capita civ lit	30.658	33.113	30.87	30.66	30.664	30.725	33.089	32.198
	(23.34)**	(16.53)**	(23.84)**	(23.34)**	(23.34)**	(23.22)**	(16.52)**	(24.89)**
log of per capita taxes	-43.023	-46.676	-43.263	-43.017	-43.018	-43.19	-46.532	-45.52
	(19.51)**	(13.51)**	(19.93)**	(19.50)**	(19.50)**	(19.43)**	(13.47)**	(20.78)**
actualsalesvolume	0	0	0	0	0	0	0	0
	(4.02)**	(3.44)**	(2.39)*	(4.03)**	(4.03)**	(3.99)**	-1.51	(4.11)**
new orgs previous year	-21.201	-31.066	-22.284	-21.265	-21.344	-22.511	-32.28	-16.95
	(2.43)*	(2.43)*	(2.54)*	(2.42)*	(2.43)*	(2.53)*	(2.52)*	-1.94
After2005	4.262	6.255	4.281	4.259	4.257	4.269	6.259	
	(4.80)**	(4.06)**	(4.80)**	(4.80)**	(4.80)**	(4.78)**	(4.06)**	
women owned firm		1.87					1.776	
		(3.09)**					(2.93)**	
actualemployeesize			0.017				0.015	
			(2.01)*				-1.23	
firm with less than 11 employees				-0.089				
				-0.1				
firms with 11 to 19 employees					0.195			
					-0.18			
primarysic						0		
						-1.24		
new orgs current year								33.608
								(5.79)**
Constant	149.089	161.544	149.886	149.138	149.045	149.419	160.928	155.474
	(16.84)**	(11.62)**	(17.20)**	(16.82)**	(16.83)**	(16.78)**	(11.57)**	(17.95)**
Observations	91432	40016	91432	91432	91432	91416	40016	91432
Number of infousaid	11429	5002	11429	11429	11429	11427	5002	11429
Absolute value of z statistics in parentheses								
* significant at 5%; ** significant at 1%								
pr 0, 0	27,545	12,568	27,544	27,544	27,552	27,560	12,568	27,616
pr 0, 1	112	101	112	112	112	112	96	112
pr 1, 0	99,615	114,592	99,616	99,616	99,608	99,600	114,592	99,544
pr 1, 1	111,152	111,163	111,152	111,152	111,152	111,152	111,168	111,152
% correct	58.17%	51.90%	58.17%	58.17%	58.18%	58.18%	51.90%	58.20%
% correct MA	189.43%	202.90%	189.43%	189.43%	189.42%	189.42%	202.90%	189.37%
% coorect NH	21.75%	9.96%	21.75%	21.75%	21.76%	21.76%	9.96%	21.81%

Table 54. Model 2 (new orgs in current & previous period)

	(1) MA	(2) MA	(3) MA	(4) MA	(5) MA	(6) MA	(7) MA	(8) MA
exist	0.09	0.085	0.075	0.083	0.082	0.084	0.084	0.039
	-0.32	-0.3	-0.19	-0.29	-0.29	-0.3	-0.3	-0.1
population	0.07	0.068	0.074	0.069	0.069	0.068	0.068	0.069
	(13.93)**	(12.75)**	(9.50)**	(12.81)**	(12.70)**	(12.75)**	(12.76)**	(9.43)**
previous year populaton	-0.071	-0.069	-0.076	-0.07	-0.07	-0.069	-0.069	-0.071
	(14.05)**	(12.86)**	(9.58)**	(12.92)**	(12.81)**	(12.86)**	(12.87)**	(9.52)**
previous year population density	3710527.839	3597809.188	3881647.785	3641148.392	3653059	3602846.1	3606046.5	3663882.8
	(15.38)**	(14.16)**	(10.86)**	(14.23)**	(14.17)**	(14.16)**	(14.16)**	(10.73)**
population density	-3709786.16	-3597205.65	-3879452.74	-3640440.04	-3652396	-3602227	-3605406	-3662159
	(15.41)**	(14.18)**	(10.88)**	(14.26)**	(14.20)**	(14.19)**	(14.19)**	(10.75)**
endogenous knowledge	0.175	0.168	0.117	0.169	0.168	0.168	0.168	0.105
	(11.42)**	(10.41)**	(4.48)**	(10.37)**	(10.82)**	(10.39)**	(10.40)**	(4.52)**
1 yr lag endogenous knowledge	0.095	0.096	0.158	0.098	0.098	0.096	0.097	0.156
	(5.77)**	(5.50)**	(5.25)**	(5.53)**	(5.84)**	(5.50)**	(5.50)**	(5.28)**
log 1yr lag per capita civ lit	32.198	31.843	34.258	32.046	32.03	31.866	31.874	33.113
	(24.89)**	(23.66)**	(16.44)**	(23.56)**	(23.94)**	(23.65)**	(23.66)**	(16.53)**
log of per capita taxes	-45.52	-45.14	-48.567	-45.55	-45.34	-45.155	-45.163	-46.676
	(20.78)**	(19.87)**	(13.44)**	(19.81)**	(20.11)**	(19.85)**	(19.85)**	(13.51)**
actualsalesvolume	0	0	0	0	0	0	0	0
	(4.11)**	(4.09)**	(3.48)**	(4.05)**	(2.28)*	(4.13)**	(4.10)**	(3.44)**
new orgs previous year	-16.95	-21.397	-28.978	-23.186	-22.469	-21.475	-21.575	-31.066
	-1.94	(2.41)*	(2.20)*	(2.55)*	(2.52)*	(2.40)*	(2.41)*	(2.43)*
new orgs current year	33.608	22.206	17.013	23.993	21.679	22.404	22.471	
	(5.79)**	(2.80)**	-1.49	(2.99)**	(2.73)**	(2.82)**	(2.83)**	
After2005		2.401	4.823	2.266	2.465	2.381	2.373	6.255
		(2.12)*	(2.61)**	(1.98)*	(2.16)*	(2.10)*	(2.09)*	(4.06)**
women owned firm			1.949					1.87
			(3.16)**					(3.09)**
primarysic				0				
				-1.56				
actualemployeesize					0.017			
					-1.89			
firm with less than 11 employees						-0.149		
						-0.17		
firms with 11 to 19 employees							0.284	
							-0.26	
Constant	155.474	155.408	166.97	156.41	156.106	155.556	155.423	161.544
	(17.95)**	(17.41)**	(11.70)**	(17.36)**	(17.64)**	(17.38)**	(17.38)**	(11.62)**
Observations	91432	91432	40016	91416	91432	91432	91432	40016
Number of infousaid	11429	11429	5002	11427	11429	11429	11429	5002
Absolute value of z statistics in parentheses								
* significant at 5%; ** significant at 1%								
pr 0, 0	27,616	27,616	12,568	27,608	27,608	27,616	27,616	12,568
pr 0, 1	112	112	80	112	112	112	112	101
pr 1, 0	99,544	99,544	114,592	99,552	99,552	99,544	99,544	114,592
pr 1, 1	111,152	111,152	111,184	111,152	111,152	111,152	111,152	111,163
% correct	58.20%	58.20%	51.90%	58.20%	58.20%	58.20%	58.20%	51.90%
% correct MA	189.37%	189.37%	202.92%	189.37%	189.37%	189.37%	189.37%	202.90%
% correct NH	21.81%	21.81%	9.95%	21.80%	21.80%	21.81%	21.81%	9.96%

Table 55. Model 3 (interaction between current/previous entry, gender & policy)

	(1) MA	(2) MA	(3) MA	(4) MA	(5) MA	(6) MA	(7) MA
exist	0.071	0.116	0.077	0.064	0.063	0.065	0.072
	-0.26	-0.42	-0.2	-0.24	-0.23	-0.24	-0.18
population	0.071	0.069	0.067	0.062	0.059	0.062	0.066
	(13.56)**	(12.84)**	(9.56)**	(12.72)**	(12.21)**	(12.71)**	(9.29)**
previous year populaton	-0.073	-0.07	-0.068	-0.063	-0.06	-0.063	-0.067
	(13.69)**	(12.97)**	(9.66)**	(12.86)**	(12.35)**	(12.85)**	(9.38)**
previous year population density	3768369	3599798	3512809	3350083	3206136	3344741	3487837
	(14.80)**	(14.15)**	(10.94)**	(13.86)**	(13.68)**	(13.84)**	(10.68)**
population density	-3766829	-3599659	-3512630	-3350751	-3207369	-3345364	-3488106
	(14.83)**	(14.17)**	(10.95)**	(13.88)**	(13.71)**	(13.86)**	(10.70)**
endogenous knowledge	0.159	0.168	0.112	0.156	0.161	0.155	0.119
	(9.42)**	(10.06)**	(4.98)**	(10.34)**	(12.11)**	(10.31)**	(5.18)**
1 yr lag endogenous knowledge	0.118	0.105	0.144	0.101	0.082	0.101	0.134
	(6.51)**	(6.15)**	(5.36)**	(5.96)**	(5.63)**	(5.94)**	(4.83)**
log 1yr lag per capita civ lit	33.328	32.705	32.447	31.44	29.948	31.441	31.974
	(25.01)**	(24.76)**	(17.70)**	(25.85)**	(25.65)**	(25.86)**	(16.98)**
log of per capita taxes	-46.948	-46.914	-46.601	-44.607	-42.538	-44.547	-46.027
	(20.66)**	(19.76)**	(13.78)**	(20.34)**	(20.37)**	(20.34)**	(13.30)**
new orgs previous year	-29.131						
	(3.42)**						
new orgs current year	21.572	22.176					
	(2.74)**	(2.62)**					
After2005	1.987	0.999	5.234	2.811	3.617	2.859	5.269
	-1.89	-0.99	(4.43)**	(4.10)**	(4.52)**	(4.19)**	(3.84)**
women owned firm			1.844				1.836
			(3.15)**				(2.94)**
primarysic				0			0
				-0.97			-1.11
actualemployeesize					-0.003		-0.003
					(1.98)*		(2.10)*
firms with 11 to 19 employees						0.006	
						-0.01	
Constant	161.626	161.209	161.072	153.694	147.016	153.715	158.696
	(18.05)**	(17.24)**	(11.71)**	(17.28)**	(17.35)**	(17.29)**	(11.32)**
Observations	108480	108480	44504	108464	91432	108480	40016
Number of infousaid	13560	13560	5563	13558	11429	13560	5002
Absolute value of z statistics in parentheses							
* significant at 5%; ** significant at 1%							
pr 0, 0	38,608	38,536	13,136	38,496	27,504	38,496	12,528
pr 0, 1	112	112	80	112	112	112	80
pr 1, 0	88,552	88,624	114,024	88,664	99,656	88,664	114,632
pr 1, 1	111,152	111,152	111,184	111,152	111,152	111,152	111,184
% correct	62.81%	62.78%	52.14%	62.77%	58.16%	62.77%	51.89%
% correct MA	179.49%	179.55%	202.41%	179.59%	189.47%	179.59%	202.96%
% correct NH	30.45%	30.39%	10.39%	30.36%	21.72%	30.36%	9.92%

Table 56. Variance Covariance Estimation (bootstrap), Models 1-3

lnsig2u_cons	_cons	After2005	lag_entryrate	actual sales volume	lgpctxrev	lglagpcCvLt	lagpatents	patents	density	lagdens	poplag1	population	exist	MA	e(V)
-1.441E-05	-6.236E-02	1.327E-02	1.254E-01	7.542E-13	3.199E-03	2.925E-03	5.113E-05	-4.718E-06	-2.723E+03	2.723E+03	-1.498E-05	1.460E-05	5.148E-02	exist	MA
6.601E-07	2.695E-04	-1.314E-04	-6.043E-03	-5.093E-13	-3.535E-04	7.649E-04	3.810E-06	1.060E-05	-6.830E+02	6.856E+02	-1.385E-05	1.373E-05		population	
-7.766E-07	-2.873E-04	1.348E-04	6.138E-03	5.217E-13	3.663E-04	-7.860E-04	-3.882E-06	-1.079E-05	6.900E+02	-6.926E+02	1.397E-05			poplag1	
2.033E+02	1.230E+04	-9.789E+03	-3.039E+05	-4.623E-05	-3.028E+04	6.784E+04	2.234E+02	6.842E+02	-4.250E+10	4.261E+10				lagdens	
-2.012E+02	-1.233E+04	9.694E+03	3.027E+05	4.617E-05	3.024E+04	-6.772E+04	-2.226E+02	-6.817E+02	4.239E+10					density	
-1.447E-05	2.992E-03	-2.216E-04	-7.928E-03	-1.449E-12	-1.525E-03	2.104E-03	-2.678E-05	5.441E-05						patents	
7.575E-06	4.923E-03	-9.213E-05	-1.286E-02	-5.067E-13	-1.333E-03	1.167E-03	4.257E-05							lagpatents	
3.455E-03	6.163E-01	-4.379E-02	-1.560E+00	-2.133E-10	-2.806E-01	3.701E-01								lglagpcCvLt	
-2.415E-03	-1.711E+00	2.582E-02	2.895E+00	1.647E-10	4.164E-01									lgpctxrev	
-3.328E-13	-4.191E-10	3.329E-11	1.059E-09	1.154E-17										actual sales volume	
-1.583E-02	-1.486E+01	-1.475E+00	4.338E+01											lag_entrate	
-1.212E-03	6.195E-02	3.447E-01												After2005	
5.209E-03	8.867E+00													_cons	
2.180E-03														lnsig2u_cons	

These interactions between the variables and variance inflation may render the coefficients in the third model inefficient and thus case a false negative for the policy variable, failing to identify significant interactions. In a similar related series of regressions, the density measures were removed from the regression. These regressions also had an explanatory power in the 50-60% range, and in each of these regressions the results were similar: the policy variable was significant as was gender with firm size and SIC as measured by primary SIC was not.

In each example, the policy variable has a positive coefficient of 2-5 which suggests that the log odds ratio increased after the implementation of the policy. This would seem counter intuitive given that the actual proportion of new firms in New Hampshire relative to Massachusetts has increased markedly since the implementation of the policy.

Table 57. Impact of proportions on log-odds ratio

Pi	1-Pi	Pi/(1-Pi)	ln(P/1-Pi)
0.70	0.30	2.33333	0.84730
0.65	0.35	1.85714	0.61904
0.60	0.40	1.50000	0.40547
0.55	0.45	1.22222	0.20067
0.50	0.50	1.00000	0.00000
0.45	0.55	0.81818	-0.20067
0.40	0.60	0.66667	-0.40547
0.35	0.65	0.53846	-0.61904
0.30	0.70	0.42857	-0.84730

In the particular case, the actual proportion of firms formed in Massachusetts versus New Hampshire moves from as high as 70% to as low as 40% and it does this before and after the passage of the Massachusetts Health Reform Law of 2006 respectively. This as well as the potential for variance inflation and thus a failure to reject the null when it is in fact true leads us to seek an alternate approach to assessing the impact.

A further exploration employing two-digit SIC dummy variables and based on the first model ascertained that the policy variable, gender and SIC were all statistically significant, but firm size was not significant.

Table 58. Model 1 with Large Dummy-variable set

	(1)	(2)	(3)	(4)	(5)
	MA	MA	MA	MA	MA
exist	-0.022	-0.03	-0.022	-0.028	-0.035
	-0.07	-0.06	-0.07	-0.05	-0.07
population	0.074	0.117	0.075	0.118	0.115
	(12.32)**	(7.76)**	(12.32)**	(7.78)**	(7.62)**
previous year populaton	-0.076	-0.119	-0.076	-0.12	-0.117
	(12.47)**	(7.80)**	(12.46)**	(7.82)**	(7.67)**
previous year population density	3921337.2	6065536.6	3921549.2	6104350	5981987.5
	(13.41)**	(8.53)**	(13.40)**	(8.54)**	(8.44)**
population density	-3918770	-6064294	-3918984	-6103402	-5981518
	(13.43)**	(8.53)**	(13.42)**	(8.55)**	(8.45)**
endogenous knowledge	0.162	0.232	0.162	0.235	0.239
	(10.27)**	(6.10)**	(10.25)**	(6.09)**	(6.27)**
1 yr lag endogenous knowledge	0.142	0.242	0.142	0.248	0.23
	(7.38)**	(5.81)**	(7.37)**	(5.76)**	(5.64)**
log 1yr lag per capita civ lit	37.345	57.314	37.349	58.344	56.912
	(24.46)**	(9.71)**	(24.45)**	(9.47)**	(9.67)**
log of per capita taxes	-52.328	-82.7	-52.338	-84.495	-82.469
	(20.84)**	(8.97)**	(20.80)**	(8.70)**	(8.94)**
new orgs previous year	-33.787	-32.074	-33.784	-28.757	-26.552
	(3.60)**	-1.63	(3.57)**	-1.4	-1.32
After2005	3.944	8.312	3.944	8.309	8.145
	(4.38)**	(3.67)**	(4.38)**	(3.66)**	(3.15)**
women owned firm		4.958		5.076	5.294
		(4.00)**		(4.04)**	(4.14)**
actualemployeesize					0.00
					0.00
firms with 11 to 19 employees			-0.026	-1.642	
			-0.02	-0.69	
Ag Services	-6.02	-14.02	-6.024	-14.473	-14.219
	(5.53)**	(5.75)**	(5.52)**	(5.67)**	(5.81)**
Printing/Publishing Ind	-8.371	-11.526	-8.374	-11.79	-11.455
	(2.88)**	(2.85)**	(2.88)**	(2.88)**	(2.80)**
fabricated metal mfg	14.536	22.355	14.539	22.807	21.396
	(3.20)**	(2.29)*	(3.19)**	(2.14)*	(2.71)**
local transport, hwy	-5.528	-14.912	-5.528	-15.44	-14.924
	(2.13)*	(3.62)**	(2.13)*	(3.68)**	(3.44)**
wholesale, durable gds	-4.75	-5.558	-4.751	-5.649	-5.4
	(4.27)**	(2.88)**	(4.27)**	(2.94)**	(2.80)**
wholesale, non-durable gds	-9.574	-19.083	-9.578	-19.467	-18.853
	(4.21)**	(4.34)**	(4.21)**	(4.35)**	(4.39)**
homefurniture stores	-7.834	-10.419	-7.837	-10.807	-10.441
	(5.73)**	(4.24)**	(5.72)**	(4.24)**	(4.15)**
misc retail	-2.723	-8.369	-2.726	-8.68	-8.522
	(2.93)**	(4.63)**	(2.93)**	(4.61)**	(4.71)**
real estate	-4.149	-11.034	-4.151	-11.359	-12.904
	(3.14)**	(4.07)**	(3.14)**	(4.11)**	(4.28)**
busn services	-4.444	-8.915	-4.443	-9.062	-9.024
	(4.43)**	(4.18)**	(4.41)**	(4.23)**	(4.21)**
auto repairsrv	-2.695	-7.747	-2.697	-8.127	-7.847
	-1.93	(2.95)**	-1.93	(3.02)**	(2.93)**
amusement recr	-3.841	-6.938	-3.844	-7.152	-7.041
	(2.11)*	-1.25	(2.11)*	-1.25	-1.28
admin human res progrm	5.631	-5.045	5.629	-5.201	-5.031
	(2.14)*	-0.2	(2.14)*	-0.19	-0.23
Constant	183.053	292.706	183.096	299.532	292.19
	(18.39)**	(8.48)**	(18.35)**	(8.22)**	(8.45)**
Observations	108464	44504	108464	44504	40016
Number of infousaid	13558	5563	13558	5563	5002
Absolute value of z statistics in parentheses					
* significant at 5%; ** significant at 1%					
pr 0, 0	38,640	13,176	38,640	13,184	12,600
pr 1, 0	88,520	113,984	88,520	113,976	114,560
pr 0, 1	128	64	128	64	64
pr 1, 1	111,136	111,200	111,136	111,200	111,200
% correct	62.82%	52.17%	62.82%	52.17%	51.92%
% correct MA	179.44%	202.39%	179.44%	202.38%	202.90%
% correct NH	30.49%	10.41%	30.49%	10.42%	9.96%

As with our earlier approach at assessing the impact of the time variable, we employ a random effects model using a backward stepwise regression, only at this juncture we employ our two variables of interest: primarysic, a continuous form, and the large dummy variable set based on 2-digit SIC categories, twodigitsics. In the case of the large dummy variable set, we begin with the base model from the earlier regression where in place of the primary SIC code dummy variables are employed for each of the 81, 2-digit SIC groups and eliminate groups based on significance in a backward stepwise fashion.

The inclusion of primary SIC in the backwards stepwise regression found that by and large sector was not statistically significant, but when expanded to more precisely measure the impact of sector by utilizing the two-digit SIC codes, several sectors were of import including: wholesale trade - durable goods, wholesale trade – nondurable goods, miscellaneous retail, business services, automotive repair services, amusement and recreation services, home furniture stores, real estate, agricultural services, printing and publication and allied industries, local suburban and highway transit, fabricated metal products manufacturers, and government administration human resource programs.

In only two SIC groups, fabricated metal manufacturing and government administrative human resource programs is the coefficient positive. The remaining significant SICs cannot clearly be said to represent largely high value, high wage sectors or low value, low wage sectors. Retail, amusement, recreation services and home furnishing stores are not typically high value-high wage employers, but auto repair, wholesale trade and business services may all require significant levels of trade-skill, education or generate substantial returns commercially. Two sectors tested repeatedly and found to have insignificant coefficients were legal services and health services. Thus, to the extent the legislation was intended to improve the quality of healthcare or the access to healthcare by increasing the availability of services, at this juncture the data does not support this conclusion.

The alternate model tells a different story with regard to industrial sector. While sector is clearly statistically significant regardless of measured as a continuous variable or in sector specific dummy variables, the specific sectors of interest which are significant varies substantially, and the policy variable's significance persists when controlling for sector, owner gender or organization size, and explanatory power remains high except when gender and organization size are considered and this is likely largely due to the nature of the sample which contains this data in the short run – 2006 and 2007.

The sectors which proved significant in this case were heavy construction, home furniture stores, eating and drinking establishments, miscellaneous retail, securities and commodities brokers, insurance agent and broker services, real estate, business services, membership organizations, engineering, accounting and management services, and

unclassified establishments. This later category is a catch-all category and would tend to be very large in the newer datasets. All of the coefficients for the sectors are negative except for heavy construction and eating and drinking places. This may be due to the greater population on the Massachusetts side of the border and greater prevalence of larger communities in both cases. Heavy construction might be considered a high wage sector, but the eating and drinking places is typically a moderate to low wage service business. The other sectors, many of which are high value sectors have negative coefficients suggesting that the log of the odds ratio is decreasing and thus the likelihood of a firm with these characteristics being located in Massachusetts diminishing. The only groups consistent between the two model formats were home furniture stores, miscellaneous retail, real estate, and business services. The explanatory power of this model, including actual employee size is 77% versus 63% for the model which did not use high school performance due to the inability of the estimation routine to reach concavity. When actual employee size is removed from this model, the explanatory power raises from 77% to 93%.

As the subsequent tables will illustrate, gender is statistically significant in all models thus far explored; however, it became insignificant in the model employing educational effectiveness with a large set of dummy variables and when organization size was also considered. When considered in the backward stepwise regression models it was significant both alone and when considered alongside interaction terms for agricultural services, miscellaneous retail and business services. The interaction term for agricultural services was significant at the 95% confidence level and the coefficient negative. The interaction terms for miscellaneous retail and business services however were positive and significant at the 99% level, while all other statistically significant industry specific dummy variables were significant at the 99% level.

When considering gender alone with dummy variables to account for specific SIC categories, gender was highly significant and positive with a coefficient ranging from 4.958 to 5.294, and the statistically significant SIC categories included agricultural services, publishing and printing, fabricated metal manufacturing, local transportation, wholesale goods both durable and non-durable, home furniture stores, miscellaneous retail, real estate, business services, auto repair services, amusement and recreation and administration human resource programs. When interaction terms were introduced gender remained statistically significant, though the absolute magnitude of the coefficients dropped to between 2.342 and 2.825, and amusement and recreation and administrative human resource programs became statistically insignificant.

Explanatory power however ranged between 52-62% with a very strong tendency to predict the organization as having located in Massachusetts when it was not in Massachusetts. In fact, in most cases the regression predicted location in Massachusetts falsely between 70-90% of the time. This result likely stems from an overdependence on population related terms whether population, population density, endogenous knowledge

or litigation measures which as we have already discussed are problematic and likely to overstate the likelihood of an organization being in Massachusetts.

Table 59. Location Controlling for Gender & SIC with Backward Model

	(1) MA	(2) MA	(3) MA	(4) MA	(5) MA
exist	-0.022	-0.03	-0.022	-0.028	-0.035
	-0.07	-0.06	-0.07	-0.05	-0.07
population	0.074	0.117	0.075	0.118	0.115
	(12.32)**	(7.76)**	(12.32)**	(7.78)**	(7.62)**
previous year populaton	-0.076	-0.119	-0.076	-0.12	-0.117
	(12.47)**	(7.80)**	(12.46)**	(7.82)**	(7.67)**
previous year population density	3921337.2	6065536.6	3921549.2	6104350	5981987.5
	(13.41)**	(8.53)**	(13.40)**	(8.54)**	(8.44)**
population density	-3918770.5	-6064294.1	-3918984.2	-6103402.4	-5981517.7
	(13.43)**	(8.53)**	(13.42)**	(8.55)**	(8.45)**
endogenous knowledge	0.162	0.232	0.162	0.235	0.239
	(10.27)**	(6.10)**	(10.25)**	(6.09)**	(6.27)**
1 yr lag endogenous knowledge	0.142	0.242	0.142	0.248	0.23
	(7.38)**	(5.81)**	(7.37)**	(5.76)**	(5.64)**
log 1yr lag per capita civ lit	37.345	57.314	37.349	58.344	56.912
	(24.46)**	(9.71)**	(24.45)**	(9.47)**	(9.67)**
log of per capita taxes	-52.328	-82.7	-52.338	-84.495	-82.469
	(20.84)**	(8.97)**	(20.80)**	(8.70)**	(8.94)**
new orgs previous year	-33.787	-32.074	-33.784	-28.757	-26.552
	(3.60)**	-1.63	(3.57)**	-1.4	-1.32
After2005	3.944	8.312	3.944	8.309	8.145
	(4.38)**	(3.67)**	(4.38)**	(3.66)**	(3.15)**
women owned firm		4.958		5.076	5.294
		(4.00)**		(4.04)**	(4.14)**
actualemployeesize					0.00
					0.00
firms with 11 to 19 employees			-0.026	-1.642	
			-0.02	-0.69	
Ag Services	-6.02	-14.02	-6.024	-14.473	-14.219
	(5.53)**	(5.75)**	(5.52)**	(5.67)**	(5.81)**
Printing/Publishing Ind	-8.371	-11.526	-8.374	-11.79	-11.455
	(2.88)**	(2.85)**	(2.88)**	(2.88)**	(2.80)**
fabricated metal mfg	14.536	22.355	14.539	22.807	21.396
	(3.20)**	(2.29)*	(3.19)**	(2.14)*	(2.71)**
local transport, hwy	-5.528	-14.912	-5.528	-15.44	-14.924
	(2.13)*	(3.62)**	(2.13)*	(3.68)**	(3.44)**
wholesale, durable gds	-4.75	-5.558	-4.751	-5.649	-5.4
	(4.27)**	(2.88)**	(4.27)**	(2.94)**	(2.80)**
wholesale, non-durable gds	-9.574	-19.083	-9.578	-19.467	-18.853
	(4.21)**	(4.34)**	(4.21)**	(4.35)**	(4.39)**
homefurniture stores	-7.834	-10.419	-7.837	-10.807	-10.441
	(5.73)**	(4.24)**	(5.72)**	(4.24)**	(4.15)**
misc retail	-2.723	-8.369	-2.726	-8.68	-8.522
	(2.93)**	(4.63)**	(2.93)**	(4.61)**	(4.71)**
real estate	-4.149	-11.034	-4.151	-11.359	-12.904
	(3.14)**	(4.07)**	(3.14)**	(4.11)**	(4.28)**
busn services	-4.444	-8.915	-4.443	-9.062	-9.024
	(4.43)**	(4.18)**	(4.41)**	(4.23)**	(4.21)**
auto repairsrv	-2.695	-7.747	-2.697	-8.127	-7.847
	-1.93	(2.95)**	-1.93	(3.02)**	(2.93)**
amusement recr	-3.841	-6.938	-3.844	-7.152	-7.041
	(2.11)*	-1.25	(2.11)*	-1.25	-1.28
admin human res progrm	5.631	-5.045	5.629	-5.201	-5.031
	(2.14)*	-0.2	(2.14)*	-0.19	-0.23
Constant	183.053	292.706	183.096	299.532	292.19
	(18.39)**	(8.48)**	(18.35)**	(8.22)**	(8.45)**
Observations	108464	44504	108464	44504	40016
Number of infousaid	13558	5563	13558	5563	5002
Absolute value of z statistics in parentheses					
* significant at 5%; ** significant at 1%					
pr 0, 0	38,640	13,176	38,640	13,184	12,600
pr 1, 0	88,520	113,984	88,520	113,976	114,560
pr 0, 1	128	64	128	64	64
pr 1,1	111,136	111,200	111,136	111,200	111,200
correct prediction	0.6282	0.5217	0.6282	0.5217	0.5192

Table 60. Location Controlling for Gender & SIC with Interactions Backward model

	(1) MA	(2) MA	(3) MA	(4) MA
population	0.107	0.155	0.15	0.155
	(7.91)**	(7.43)**	(7.19)**	(7.43)**
previous year populaton	-0.109	-0.158	-0.153	-0.158
	(7.97)**	(7.46)**	(7.22)**	(7.46)**
previous year population density	5394524.751	7638687.637	7436872.158	7645114.611
	(8.89)**	(7.89)**	(7.76)**	(7.88)**
population density	-5392043.962	-7637694.807	-7436981.899	-7644524.565
	(8.90)**	(7.90)**	(7.77)**	(7.88)**
endogenous knowledge	0.215	0.364	0.367	0.366
	(6.14)**	(5.89)**	(6.06)**	(5.90)**
1 yr lag endogenous knowledge	0.204	0.281	0.263	0.286
	(5.34)**	(5.97)**	(5.49)**	(5.98)**
log 1yr lag per capita civ lit	50.104	75.951	74.392	76.743
	(10.76)**	(8.60)**	(8.57)**	(8.54)**
log of per capita taxes	-73.731	-114.18	-112.265	-115.659
	(9.85)**	(8.47)**	(8.41)**	(8.36)**
new orgs previous year	-53.572	-110.699	-103.167	-106.231
	(2.91)**	(3.96)**	(3.70)**	(3.66)**
After2005	8.065	15.346	14.936	15.225
	(3.91)**	(5.25)**	(4.80)**	(5.23)**
actualemployeesize			-0.005	
			-0.1	
firms with 11 to 19 employees				-1.557
				-0.6
women owned firm	2.825	2.343	2.69	2.342
	(3.10)**	(2.03)*	(2.24)*	(2.03)*
female, ag services		-6.971	-7.437	-6.951
		(2.17)*	(2.29)*	(2.15)*
female, misc. retail		19.461	19.541	19.666
		(4.30)**	(4.35)**	(4.30)**
female business services		20.212	19.618	20.229
		(3.24)**	(3.12)**	(3.23)**
homefurniture stores	-10.176	-19.802	-19.304	-20.133
	(4.55)**	(5.10)**	(5.05)**	(5.08)**
real estate	-10.039	-19.273	-22.137	-19.451
	(3.88)**	(4.68)**	(4.76)**	(4.69)**
Ag Services	-12.793	-21.295	-20.96	-21.703
	(5.76)**	(5.48)**	(5.51)**	(5.43)**
Printing/Publishing Ind	-11.922	-21.119	-20.673	-21.274
	(3.12)**	(4.02)**	(3.95)**	(4.04)**
local transport, hwy	-13.249	-21.09	-20.616	-21.552
	(3.28)**	(2.41)*	(2.33)*	(2.44)*
wholesale, non-durable gds	-18.577	-32.029	-31.23	-32.348
	(4.65)**	(5.00)**	(5.12)**	(5.00)**
auto repairsrv	-7.221	-15.092	-14.514	-15.386
	(2.93)**	(3.18)**	(3.12)**	(3.26)**
busn services	-8.292	-20.974	-20.522	-21.041
	(4.28)**	(5.39)**	(5.39)**	(5.38)**
misc retail	-7.721	-23.426	-23.49	-23.782
	(4.50)**	(5.47)**	(5.56)**	(5.45)**
wholesale, durable gds	-5.884	-11.085	-10.607	-11.217
	(3.25)**	(4.47)**	(4.40)**	(4.48)**
Constant	266.385	420.801	414.166	426.544
	(9.23)**	(8.25)**	(8.17)**	(8.13)**
Observations	44504	44504	40016	44504
Number of infousaid	5563	5563	5002	5563
Absolute value of z statistics in parentheses				
* significant at 5%; ** significant at 1%				
pr 0, 0	13,168	13,184	12,608	13,136
pr 0, 1	72	48	48	48
pr 1, 0	113,992	113,976	114,552	114,024
pr 1, 1	111,192	111,216	111,216	111,216
% correct	0.5216	0.5218	0.5193	0.5216

By contrast, in the alternate model specification, where institutional quality is measured using the previous year performance of high school tenth graders on math achievement tests, gender which was significant at the 95% confidence level when considered alone, becomes insignificant when controlling for organization size and industrial sector either as a continuous or dummy variable form. Proceeding from all the available SIC categories and interaction terms for female-SIC category, a backwards process was employed to ascertain the significant interaction terms. The final model in this case contained dummy variables for heavy construction, home furniture stores, eating and drinking places, securities and commodities brokers, engineering, accounting and management services and non-classified establishments, and statistically significant interaction terms for agricultural services, building materials and hardware, apparel stores, business and educational services organizations. This suggests that gender of the owner/manager is critical for specific industries and that the policy may have adverse affects in this regard. Each model shared significant interaction terms for agricultural services and business services and in each case the signs were consistent thought the magnitudes varied greatly. The population based model's coefficient estimates were between 2X and 7X that of the education based model. Overall, the education based model was 10-20% more effective at predicting correctly the location of a given firm with the percent of correct prediction ranging from 60.2% to 77.2%.

Table 61. Top 10 bivariate random effects regression models

	(45)	(37)	(2)	(32)	(25)	(43)	(44)	(34)	(33)	(3)
	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
exist	0.266	0.093	0.373	0.193	0.195	-0.078	0.116	0.141	0.185	-0.229
	(7.88)**	(2.92)**	(5.31)**	(6.24)**	(6.13)**	(2.62)**	(3.18)**	(2.29)*	(2.82)**	(6.50)**
Constant	-7.459	-6.8	-28.122	-19.995	-6.134	-4.267	-6.895	61.226	11.629	-6.283
	(168.74)**	(148.12)**	(58.62)**	(157.58)**	(132.88)**	(91.05)**	(126.84)**	(141.62)**	(146.09)**	(113.47)**
cummulative prop churches protestant										
% 10th graders scoring Adv in Math+Eng			0.481							0.096
			(52.35)**							(23.21)**
primarysic										
lagged HS Total		0.19	0.226							0.113
		(130.76)**	(21.92)**							(25.72)**
new orgs previous year			-90.418							
			(35.58)**							
population density			17,901.44							
			(49.37)**							
population										
prev year prop churches proptestant										
lagged HS Math	0.393									
	(135.72)**									
% of HS 10th graders scoring ADV in Math							0.412			
							(120.69)**			
lagged HS eng						0.244				
						(82.38)**				
% of HS 10th graders scoring ADV in English										
previous year population density										
new orgs current year										
log of lagged per capita taxes								-9.405		
								(133.09)**		
lagged per capita taxes									-0.014	
									(96.54)**	
log 1yr lag per capita civ lit				4.015						
				(150.37)**						
1yr lag taxes										
previous year populaton										
log of lagged population										
log of population										
1 yr lag endogenous knowledge										
per capita litigation 1 yr lag					0.032					
					(109.50)**					
logged per capita litigation										
per capita litigation										
court dist. pop. 1 yr lag										
court district population										
civil litigation										
log of per capita taxes										
per capita taxes										
Annual Actual Tax Receipts										
endogenous knowledge										
year										
Observations	201248	201248	164856	217688	217688	201248	174528	159320	159320	164856
Number of infousaid	25156	25156	20607	27211	27211	25156	21816	19915	19915	20607
Absolute value of z statistics in parentheses										
* significant at 5%; ** significant at 1%										
pr 0, 0	108,830	107,608	77,920	93,712	93,712	104,770	72,276	57,136	56,064	72,484
pr 1, 0	18,330	19,552	49,240	33,448	33,448	22,390	54,884	70,024	71,096	54,676
pr 0, 1	23,056	29,336	1,066	28,058	28,688	42,296	16,568	1,608	1,608	24,240
pr 1, 1	88,208	81,928	110,198	83,206	82,576	68,968	94,696	109,656	109,656	87,024
correct predicions	82.64%	79.50%	78.90%	74.20%	73.94%	72.87%	70.03%	69.96%	69.51%	66.90%
rank (pred power)	1	2	3	4	5	6	7	8	9	10

Appendix C

Statistical Appendix – Computation of the distance to the state lines

Geocoded results yielded roughly 7,000 unmatched addresses. Recoding with relaxation of spelling rules yielded approx 4,000 unmatched addresses. Hand recoding reduced that number to 3,889 addresses unmatched. Estimation of lat-long for these addresses was accomplished using the average lat-long for business addresses successfully geocoded in the same 5-digit zip code ... essentially a commercially weighted centroid which of course would correspond to largest amount of code-able, relevant zoning.

The distance between these points and the border reference points listed below. These points were manually sampled from a line created using the edit feature of ArcGIS and the intersection tool coupled with a data extract of the county lines for Essex and Middlesex counties (file cntysa1 from the mass.gov towns_polym.zip file, FIDs 11, 26 and 27). This produced an artificial or estimated state line. Using the measurement tool of ArcMAP/ArcView, the total length of this line was determined to be 60.680186 miles. Lat/Long coordinates were obtained for the inflection points along this line using the information tool were "eyeballed" from a view which enabled viewing the entire map. Lat/long coordinates for inflection points along this line were estimated by using the information tool. This yielded a rough error of 0.001% (X) and 0.003% (Y) or 0.08 miles E-W and 0.63 miles N-S. The state line between these inflection points was estimated by interpolation. The inflection points are indicated below with a (**) symbol. Distance to the inflection points was calculated using the equation below.

$$D = \sqrt{\left((X_2 - X_1)^2 - (Y_2 - Y_1)^2\right)}$$

Equation 9. Distance (dmin) formula

Table 62. Latitude and Longitudes for distance to border calculation

Latitude (X)	Longitude (Y)	Latitude (X)	Longitude (Y)	Latitude (X)	Longitude (Y)
-71.806029	42.708621**	-71.50616749	42.70107183	-71.19190725	42.738994
-71.79792463	42.70841697	-71.49806313	42.70086779	-71.181155	42.736897**
-71.78982027	42.70821294	-71.48995876	42.70066376	-71.186494	42.792096**
-71.7817159	42.7080089	-71.4818544	42.70045973	-71.179594	42.798055
-71.77361154	42.70780487	-71.47375003	42.7002557	-71.172694	42.804014
-71.76550717	42.70760084	-71.46564567	42.70005167	-71.165794	42.809973**
-71.75740281	42.70739681	-71.4575413	42.69984763	-71.15452733	42.81407767
-71.74929844	42.70719278	-71.44943694	42.6996436	-71.14326067	42.81818233
-71.74119408	42.70698875	-71.44133257	42.69943957	-71.131994	42.822287**
-71.73308971	42.70678471	-71.43322821	42.69923554	-71.12471756	42.82057567
-71.72498535	42.70658068	-71.42512384	42.69903151	-71.11744111	42.81886433
-71.71688098	42.70637665	-71.41701948	42.69882748	-71.11016467	42.817153
-71.70877662	42.70617262	-71.40891511	42.69862344	-71.10288822	42.81544167
-71.70067225	42.70596859	-71.40081075	42.69841941	-71.09561178	42.81373033
-71.69256789	42.70576456	-71.39270638	42.69821538	-71.08833533	42.812019
-71.68446352	42.70556052	-71.38460202	42.69801135	-71.08105889	42.81030767
-71.67635916	42.70535649	-71.37649765	42.69780732	-71.07378244	42.80859633
-71.66825479	42.70515246	-71.36839329	42.69760329	-71.066506	42.806885**
-71.66015043	42.70494843	-71.36028892	42.69739925	-71.0560465	42.8282285
-71.65204606	42.7047444	-71.35218456	42.69719522	-71.045587	42.849572**
-71.6439417	42.70454037	-71.34408019	42.69699119	-71.0389835	42.855064
-71.63583733	42.70433633	-71.33597583	42.69678716	-71.03238	42.860556**
-71.62773297	42.7041323	-71.32787146	42.69658313	-71.02393275	42.86155413
-71.6196286	42.70392827	-71.3197671	42.6963791	-71.0154855	42.86255225
-71.61152424	42.70372424	-71.31166273	42.69617506	-71.00703825	42.86355038
-71.60341987	42.70352021	-71.30355837	42.69597103	-70.998591	42.8645485
-71.59531551	42.70331617	-71.295454	42.695767**	-70.99014375	42.86554663
-71.58721114	42.70311214	-71.28606333	42.70632633	-70.9816965	42.86654475
-71.57910678	42.70290811	-71.27667267	42.71688567	-70.97324925	42.86754288
-71.57100241	42.70270408	-71.267282	42.727445**	-70.964802	42.868541**
-71.56289805	42.70250005	-71.26102233	42.73295033	-70.95631875	42.87332925
-71.55479368	42.70229602	-71.25476267	42.73845567	-70.9478355	42.8781175
-71.54668932	42.70209198	-71.248503	42.743961**	-70.93935225	42.88290575
-71.53858495	42.70188795	-71.2363335	42.744623	-70.930869	42.887694**
-71.53048059	42.70168392	-71.224164	42.745285**	-70.923374	42.886736
-71.52237622	42.70147989	-71.21341175	42.743188	-70.915879	42.885778
-71.51427186	42.70127586	-71.2026595	42.741091	-70.908384	42.88482

Appendix D

VITA

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Consultant, World Bank, Global Entrepreneurship, 1998-1999

Technological Diffusion in Mexico, 2000-2002

Science, Technology & Economic Policy (STEP) Board of the National Research Council at the National Academy of Sciences, 1998-present

Consultant, EIM Research Institute for Small- and Medium-Sized Firm Research, Zoetermeer, The Netherlands, 1997-present

Consultant, Dutch Ministry of Economic Affairs, 1997-1998

Consultant, DRI/McGraw-Hill, London, 1996

Consultant, QMS Manufacturing, Paris, 1989

Consultant, European Parliament, 1995-1998

Consultant, United Nations, Division on Transnational Corporations, 1994-1995

Consultant, OECD, Industrial Restructuring and Government Policy in Czechoslovakia and Poland, 1991-1992

Consultant, Commission of the European Communities, Directorate General for Economic and Financial Affairs, Program on Services in the European Internal Market, 1990-1991

Consultant, OECD, Task Force on Industrial Policy towards Small Enterprises in Europe, 1990-1991

Consultant, Dutch Ministry of Economic Affairs, Directorate of Technology Policy, The Hague, Netherlands, 1989

Consultant, United States Federal Trade Commission, Washington, D.C., 1986-1989

Consultant, Office of Economics, United States International Trade Commission, Washington, D.C., Summer 1984

Consultant, Vermont Bar Association, 1982-1983

Board Memberships and Offices Held:

Board of Directors, *CARTHA*, 2006-present

Board Member, Deutsche Telekomstiftung (Foundation), 2006-present

International Board, Observatory for Small Business Economics at the Directorate General, Central Government in Madrid, Spain, 2005 – present

The Atlantic Council of the United States, 2004

Member of the Scientific Committee of the Hellenic Workshop on Productivity & Efficiency Measurement, 2003 and 2006

Auditor, International Joseph S. Schumpeter Society, 2002 – present

International Reference Group, Swedish Foundation for Small Business Research, 2001-present

Scientific Council, Hamburgisches Welt-Wirtschafts-Archiv (HWWA, Hamburg Institute of International Economics), 1999-2005

Scientific Council, Zentrum fuer Europaeisch Wirtschaftsforschung (ZEW, Centre for Economic Research), Mannheim, Germany, 1999-present

Vice-President, International Joseph S. Schumpeter Society, 1998-2000

Chairman of the 1998 Joseph S. Schumpeter Prize Committee ($10,000) for the International Joseph S. Schumpeter Committee

Member of the 1996 Joseph S. Schumpeter Prize Committee ($10,000) for the International Joseph S. Schumpter Committee

Academic Council, American Institute for Contemporary German Studies, Johns Hopkins University, 1996-2002.

Member of the Program Committee of the Annual Meetings of the European Association for Research in Industrial Economics (EARIE), 1994, 1995, 1997, 1998, 2000 and 2002

Member of the Program Committee of the Bi-Annual Meetings of the International Economics Association, Tunesia, 1995

Congressional Testimony:

"R&D and Small Firms" before the sub-committee on Monopolies and Commercial Law, Committee on the Judiciary, U.S. House of Representatives, February 24, 1988

Editorial Services:

- Editor: *International Entrepreneurship and Management Journal*, Springer, 2004 - present

International Journal of Entrepreneurship Education, Senate Hall Publishers, 2001-present

Small Business Economics: An International Journal, Springer Publishers, 1989-present

Springer Series on American and European Economic and Political Studies, Series Editor (with Jackson Janes and Paul J.J. Welfens), Springer Publishers, 2001-present

Series on Entrepreneurship Studies (with Zoltan Acs), Kluwer Publishers, 2002-present

International Handbook of Entrepreneurship Series (with Zoltan Acs), Springer, 1998-present

The International Library of Entrepreneurship, Series Editor, Edward Elgar Publishing Limited, 2003

Associate Editor: *The Annals of Regional Science*, 2005-present

Journal of Policy Analysis and Management, 2003- present

International Journal of Industrial Organization, North Holland, 1994-present

International Journal of Biotechnology, 1998-present

International Journal of Technology Transfer and Commercialisation, Interscience Enterprises Limited, 2000-present

Regional Studies 2001-2009

- Editorial Board: Editorial Advisory Board *Regional Studies*, 2006-2009

Editorial Board Member, *ICFAI Journal of Industrial Economics* (IJIE)

Editorial Advisory Board, *Strategic Entrepreneurship Journal (SEJ)*

International Economics and Economic Policy, 2003 – present

International Entrepreneurship and Management Journal (IEMJ), 2004-present

l'Industria Rivista di economia e politica industriale, Scientific Committee, 2004 – present

International Economics and Economic Policy, 2003-present

- Referee: *American Economic Review, Bulletin of Economic Research, Business History Review, Eastern Economic Journal, Economic Development Quarterly, Economic Journal, Economics of Information and New Technology, European Journal of Political Economy, European Economic Review, Growth and Change: A Journal of Urban and Regional Policy, International Journal of Industrial Organization, International Management, International Small Business Journal, Journal of Economic Behavior and Organization, Journal of Evolutionary Economics, Journal of Financial Economics, Journal of Industrial Economics, Journal of Industry Studies, Journal of Institutional and Theoretical Economics, Journal of Political Economy, Labor Economics, Management Science, Rand Journal, Research Policy, Review of Economics and Statistics, Review of Industrial Organization, Strategic Management, Zeitschrift für die gesamte Staatswissenschaft, Zeitschrift für Betriebswirtschaft*

Anglo-German Foundation, Bundesministerium für Forschung und Technologie, Blackwells, Canadian Social Science Research Council, Harvester-Wheatsheaf, Kluwer Academic, MIT Press, National Academy of Sciences, National Academy of Sciences, National Science Foundation, New York, South Carolina, University Press, MacMillan, Oxford University Press, The

Leverhulme Trust, University of Michigan Press, Edward Elgar, Volkswagen Stiftung (Foundation)

Honors/Awards Received:

Alumni Achievement in the Arts Award, Drew University, 2006

International Award for Entrepreneurship and Small Business Research (with Z. Acs), 2001, ($50,000) by the Swedish Foundation for Small Business Research

Who's Who in Social Sciences Higher Education, 2004

Award of Excellence, 44th World Conference of International Council of Small Business, Naples, 1999 for the paper "Entrepreneurship and unemployment in the knowledge economy".

University of Chicago Fellowship for Applied Economics Research, Summer 1984

University of Wisconsin Outstanding Teaching Assistant Award ($500), 1980

Department Nominee for University of Wisconsin Outstanding Teaching Assistant Award, 1979 and 1980

Recent Grants and Contracts Received:

"Entrepreneurship and Economic Growth" The Ewing Marion Kauffman Foundation, 2006-2007, Principle Investigator ($75,131)

Title VI Foreign Language and Area Studies (FLAS) U.S. Department of Education for the Institute for West European Studies 2003-2006, Principle Investigator ($447,000.00)

Title VI National Resource Center Grant U.S. Department of Education for the Institute for West European Studies 2003-2006, Principle Investigator ($697,000.00)

Advanced Technology Program, U.S. Department of Commerce, "The Impact of Public Policy on University Entrepreneurship," 2004-2006, Principle Investigator ($99,000)

National Science Foundation Grant April 15, 2001 – March 31, 2004, “Can Europe Create a New Economy?”, Principle Investigator ($22,500.00)

National Academy of Sciences, National Research Council, “Can the Small Business Innovation Research Program (SBIR) Impact Career Trajectories?,” 1998-1999, Principle Investigator ($5,000)

National Academy of Sciences, National Research Council, “Evaluating the Proposed NASA Ames Research Park,” 1999-2000, Principle Investigator ($5,000)

Professional Associations:

American Public Affairs and Management (APAM)

American Economic Association

European Association for Research in Industrial Economics (EARIE)

European Economic Association

Industrial Organization Society

International Joseph Schumpeter Society

Selected Popular Media Coverage:

“States step up push to lure innovators and investors,” *Christian Science Monitor*, February 26, 2007.

"Study: Commercialized University Research is Undervalued,*” Kansas City Business Journal*, April 10, 2006.

“U.S. Research Funds Often Lead to Start-Ups, Study Says,” Steve Lohr, *The New York Times,* April 10, 2006

“Many University Researchers Receiving Federal Funding Start Their Own Businesses,” *Kaisernetwork.org*, April 10, 2006.

“Study: U.S. Funds for Research Often Lead to Startups,” *Indianapolis Star*, April, 10, 2006.

"US Public Research Funds Often Lead to Start-ups, Study Says," Finfacts Team, *Finfacts.com*, April 11, 2006.

"Bits&Bytes: Study shows federal funding for scientists paid off," Corilyn Shropshire, *Pittsburgh Post-Gazette*, April 15, 2006.

"US Cancer Funding Creates business as well as Science," *Nature*, April 20, 2006.

"Measuring University Startups," *Red Herring*, May 15, 2006.

"Hemmnis Bürokratie," *Stuttgarter Zeitung*, June 23, 2006.

"Top 25 der deutschen VWL-Professoren", *Handelsblatt*, September 18, 2006.

"Geschäftsideen aus dem Labor," *Max Planck Forschung Magazin*, 2nd Quarter, 2006

"Making the Switch from Science to Business, "*Nature Magazine*, May 30, 2003

"How Germany Can Create Jobs," *Wall Street Journal*, January 12, 1999.

Authored Books:

The Entrepreneurial Society, Oxford University Press, July 2007.

Entrepreneurship and Economic Growth (with Max Keilbach and Erik Lehmann), Oxford University Press, 2006.

The New Economy and Economic Growth in Europe and the US (with Paul J.J. Welfens), Springer Publishers, 2002

Globalization, Economic Growth and Innovation Dynamics (with P. Welfens, J. Addison and H. Grupp), Springer Publishers, 1999.

Technological Competition, Employment and Innovation Policy in OECD Countries (with P. Welfens, J. Addison and H.Grupp), Springer Publishers, 1998.

Innovation and Industry Evolution, MIT Press, 1995.

Innovation durch kleine Unternehmen (with Zoltan J. Acs), edition sigma, 1992.

Innovation and Small Firms (with Zoltan J. Acs), MIT Press, 1990.

The Market and the State: Government Policy Towards Business in Europe, Japan, and the U.S., New York University Press, 1989.

The Effectiveness of Antitrust Policy Towards Horizontal Mergers, UMI Research Press, 1983.

Edited Books:

Handbook of Research on Entrepreneurship Policy (with Isabel Grilo and A. Roy Thurik), Edward Elgar Publishing, 2007.

Entrepreneurship, Innovation and Economic Growth, Edward Elgar Publishing, 2006.

Local Heroes in the Global Village: Globalization and New Entrepreneurship Policies (with Heike Grimm and Charles Wessner), New York: Springer Publishers, 2005.

The Role of Labour Mobility and Informal Networks for Knowledge Transfer (with Dirk Fornahl and Christian Zellner), New York: Springer Publishers, 2004.

SMEs in the Age of Globalization, Edward Elgar Publishing, 2003.

Handbook of Entrepreneurship Research, (edited with Z. Acs), Kluwer Academic Publishers, 2003.

Entrepreneurship: Determinants and Policy in a European-U.S. Comparison, (edited with Roy Thurik, Ingrid Verheul, and Sander Wennekers, Kluwer Academic Publishers, 2002.

Globalization and Regionalization: Challenges for Public Policy (edited with Charles Bonser), Kluwer Academic Publishers, 2002.

The Economics of Science and Innovation, Volumes I and II, (edited with P. Stephan), Edward Elgar Publishing, 2000.

Innovation, Industry Evolution and Economic Development, Volumes I and II, (edited with S. Klepper), Edward Elgar Publishing, 2000.

Innovation, Industry Evolution and Employment (edited with R. Thurik), Cambridge University Press, 1999.

Industrial Policy and International Competitiveness, Volumes I, II, and III, Edward Elgar Publishing, 1998.

Small Firms and Entrepreneurship: An East-West Perspective (with Z. Acs), Cambridge University Press, 1993.

Empirical Studies in Industrial Organization: Essays in Honor of Leonard W. Weiss (with John J. Siegfried), Kluwer Academic Publishers, 1992.

Structure, Conduct, and Performance: Leonard Weiss (with H.Yamawaki), New York University Press, 1991.

Innovation and Technological Change: An International Comparison (with J. Acs), University of Michigan Press, 1991.

The Economics of Small Firms: A European Challenge (with Z.J. Acs), Kluwer Academic, 1990

The Internationalization of U.S. Markets (with M. Claudon), New York University Press, 1989.

The Convergence of International and Domestic Markets and Policy Responses in Europe, Japan, and the U.S. (co-edited with L. Sleuwaegen and H. Yamawaki), North-Holland, 1989.

The Multinational Corporation in the 1980s (co-edited with Charles P. Kindleberger), MIT Press, 1983.

Refereed Journal Articles:
- Selected Articles -

"New Venture Growth: A Review and Extension," with Brett Gilbert and Patricia McDougall, *Journal of Management*, Vol. 32, No. 6, December 2006, 926-950.

"Innovation in Cities: Science-Based Diversity, Specialization and Localized Monopoly," with Maryann P. Feldman, *European Economic Review*, Vol. 43, 1999, 409-429.

"Company-Scientist Locational Links: The Case of Biotechnology," with Paula E. Stephan, *American Economic Review*, Vol. 86, No. 3, June 1996, 641-652.

"R&D Spillovers and the Geography of Innovation and Production," with Maryann P. Feldman, *American Economic Review*, Vol. 86, No. 3, June 1996, 630-640.

"New-Firm Survival: New Results Using a Hazard Function," with Talat Mahmood, *Review of Economics and Statistics*, Vol. 77, No. 1, March 1995, 97-103.

"R&D Spillovers and Recipient Firm Size," with Zoltan J. Acs and Maryann P. Feldman, *Review of Economics and Statistics*, Vol. 76, No. 2, May 1994, 336-340.

"Real Effects of University Research: Comment," with Zoltan J. Acs and Maryann P. Feldman, *American Economic Review*, Vol. 82, No. 1, March 1992, 363-367.

"New-Firm Survival and the Technological Regime," *Review of Economics and Statistics*, Vol. 73, No. 3, August 1991, 441-450.

"Small-Firm Entry in U.S. Manufacturing," with Zoltan J. Acs, *Economica*, Vol. 56, No. 2, May 1989, 255-266.

"R&D Rivalry, Industrial Policy, and U.S.-Japanese Trade," with Hideki Yamawaki, *Review of Economics and Statistics*, Vol. 70, No. 3, August 1988, 438-447.

"Innovation in Large and Small Firms: An Empirical Analysis," with Zoltan J. Acs, *American Economic Review*, Vol. 78, No. 4, September 1988, 678-690.

"Import Share Under International Oligopoly with Differentiated Products: Japanese Imports in U.S. Manufacturing," with Hideki Yamawaki, *Review of Economics and Statistics*, Vol. 70, No. 4, November 1988, 569-579.

"Innovation, Market Share, and Firm Size," with Zoltan J. Acs, *Review of Economics and Statistics*, Vol. 69, No. 4, November 1987, 567-575.

- Other Articles –

"The Theory of Knowledge Spillover Entrepreneurship," with Max Keilback, *Journal of Management Studies*, forthcoming 2007.

"Clusters, Knowledge Spillovers and New Venture Performance: An Empirical Examination," *Journal of Business Venturing*, forthcoming 2007.

"Biotechnology in hostile financing environments – an organizational evolution perspective," *Journal of Organizational Change Management*, forthcoming 2007.

"Location: A Neglected Determinant of Firm Growth," with Dirk Dohse, *Review of World Economics*, Vol. 143, No. 1, April 2007, 79-107.

"Entrepreneurship capital and economic growth," *Oxford Review of Economic Policy*, Vol. 23, 2007, 63-78.

"La politica industrial actual: coneixement i innovació empresarial," with Maria Callejon, *Revista Econòmica de Catalunya*, No. 54, September 2006, 56-71.

"Industrial Organization and the Organization of Industries: An American Perspective," with William L. Baldwin, *Revue de L'OFCE (Observations et diagnostics e'conomiques)*, June 2006, 87-112.

"Can Institutional Change Impact High-Technology Firm Growth?: Evidence from Germany's Neuer Markt," with Julie Ann Elston, *Journal of Productivity Analysis*, Vol. 25, Nos. 1-2, April 2006, 9-23.

"L'émergence de l'économie entrepreneuriale," *Reflets Perspectives de la vie économique*, Vol. 65, No. 1, 2006, 43-70.

"On the Development and Use of Theory," with G.J. Castrogiovanni, D.R. Soriano and S.R. Dobón, *International Entrepreneurship and Management Journal*, Vol. 2, No. 1. 2006, 5-8.

"Entrepreneurial Access and Absorption of Knowledge Spillovers: Strategic Board and Managerial Composition for Competitive Advantage, with Erick E. Lehmann, *Journal of Small Business Management*, Vol. 44, No. 2, 2006, 155-166.

"Empirical Evidence on Knowledge Flows from Research Collaborations: Introduction to the Special Issue," with Al Link, *Economics of Innovation and New Technology*, Vol. 15, No. 1, 2006, 1-3.

"Do Locational Spillovers Pay? Empirical Evidence from German IPO Data," with Erik E. Lehmann, *Economics of Innovation and New Technology*, Vol. 15, No. 1, 2006, 71-81.

"A Model of the Entrepreneurial Economy," with A. Roy Thurik, *International Journal of Entrepreneurship Education*, Vol. 2, No. 2, 2005, 143-166

"The Effects of Experience, Ownership, and Knowledge on IPO Survival: Empirical Evidence from Germany," with Erik E. Lehmann, *Review of Accounting and Finance*, Vol. 4, No. 4, 2005, 13-33.

"University spillovers and new firm location," with Erik E. Lehmann and Susanne Warning, *Research Policy*, Vol. 34, No. 7, 2005, 1113-1122.

"Does the Knowledge Spillover Theory of Entrepreneurship hold for regions?", with Erik E. Lehmann, *Research Policy*, Vol. 34, No. 8, 2005, 1191-1202.

"Do Knowledge Conditions Make a Difference? Investment, Finance and Ownership in German Industries," with Jürgen Weigand, *Research Policy*, Vol. 34, No 5, 2005, 595-613.

"Linking Entrepreneurship and Management," with Gary J. Castrogiovanni and Domingo Ribeiro, *International Entrepreneurship and Management Journal*, Vol. 1, No. 1, 2005, 5-7.

"Do University Policies Make a Difference?" with Erik E. Lehmann, *Research Policy*, Vol. 34, 2005, 343-347.

"Entrepreneurship Capital and Regional Growth," with Max Keilbach, *Annals of Regional Science*, Vol. 39, No. 3, September 2005, 457-469.

"Mansfield's Missing Link: The Impact of Knowledge Spillovers on Firm Growth," (with Erik Lehmann) *Journal of Technology Transfer*, Vol. 30, 2005, 207-210.

"Does Entrepreneurship Capital Matter?" with Max Keilbach, *Entrepreneurship Theory and Practice*, Vol. 28, No. 5, September 2004, pp. 419-430.

"Entrepreneurship Capital and Economic Performance," with Max Keilbach, *Regional Studies*, Vol. 38, No.8, November 2004, pp. 949-959.

"Entrepreneurship and Regional Growth: An Evolutionary Perspective," with Max Keilbach, Journal of Evolutionary Economics, Vol. 14, No.5, December 2004, pp. 605–616.

"Debt or Equity: The Role of Venture Capital in Financing High-Tech Firms in Germany," with Erik E. Lehmann, *Schmalenbach Business Review*, Vol. 56, 2004, 340-357.

"Economic integration, innovation dynamics and growth," with Lucas Bretschger and Paul J.J. Welfens, *International Economics and Economic Policy*, Vol. 1, No. 2-3, 2004, 111-117.

"Sustaining Innovation and Growth: Public Policy Support for Entrepreneurship," *Industry and Innovation*, Vol. 11, No. 3, 2004, 167-191.

"University Spillovers: Does the Kind of Science Matter?" with Erik E. Lehmann and Susanne Warning, *Industry and Innovation*, Vol. 11, No. 3, 2004, 193-205.

"Gibrat's Law: are the services different?," with L. Klomp and E. Santarelli, *Review of Industrial Organization*, Vol. 24, No. 3, 2004, 301-324.

"Industry Evolution: Diversity, Selection and the Role of Learning," with Patrick Houweling, and A. Roy Thurik, *International Small Business Journal*, Vol. 22, No. 4, 2004, 331-348.

"Option Programmes for Top Managers and Scandals on the Stock Exchange," with Erik Lehmann, *ZEW Stock Option Watch*, Special Supplement, 2004, 4-6.

"Euroopan yhdentyminen ja yrittäjyystalouden esiinnousu," *Talous Yhteiskunta*, Vol. 32, No. 4, 2004, 30-34.

"The Indiana University Advanced Research and Technology Institute: A Case Study," with Scott Jackson, *Journal of Technology Transfer*, Vol. 29, No. 2, 2004, 119-124.

"The Emergence of Entrepreneurship Policy," with Brett Anitra Gilbert and Patricia P. McDougall, *Small Business Economics*, Vol.22, Nos. 3-4, 2004, 313-323.

"Economic Integration, Innovation Dynamics and Growth," with Lucas Bretschger and Paul J.J. Welfens, *International Economics and Economic Policy*, Vol. 1, Nos. 2-3, 111-117.

"Entrepreneurship and Regional Growth: An Evolutionary Interpretation," with Max Keilbach, *Journal of Evolutionary Economics*, Vol. 14, 2004, 605-616.

"Universitäten als regionale Förderer der Wirtschaft?," with Erik E. Lehmann, *ifo Dresden*, Vol. 11, No. 3, 2004, 18-23.

"Entrepreneurship Policy in Comparative-Historical Perspectives," with Heike Grimm and Charles Wessner (eds.), *Local Heroes in the Global Village*, New York: Springer Publishers. 2005, 3-19.

"Entrepreneurship Capital and Economic Growth," with Max Keilbach, *Entrepreneurship Research Series*, Research Series: 2005, 2003.

"Small-Firm Strategic Research Partnerships: The Case of Biotechnology," *Technology Analysis & Strategic Management*, Vol. 15, No. 2, 2003, 273-288.

"Innovation and Spatial Externalities," *International Regional Science Review*, Vol. 26, No. 2, 2003, 167-174.

"Linking Entrepreneurship to Growth: The Case of West Germany," with Michael Fritsch, *Industry and Innovation*, Vol. 10, No. 1, 2003, 65-73.

"Standing on the Shoulders of Midgets: The U.S. Small Business Innovation Research Program (SBIR)," *Small Business Economics*, Vol. 20, No. 2, March 2003, 129-135.

"Introducing the International Journal of Entrepreneurship Education: IJEE," with Andrew Burke, Marilyn L. Kourilsky, *International Journal of Entrepreneurship Education*, Vol.1, No. 1. 3-4, 2002-03.

"Der Wandel von traditioneller Mittelstandspolitik zu – Entrepreneurship Policy – ein Blick auf Deutschland und die USA," with Anja Kettner, *Politische Studien*, Issue 384, 2002.

"The Dynamic Role of Small Firms: Evidence from the U.S.," *Small Business Economics*, Vol. 18, Nos. 1-3, February-May 2002, 13-40.

"Impeded Industrial Restructuring: The Growth Penalty," with Martin A. Carree, Adriaan J. van Stel and A. Roy Thurik, *Kyklos: International Review for Social Sciences*, Vol. 55, No. 1, 2002, 81-98.

"Growth Regimes over Time and Space," with Michael Fritsch, *Regional Studies*, Vol. 36, No. 2, 2002, 113-124.

"Public/Private Technology Partnerships: Evaluating SBIR-Supported Research," with Albert N. Link and John T. Scott, *Research Policy*, Vol. 31, No. 1, January 2002, 145-158.

"The Innovative Advantage of US Cities," *European Planning Studies*, Vol. 10, No. 2, March 2002, 165-176.

"The Economics of Science and Technology," with Barry Bozeman, Kathryn L. Combs, Maryann Feldman, Albert N. Link, Donald Siegel, Paula Stephan, Gregory Tassey, and Charles Wessner, *Journal of Technology Transfer*, Vol. 27, 2002, 155-203.

"The Impact of the SBIR on Creating Entrepreneurial Behavior," with Juergen Weigand and Claudia Weigand, *Economic Development Quarterly*, Vol. 16, No. 1, February 2002, 32-38.

"Does Firm Size Matter? Evidence on the Impact of Liquidity Constraints on Firm Investment Behavior in Germany," with Julie Ann Elston, *International Journal of Industrial Organization*, Vol. 20, No. 1, January 2002, 1-138.

"The Role of Small Firms in U.S. Biotechnology Clusters," *Small Business Economics*, Vol. 17, Nos. 1-2, August-September 2001, 3-15.

"Knowledge in the New Economy," *Wirtschaftspolitische Blatter*, Vol. 48, No. 2, 2001, 140-148.

"Competition Policy in Dynamic Markets," with William Baumol and Andrew Burke, *International Journal of Industrial Organization*, Vol. 19, No. 5, April 2001, 613-634.

"Research Issues Relating to Structure, Competition and Performance of Small Technology-Based Firms," *Small Business Economics*, Vol. 16, No. 1, February 2001, 37-51

"Does Entry Size Matter? The Impact of the Life Cycle and Technology on Firm Survival," with R. Agarwal, *Journal of Industrial Economics*, March 2001, Vol. 49, No.1, 21-43.

"What's New about the New Economy? Sources of Growth in the Managed and Entrepreneurial Economies," with Roy Thurik, *Industrial and Corporate Change*, Vol. 10, No. 1, 2001, pp. 267-315.

"Market Dynamics in the Netherlands: Competition Policy and the Role of Small Firms," with Geoge van Leeuwen, Bert Menkveld, and Roy Thurik," *International Journal of Industrial Organization*, Vol. 19, No. 5, 795-822.

"Small Business Problems: The Policy Response in the U.S." Wirtschaftspolitische Blaetter, *Vol. 47, No. 3, 2000, 276-281.*

"Firm Survival in the Netherlands," with Roy Thurik, the *Review of Industrial Organization*, Vol. 16, 2000, pp. 1-11.

"Innovative Clusters and the Strategic Management of Places," *Wirtschaftspolitische Blaetter*, Vol. 47, No. 2, 2000, 155-164.

"Start-Up Size and Industrial Dynamics: Some Evidence from Italian Manufacturing," with Enrico Santarelli and Marco Vivarelli, *International Journal of Industrial Organization*, Vol. 17, No. 7, 1999, 965-984.

"The Industry Component of Regional New Firm Formation Processes," with Michael Fritsch, *Review of Industrial Organization*, Vol. 15, 1999, 239-252.

"La nuova organizzazione industriale. Dalla economia gestita all'economia imprenditoriale, " with A. Roy Thurik, *l'Industria Rivista di economia e politica industriale*, 1999, Nuova serie, Anno XX, n. 4, 637-656.

"The Biology of Firms and Evolution of Industries," *Tijschrift voor Economie en Management*, Vol. 64, No. 3, 1999.

"Capitalism and Democracy in the 21st Century: From the Managed to the Entrepreneurial Economy," with A.R. Thurik, *Journal of Evolutionary Economics*, Vol. 10, No. 1-2, 2000, 17-34.

"Is the German Economic Model Still Viable?" *Wirtschaftspolitische Blaetter*, 1999, Vol. 46, No. 3, 276-285.

"Do Small Firms Compete with Large Firms?" with Yvonne M. Price and A. Roy Thurik *Atlantic Economic Journal*, 1999, Vol. 27, No. 2, 201-209.

"Knowledge Spillovers in Biotechnology: Sources and Incentives," with Paula E. Stephan, *Journal of Evolutionary Economics*, 1999, Vol. 9, 97-107.

"The Two Views of Small Firms in Industry Dynamics: A Reconciliation," with Rajshree Agarwal, *Economics Letters*, 1999, Vol. 62, 245-251.

"Agglomeration and the Location of Innovative Activity," *Oxford Review of Economic Policy*, 1998, Vol. 14, No. 2, 18-29.

"The Link between the Entry Decision and Post-Entry Performance: Evidence from Italy," *Industrial and Corporate Change*, 1998, Vol. 7, No. 3, 485-500.

"Technological Regimes, Industrial Demography and the Evolution of Industrial Structures," *Industrial and Corporate Change*, 1997, Vol. 6, No. 1, 49-82.

"Financing the German *Mittelstand*," with Julie Elston, *Small Business Economics*, 1997, Vol. 9, No. 2, April, 97-110.

"The Decision between Internal and External R&D," with Bert Menkveld and A. Roy Thurik, *Journal of Institutional and Theoretical Economics*, Vol. 152, No. 3, Sept. 1996, 519-530.

"The Dynamics of Industrial Organization," with A. Roy Thurik, *Review of Industrial Organization*, Vol. 11, No. 2, April 1996, 149-153.

"Innovative Clusters and the Industry Life Cycle," with Maryann P. Feldman, *Review of Industrial Organization*, Vol. 11, No. 2, April 1996, 253-273.

"Determinants of New-Firm Startups in Italy, with Marco Vivarelli," *Empirica*, Vol. 23, No. 2, 1996, 91-105.

"Firm Size and R&D Spillovers: Evidence from Italy," *Small Business Economics*, Vol. 8, No. 3, June 1996, 249-258.

"Firm Profitability, Growth, and Innovation," *Review of Industrial Organization*, Vol. 10, No. 5, 1995, 579-588.

"The Propensity to Exit and Innovation," *Review of Industrial Organization*, Vol. 10, No. 5, 1995, 589-605.

"New-Firm Formation in Italy: A First Report," with Marco Vivarelli, *Economics Letters*, Vol. 48, No. 1, 1995, 77-81.

"Innovation, Growth and Survival," *International Journal of Industrial Organization*, Vol. 14, No. 4, 1995, 441-457.

"The Post-Entry Performance of Firms," with José Mata, *International Journal of Industrial Organization*, Vol. 14, No. 4, 1995, 413-419.

"Le financement de la Mittelstand allemande," with Julie Elston, *Revue Internationale P.M.E.*, Vol. 8, Nos. 3-4, 1995, 121-147.

"Los desafios de la competitividad y de la productividad en Europa," *Economia Industrial*, No. 305, 1995, 87-102.

"On the Measurement of Entry Rates: Reply," with Michael Fritsch, *Empirica*, Vol. 22, No. 2, 1995.

"Leonard W. Weiss and Industrial Organization," with John J. Siegfried, *Review of Industrial Organization*, Vol. 10, No.2, 1995, 121-125.

"Firm Selection and Industry Evolution: The Post-Entry Performance of New Firms," with Talat Mahmood, *Journal of Evolutionary Economics*, Vol. 4, No. 3, 1994, 243-260.

"Small Firms and R&D Spillovers: Evidence from Italy," with Marco Vivarelli, *Revue d'Economie Industrielle*, Vol. 67, No. 1, 1994, 225-237.

"The Geography of Firm Births in Germany," with Michael Fritsch, *Regional Science*, Vol. 28, No. 4, 1994, 359-365.

"Flexible Technology and Plant Size," with Bo Carlsson and Zoltan J. Acs, *International Journal of Industrial Organization*, Vol. 12, No. 4, 1994, 359-372.

"Small Business in Industrial Economics," *Revue d'Economie Industrielle*, Vol. 67, No. 1, 1994, 21-39.

"On the Measurement of Entry Rates," with Michael Fritsch, *Empirica*, Vol. 21, No. 2, 1994, 105-113.

"The Rate of Hazard Confronting New Firms and Plants in U.S. Manufacturing," with Talat Mahmood, *Review of Industrial Organization*, Vol. 9, No. 1, 1994, 41-56.

"R&D Spillovers and Innovative Activity," with Zoltan J. Acs and Maryann P. Feldman, *Managerial and Decision Economics*, Vol. 15, No. 2, March-April 1994, 131-138.

"Firm Survival and the Decision to Exit," *Journal of Business Economics*, Vol. 1, No. 1, 1994, 125-137.

"New-Firm Startups, Technology, and Macroeconomic Fluctuations," with Zoltan J. Acs, *Small Business Economics*, Vol. 6, No. 6, 1994, 439-449.

"A Reconciliation of the Unemployment-New Firm Startup Paradox," with Jim Jin, *Small Business Economics*, Vol. 6, No. 5, 1994, 381-386.

"Institutional Economics of Public Firms and Administrations: A Comment," *Journal of Institutional and Theoretical Economics*, Vol. 150, No. 1, March 1994.

"Entry, Growth, and Survival: The New Learning on Firm Selection and Industry Evolution," with Talat Mahmood, *Empirica*, Vol. 20, No. 1, 1993, 25-33.

"Innovation and Firm Size: The New Learning," with Zoltan J. Acs, *International Journal of Technology Management*, Vol. 8, No. 5/6, 1993.

"Privatization Plans of Eastern European States: A Comment," *Journal of Institutional and Theoretical Economics*, Vol. 148, No. 1, 1992, 20-23.

"The Technological Regime and Market Evolution: The New Learning," *Economics of Innovation and New Technology*, Vol. 2, No. 1, 1992, 27-34.

"Innovation and Size at the Firm Level," with Zoltan J. Acs, *Southern Economic Journal*, Vol. 57, No.1, January 1991, 739-744.

"Antitrust Policy and Innovation: A Comment," *Journal of Institutional and Theoretical Economics*, Vol. 147, No. 1, March 1991, 145-151.

"Flexible Technology and Firm Size," with Zoltan J. Acs and Bo Carlsson, *Small Business Economics*, Vol. 3, No. 4, December 1991.

"The Hazard Rate of New Establishments: A First Report," with Talat Mahmood, *Economics Letters*, Vol. 36, No. 2, 1991, 409-412.

"The Determinants of Small-Firm Growth in U.S. Manufacturing," with Zoltan J. Acs, *Applied Economics*, Vol. 22, No. 2, February 1990, 143-154.

"Union Participation, Innovation, and Concentration: Results from a Simultaneous Model," with J.-Matthias Graf von der Schulenburg, *Journal of Institutional and Theoretical Economics*, Vol. 146, No. 2, June 1990, 298-313.

"The Technological Regime and Small-Firm Turbulence," *International Small Business Journal*, Vol. 9, No. 1, October-December 1990, 80-97.

"Entrepreneurial Regimes, Learning, and Industry Turbulence," with Zoltan J. Acs, *Small Business Economics*, Vol. 2, No. 2, 1990.

"Editors' Introduction to Small Business Economics," with Zoltan J. Acs, *Small Business Economics*, Vol. 1, No. 1, January 1989, 1-5.

"The Determinants of Conglomerate Mergers," *American Economist*, Vol. 33, No. 1, Spring 1989.

"Entrepreneurial Strategy and the Presence of Small Firms," with Zoltan J. Acs, *Small Business Economics*, Vol. 1, No. 3, September 1989, 194-213.

"Births and Firm Size," with Zoltan J. Acs, *Southern Economic Journal*, Vol. 56, No. 2, October 1989, 467-475.

"Legalized Cartels in West Germany," *The Antitrust Bulletin*, Vol. 34, No. 3, November 1989, 579-600.

"Patents and Innovations Compared," with Zoltan J. Acs, *Eastern Economic Journal*, Vol. 15, No. 4, October-December 1989, 373-376.

"Small Firms in U.S. Manufacturing: A First Report," with Zoltan J. Acs, *Economics Letters*, Vol. 31, No. 4, December 1989, 399-402.

"Patents as a Measure of Innovative Activity," with Zoltan J. Acs, *Kyklos*, Vol. 42, No. 2, 1989, 171-180.

"Job Creation and Firm Size in the U.S. and West Germany," with Zoltan J. Acs, *International Small Business Journal*, Vol. 7, No. 4, 1989, 9-22.

"An Evaluation of Japanese R&D and Industrial Policies," *Aussenwirtschaft*, Vol. 43, June 1988, 231-258.

"Small-Firm Mobility: A First Report," with Zoltan J. Acs, *Economics Letters*, Vol. 26, No. 3, 1988, 281-284.

"Divergent Views in Antitrust Economics," *The Antitrust Bulletin*, Vol. 33, Spring 1988, 135-160.

"Testing the Schumpeterian Hypothesis," with Zoltan J. Acs, *Eastern Economic Journal*, Vol. 14, April-June 1988, 129-140.

"Innovation and Firm Size in Manufacturing," with Zoltan J. Acs, *Technovation*, Vol. 7, July 1988, 197-210.

"An Empirical Test of the Industry Life-Cycle," *Weltwirtschaftliches Archiv*, Vol. 123, No. 2, Summer 1987, 297-308.

"An Empirical Examination of Small-Firm Growth," with Zoltan J. Acs, *Economics Letters*, Vol. 25, No. 4, 1987, 363-366.

"Industrial Policy and U.S.-Japanese Trade," with Hideki Yamawaki, *Economics Letters*, Vol. 24, No. 1, 1987, 89-92.

"Innovation in Large and Small Firms," with Zoltan J. Acs, *Economics Letters*, Vol. 23, No. 1, 1987, 109-112.

"Regulatory Reform in the 1980s: An Anti Rent-Seeking Movement?" with Arthur Woolf, *European Journal of Political Economy*, Vol. 3, No. 3, 1987, 335-349.

"The Celler-Kefauver Act and the Deterrent Effect," *Review of Industrial Organization*, Vol. 2, No. 4, Fall 1986, 322-337.

"The Product Life Cycle and the Concentration-Profits Relationship," with Arthur Woolf, *American Economist*, Vol. 30, No. 2, Fall 1986, 46-51.

Editor of Special Issues of Journals:

Empirical Evidence on Knowledge Flows from Research Collaborations, (co-edited with Al Link), *Economics of Innovation and New Technology*, Vol. 15, No. 1, January 2006.

Economic integration, innovation dynamics and growth, (co-edited with Lucas Bretschger and Paul J.J. Welfens), *International Economics and Economic Policy*, Vol. 1, No. 2-3, 111-117

Competition Policy in Dynamic Markets, (co-edited with William Baumol and Andrew Burke), *International Journal of Industrial Organization*, Vol. 19, Issue 5, April 2001

The Post-Entry Performance of Firms in Industrial Organization, (co-edited with Jose Mata), *International Journal of Industrial Organization*, 1995.

The Dynamics of Industrial Organization, *Review of Industrial Organization*, (co-edited with Roy Thurik), 1996.

Contributions to Edited Volumes:

"Explaining entrepreneurship and the role of policy: a framework," (with Isabel Grilo and A. Roy Thurik) in David Audretsch, Isabel Grilo and A. Roy Thurik (eds.), *Handbook of Research on Entrepreneurship Policy*, Edward Elgar Publishing, 2007, 1-17.

"From small business to entrepreneurship policy," (with Iris A.M. Beckmann) in David Audretsch, Isabel Grilo and A. Roy Thurik (eds.), *Handbook of Research on Entrepreneurship Policy*, Edward Elgar Publishing, 2007, 36-53.

"Diversity: implications for income distribution," in Erik S. Reinert (ed.), *Globalization, Economic Development and Inequality An Alternative Perspective*, Edward Elgar Publishing, 2007, 288-308.

"The spread of obesity," (with Dawne DiOrio) in Zoltan Acs and Alan Lyles (eds.), *Obesity, Business and Public Policy*, Edward Elgar Publishing, 2007, 15-24.

"The Role of Risk in Entrepreneurial Behavior," (with Julie Elston) in Maria Minniti (ed.), *Entrepreneurship The Engine of Growth*, Praeger Publishers, Vol. 1, 2007, 65-80.

"Scientist Entrepreneurship: Human Capital or Social Capital," (with Taylor Aldridge and Alex Oettl) in M. Praag (ed.), *Entrepreneurship and Human Capital*, Amsterdam Center for Entrepreneurship, 2006, 88-98.

"Location and New Venture Creation," (with Erik Lehmann) in Simon Parker (ed.), *The Life Cycle of Entrepreneurial Ventures*, Springer, September 2006, 137-160.

"Entrepreneurship, growth and restructuring," (with Max Keilbach) in Mark Casson, Bernard Yeung, Anuradha Basu, and Nigel Wadeson (eds.), *The Oxford Handbook of Entrepreneurship*, Oxford University Press, August 2006, 281-310.

"The role of clusters in knowledge creation and diffusion: An institutional perspective," (with Erik Lehmann) in Bjørn Asheim, Philip Cooke, and Ron Martin (eds.), *Clusters and Regional Development: Critical Reflections and Explorations*, Routledge, 2006, 188-198.

Comment on "The Climate for Business Development and Employment Growth," in Susan Collins, Barry Bosworth, and Miguel Soto-Class (eds.), *The Economy of Puerto Rico*, CNE/Brookings, 2006, 308-312.

"A Model of the Entrepreneurial Economy," (with Roy Thurik) in Andrew E. Burke (ed.), *Modern Perspectives on Entrepreneurship Modern Perspectives on Entrepreneurship*, Senate Hall Academic Publishing, 2006, 23-46.

"Is the Social Market Economy Compatible with Globalization?,"(with Richard M. Stazinski) in David Eaton, Eberhard Bohne, Charles Bonser and Kenneth Spencer (eds.), *The End of Sovereignty?*, LIT Verlag Hamburg, 2006, 265-285.

"Innovationen: Aufbruch zur Entrepreneurship-Politik,"in Zimmermann, Klaus F. (ed.), *Deutschland – was nun*?, Beck Publishers, 2006, 237-250.

"The Knowledge Spillover Theory of Entrepreneurship and Spatial Clusters," in Iréne Johansson (ed.), *Uddevalla Symposium 2005: Innovations and Entrepreneurship in Functional Regions*, University West, 2005, 177-188.

"Economic Growth and National Security," (with Richard M. Stazinski and T. Taylor Aldridge) in Michele Fratianni, John Kirton, Alan Rugman and Paolo Savona (eds.), *New Perspectives on Global Governance*, Ashgate, 2005, 105-118.

"Empresarialidad: Contribució al crecimiento y al bienestar económico?," (with Mari Jose Aranguren Querejeta and Maria Callejón) in M.D. Parrilli, P. Bianchi, and R. Sugden (eds.), *Alta Tecnologia, Productividad Y Redes un enfoque sistémico para el*

desarrollo de las prequeñas y medianas empresas, Imprenta de la Universidad de Costa Rica, San José, 2005, 169-193.

"The Knowledge Spillover Theory of Entrepreneurship and Technological Diffusion," (with Max Keilbach and Erik Lehmann) in Gary D. Libecap (ed.), *University Entrepreneurship and Technology Transfer: Process, Design, and Intellectual Property*, New York: Elsevier, 2005, 69-92.

"The Knowledge Spillover Theory of Entrepreneurship and Economic Growth," in G.T. Vinig and R.C.W. Van Der Voort (eds.), *The Emergence of Entrepreneurial Economics*, New York: Elsevier, 2005, 37-54.

"Determinants of Scientist Entrepreneurship: An Integrative Approach," (with Doga Kayalar Erdem) in Sharon Alvarez, Rajshree Agarwal, and Olav Sorenson (eds.), *Handbook of Entrepreneurship Research: Disciplinary Perspectives*, New York: Springer, 2005.

"The Knowledge Production Function and R&D Spillovers" in David Audretsch, and Talat Mahmood (eds.), *Sustainable Development Bridging the Research/Policy Gaps in Southern Contexts*, Vol. 2: Social Policy. Karachi: Oxford University Press Pakistan, 2005, 221-231.

"Small firms, innovation and competition," in Manfred Neumann and Jürgen Weigand (eds.), *The International Handbook of Competition*, Edward Elgar Publishing, 2005, 88-114.

"The Emergence of Entrepreneurship Policy," in David Audretsch, Heike Grimm, and Charles W. Wessner (eds.), *Local Heroes in the Global Village,* Springer Publishers, 2005, 21-43.

"Entrepreneurship Policy in Comparative-Historical Perspectives," (with Heike Grimm), in David Audretsch, Heike Grimm, and Charles W. Wessner (eds.), *Local Heroes in the Global Village,* Springer Publishers, 2005, 3-19.

"Introduction: Structuring Informal Mechanisms of Knowledge Transfer," (with Dirk Fornahl and Christian Zellner) in David B. Audretsch, Dirk Fornahl and Christian Zellner (eds.), *The Role of Labour Mobility and Informal Networks for Knowledge Transfer*, New York: Springer Publishers, 2004.

"The Mobility of Economic Agents as Conduits of Knowledge Spillover," (with Max Keilbach) in David B. Audretsch, Dirk Fornahl and Christian Zellner (eds.), *The Role of Labour Mobility and Informal Networks for Knowledge Transfer*, New York: Springer Publishers, 2004.

"Knowledge Spillovers and the Geography of Innovation," (with Maryann Feldman), in J. Vernon Henderson and Jacques-François Thisse (eds.), *Handbook of Regional and Urban Economics*, Vol. 4, Amsterdam: Elsevier, 2004, 2713-2739.

"The Entrepreneur and Starting Up New R&D&I Businesses: Introduction," in Salvador Roig, Domingo Ribeiro, V. Ramón Torcal, Amparo de la Torre, Elvira Cerver (eds.), *The Entrepreneur and Starting Up New R&D&I Businesses*, Servei de Publicaions, Vol. 27, 2004.

"Entrepreneurship, Industry Evolution and Economic Growth," in Roger Koppl (ed.), *Austrian Economics and Entrepreneurial Studies*, JAI Press, New York, Vol. 6, 2003, 39-56.

"Entrepreneurship, innovation and globalization: Does Singapore need a new policy approach?," in Ramkishen S. Rajan (ed.), *Sustaining Competitiveness in the New Global Economy*, Edward Elgar Publishing Limited, 2003, 205-226.

"Entrepreneurship Policy and the Strategic Management of Places," in David M. Hart (ed.), *The Emergence of Entrepreneurship Policy*, Cambridge University Press, 2003, 20-38.

"Managing Knowledge Spillovers: The Role of Geographic Proximity," in Joel Baum and Olav Sorenson (eds.), *Geography and Strategy*, JAI Press, New York, Vol. 20, 2003, 23-48.

"Supply and Demand as Driving Forces in Commercialization of Academic Research Results," in D. Nordfors, J. Sandred and C. Wessner (eds.), *Commercialization of Academic Research Results*, Vinnova Publications, 2003.

"Editors' Introduction," in Zoltan Acs and David Audretsch (eds.), *Handbook of Entrepreneurship Research*, Kluwer Academic Publishers, Vol.1, 2003, 3-20.

" Innovation and Technological Change," in Zoltan Acs and David Audretsch (eds.), *Handbook of Entrepreneurship Research*, Kluwer Academic Publishers, Vol. 1, 2003, 55-80.

"Globalization, Innovation and the Strategic Management of Places," in Johannes Bröcker, Dirk Dohse, Rüdiger Soltwedel (eds.) *Innovation Clusters and Interregional Competition*, Springer Publishers, 2003, 11-27.

"The role of small firms in US biotechnology clusters," in Gerhard Fuchs (ed.), *Biotechnology in Comparative Perspective*, Routledge, 2003, 14-32.

"The Dynamic Role of Small Firms: Evidence from the U.S.," in Farrukh Iqbal and Shujiro Urata (eds.) *Small Firm Dynamism in East Asia,* Kluwer Academic Publishers, 2002, 13-40.

"Small and medium sized enterprises," in William Lazonick (ed.) *International Encyclopedia of Business & Management, The Handbook of Economics*, Thomson, 2002, 213-230

"An Eclectic Theory of Entrepreneurship: Policies, Institutions and Culture," in David B. Audretsch, Roy Thurik, Ingrid Verheul, and Sander Wennekers (eds.) *Entrepreneurship: Determinants and Policy in a European-U.S. Comparison*, Kluwer Academic Publishers, 2002.

"Understanding Entrepreneurship across Countries and over Time," in David B. Audretsch, Roy Thurik, Ingrid Verheul, and Sander Wennekers (eds.) *Entrepreneurship: Determinants and Policy in a European-U.S. Comparison*, Kluwer Academic Publishers, 2002.

"Regional Policy in the New Economy," with Charles F. Bonser in David B. Audretsch and Paul J.J. Welfens (eds.) The *New Economy and Economic Growth in Europe and the US*, Springer Publishers, 2002, 129-160.

"Small and medium sized enterprises," in Malcolm Warner (ed.) *International Encyclopedia of Business & Management*, second edition, 8-volume set, Thomson Learning, 5928-5941, forthcoming.

"Small Firms and Entrepreneurship: The Western Experience," in Oliver Pfirrmann and Günter H. Walter (eds.) *Small Firms and Entrepreneurship in Central and Eastern Europe*, Technology Innovation and Policy 14, Physica-Verlag, 15-46.

"From the University to the Marketplace: The Impact of SBIR," in Veijo Ilmavirta and Charles W. Wessner (eds.) *Programs to Support Innovation and the Development of Small Business in Finland and The United States: A Review of Current Policy and Research*, Otaniemi International Innovation Centre 2-2001, 100-102

"Corporate Governance," with Jürgen Weigand in Peter-J. Jost (ed.), *Die Spieltheorie in Der Betriebs-Wirtschaftslehre*, Schaffer Poeschel, 2001, 83-134.

"Knowledge, Globalization, and Regions: An Economist's Perspective," in John H. Dunning (ed.), *Regions, Globalization, and the Knowledge-Based Economy*, Oxford: Oxford University Press, 2000, 63-81.

"Corporate Form and Spatial Form," in Gordon L. Clark, Maryann P. Feldman, and Meric S. Gertler (eds.), *The Oxford Handbook of Economic Geography*, "Oxford: Oxford University Press, 2000, 333-352.

"Entrepreneurship in Germany," in Donald L. Sexton and Hans Landström (eds.), *Handbook of Entrepreneurship*, Oxford: Blackwell Publishers, 2000, 107-128.

"Does the Small Business Innovation Research Program Foster Entrepreneurial Behavior? Evidence from Indiana," with Juergen Weigand and Claudia Weigand, in Charles W. Wessner (ed.), *The Small Business Innovation Research Program*, Washington, D.C.: National Academy Press, 2000, 160-193.

"Statistical Analysis of the National Academy of Sciences Survey of SBIR Awardees: Analyzing the Influence of the Fast Track Program," in Charles W. Wessner (ed.), *The Small Business Innovation Research Program*, Washington, D.C.: National Academy Press, 2000, 291-306.

"Knowledge Spillovers in Biotechnology: Sources and Incentives," with Paula E. Stephan, in Uwe Cantner, Horst Hanusch and Steven Klepper (eds.), *Economic Evolution, Learning, and Complexity*, Heidelberg: Physica-Verlag, 2000, 127-138.

"The Telecommunications Revolution and the Geography of Innovation," with Maryann P. Feldman, *Cities in the Telecommunications Age*, in James O. Wheeler, Yuko Aoyama, and Barney Warf, (eds.), New York: Routledge, 2000, 181-200.

"Small Firms and Efficiency," in Z. Acs (ed.), *Are Small Firms Important? Their Role and Impact*, Boston: Kluwer Academic Publishers, 1999, 21-38.

"Linking Entrepreneurship to Economic Growth, in Gary D. Libecap (ed.), *The Sources of Entrepreneurial Activity*, Stamford, CT: JAI Press, 1999, 1-29.

"Innovation and Globalization: A U.S.-Germany Comparison," with Maryann P. Feldman, *Responses to Globalization in Germany and the United States*, Carl Lankowski (ed.) American Institute for Contemporary Germany Studies Research Report No. 10, 79-100.

"Innovation, Raumstruktur und Internationalisierungsstrategien, " with Claudia Weigand in Otto G. Mayer and Hans-Eckart Scharrer (eds.), Internationale Unternehmensstrategien und nationale Standortpolitik," Baden-Baden: Nomos Verlagsgesellschaft, 1999, 129-150.

"Small Firms and Efficiency," in Zoltan J. Acs (editor), *Are Small Firms Important? Their Role and Impact*, Boston: Kluwer Academic Publishers, 1999.

"Die Standortkrise und die Rolle von kleinen und mittleren Unternehmen in der deutschen Wirtschaftspolitik, " in Paul J.J. Welfens and C. Graack (eds.), *Technologie-orientierte Untrnehmens-gründungen und Mittelstandspolitik in Europa*, Physica-Verlag Heidelberg, 1999, 75-85.

"Entrepreneurship and Economic Restructuring: An Evolutionary View," in Zoltan Acs, Bo Carlsson, and Charlie Karlsson (eds.), *Entrepreneurship, Small and Medium-Sized Enterprises and the Macroeconomy*, Cambridge: Cambridge University Press, 1999.

"Knowledge Sources in Biotechnology through the Schumpeterian Lens," with P. Stephan in Gunnar Eliasson and Christopher Green (eds.), *Microfoundations of Economic Growth: A Schumpeterian Perspective*, Ann Arbor: University of Michigan Press, 1999, 196-187.

"How and Why Does Knowledge Spill Over in Biotechnology?" with P. Stephan in David B. Audretsch and Roy Thurik, *Innovation, Industry Evolution, and Employment*, Cambridge: Cambridge University Press, 1999, 216-229.

"Do Services Differ from Manufacturing? The Post-Entry Performance of Firms in Dutch Services," with Luuk Dlomp and Roy Thurik in David B. Audretsch and Roy Thurik, *Innovation, Industry Evolution, and Employment*, Cambridge: Cambridge University Press, 1999, 230-252.

"Innovation, Industry Evolution and Employment: Introduction," with Roy Thurik in David B. Audretsch and A. Roy Thurik, *Innovation, Industry Evolution, and Employment*, Cambridge: Cambridge University Press, 1999, 1-12.

"Does Startup Size Influence the Likelihood of Survival?" with Enrico Santarelli and Marco Vivarelli in David B. Audretsch and Roy Thurik, *Innovation, Industry Evolution, and Employment*, Cambridge: Cambridge University Press, 1999, 280-296.

"The Microeconomics of Invention and Innovation," in Michael Bruno (ed.), *Contemporary Economic Issues*, London: Macmillan, 1998.

"Industrial Policy and Industrial Organization," in Dennis Mueller, Alfraid Haid and Juergen Weigand (eds.), *Competition, Efficiency and Welfare: Essays in Honor of Manfred Neumann*, Kluwer Academic Publisher, 1998.

"New Firms and Creating Employment: The European Challenge," in Paul J.J. Welfens (ed.), *European Labor Markets and Social Security*, Heidelberg: Springer Verlag, 1997, 129-157.

"Industrieoekonomik" in Juergen von Hagen, Axel Boersch-Supan and Paul J.J. Welfens (eds.), *Handbuch der Volkswirtschaftslehre*, Heidelberg:Springer Verlag, 1996, 177-228.

"Creative Destruction: Turbulence and Economic Growth in Germany," with Michael Fritsch in Ernst Helmsädter and Mark Perlman (eds.), *Behavioral Norms, Technological Progress, and Economic Dynamics: Studies in Schumpeterian Economics*, Ann Arbor, University of Michigan Press, 1996,
137-150.

"International Diffusion of Technological Knowledge," in Georg Koopmann, Hans-Eckart Scharrer (eds.), *The Economics of High-Technology Competition and Cooperation in Global Markets*, Baden Baden: Nomos Verlagsgesellschaft, 1996, 107-136.

"Intellectual Property Rights and Innovation: The New Learning," in Horst Albach, Stephanie Rosenkranz (eds.), *Intellectual Property Rights and Global Competition - Towards a New Synthesis*, edition sigma, Berlin, 1995, 35-76.

"Betriebliche Turbulenz und regionale Beschäftigungsdynamik," in Klaus Semlinger and Bernd Frick (eds.), *Betriebliche Modernisierung in personeller Erneuerung*, edition sigma, 1995, 59-74.

"Die Industrieökonomik und die Überlebenschancen neugegründeter Unternehmen," in Jürgen Schmude (ed.), *Neue Unternehmen: Interdisziplinäre Beiträge zur Gründungsforschung*, Heidelberg: Physica Verlag, 1995, 242-250.

"Die Unternehmensentwicklung in Ostdeutschland: Erste empirische Ergebnisse: Kommentar," in H. König (ed.), *Arbeitsmarktdynamik und Unternehmensentwicklung*, Springer Verlag, Berlin, 1994,
139-145.

"Entrepreneurship, Technology and Macroeconomic Fluctuations," with Zoltan J. Acs in Yuichi Shionoya and Mark Perlman (eds.), *Innovation in Technology, Industries, and Institutions: Studies in Schumpeterian Perspectives*, University of Michigan Press, Ann Arbor, 1994, 173-187.

"The Post-Entry Performance of New Firms," with Talat Mahmood in Arjen van Witteloostuijn (ed.), *Studies in Industrial Organization*, Kluwer Academic Publishers, Boston, 1994.

"The Economics of Technological Leadership," in Horst Siebert (ed.), *Economic Growth in the World Economy*, J.C.B. Mohr, Tübingen, 1993, 37-51.

"La interrelacion entre la industria manufacturera y los servicios," with Hideki Yamawaki in Andre Sapir (ed.), *La necesaria liberalizacion de los servicios en Espana*, Instituto de Estudios Economicos, Madrid, 1993.

"Industrial Policy and International Competitiveness: The Case of Eastern Europe," in Kirsty Hughes (ed.), *European Competitiveness*, Cambridge University Press, Cambridge, 1993, 259-290.

"Small Business Developments in the Long Run and Through the Business Cycle: Lessons from the Past in the Netherlands: Discussion," in Charlie Karlsson, Bengt Johannisson, and David Storey (eds.), *Small Business Dynamics: International, National, and Regional Perspectives*, Routledge, London, 1993, 38-40.

"New-Firm Formation in U.S. Manufacturing," in Charlie Karlsson, Bengt Johannisson, and David Storey (eds.), *Small Firm Dynamics: International, National, and Regional Perspectives*, Routledge, London, 1993, 40-53.

"Inovacao e Mmudanca Tecnológica: a Nova Ciència," with Zoltan J. Acs, in Joao Paulo dos Reis Velloso and Luciano Martins (eds.), *A Nova Ordem Mundial em Questao*, José Olympio, Rio de Janeiro, 1993, 291-338.

"New Firm and Plant Survival in U.S. Manufacturing," in Heinz Klandt (ed.), *Entrepreneurship and Business Development*, Avebury, Aldershot, 1993, 161-178.

"Industrial Policy and European Competitiveness," in P. Nicolaides (ed.), *Industrial Policy in the European Community: A Necessary Response to Economic Integration*?," Kluwer Academic Publishers, Boston, 1993, 67-106.

"Analyzing Innovation Output Indicators: The U.S. Experience," in Alfred Kleinknecht and Donald Bain (eds.), *New Concepts in Innovation Output Measurement*, Macmillan, London, 1993, 10-41.

"Has the Role of Small Firms Changed in the United States?" with Zoltan J. Acs, in Zoltan J. Acs and David B. Audretsch (eds.), *Small Firms and Entrepreneurship: An East-West Perspective*, Cambridge University Press, Cambridge, 1993, 55-77.

"Technological Regimes, Learning, and Industry Turbulence," with Zoltan J. Acs, in F.M. Scherer and Mark Perlman (eds.), *Entrepreneurship, Technological Innovation and Economic Growth: Studies in the Schumpeterian Perspective*, University of Michigan Press, Ann Arbor, 1992, 305-320.

"The Social and Economic Impact of Entrepreneurship," with Zoltan J. Acs, in Donald L. Sexton and John D. Kasarda (eds.), *The State of the Art of Entrepreneurship*, PWS-Kent Publishing, Boston, 1992, 45-67.

"Sub-Optimal Scale Plants and Compensating Factor Differentials in U.S. and Japanese Manufacturing," with Hideki Yamawaki, in: David B. Audretsch and John J. Siegfried (eds.), *Empirical Studies in Industrial Organization: Essays in Honor of Leonard W. Weiss*, Kluwer Academic Publishers, Boston, 1992, 161-184.

"Innovation and Technological Change: The New Learning," with Zoltan J. Acs, in Gary Liebman (ed.), *Issues in Entrepreneurship*, JAI Press, Boston, 1992, 109-142.

"La politica industrial: algunos ejemplos internationales," in Carmela Martín (ed.), *Política Industrial, Teoría y Práctica*, Celeste Ediciones, Madrid, 1992, 63-90.

"Investment Opportunities in Unified Germany," with Heather Wayland, in Josef Brada and Michael P. Claudon (eds.), *German Reunification and the Privatization of Czechoslovakia, Hungary, and Poland*, New York University Press, New York, 1992, 101-116.

"Innovation and Technological Change: An Overview," with Zoltan J. Acs in Zoltan J. Acs and David B. Audretsch (eds.), *Innovation and Technological Change: An International Comparison*, Ann Arbor: Michigan, University of Michigan Press, 1991, 1-23.

"R&D, Firm Size, and Innovative Activity," with Zoltan J. Acs in Zoltan J. Acs and David B. Audretsch (eds.), *Innovation and Technological Change: An International Comparison*, University of Michigan Press, Ann Arbor, 1991, 39-59.

"Innovation as a Means of Entry: An Overview," with Zoltan J. Acs in Paul Geroski and Joachim Schwalbach (eds.), *Entry and Contestability: An International Comparison*, Basil Blackwell, Oxford, 1991, 222-243.

"Small-Firm Turbulence under the Entrepreneurial and Routinized Regimes," in L.G. Davies and A.A. Gibb (eds.), *Recent Research in Entrepreneurship*, Avebury: Avebury England, 1991.

"Innovation and Capital Diversity in the Small Enterprise: A Comment," with Zoltan J. Acs in Zoltan J. Acs and David B. Audretsch (eds.), *The Economics of Small Firms: A European Challenge*, Kluwer Academic Publishers, Boston, MA, 1990, 135-137.

"Flexibility, Plant Size, and Industrial Restructuring," with Zoltan J. Acs and Bo Carlsson, in Zoltan J. Acs and David B. Audretsch (eds.), *The Economics of Small Firms: A European Challenge*, Kluwer Academic Publishers, Boston, MA, 1990, 141-154.

"Korreferat zur Messung des Dynamischen Wettbewerbs: Eine Empirische Analyse des Evolutionstheoretischen Modells von Iwai in B. Gahlen (ed.), *Marktstruktur und gesamtwirtschaftliche Entwicklung*, Springer-Verlag, Berlin, 1990, 293-294.

"Kleine Unternehmen, Schaffung von Arbeitsplätzen und Technologie in den USA und der Bundesrepublik Deutschland," with Zoltan J. Acs in Johannes Berger, Volker Domeyer, and Maria Funder (eds.), *Kleinbetriebsforschung in der Bundesrepublik Deutschland*, Campus Verlag, Berlin, 1990, 35-60.

"Joint R&D and Industrial Policy in Japan," in Al Link and Greg Tassey (eds.), *Cooperative Research: A New Strategy for Competitiveness*, Kluwer Academic Publishers, Boston, MA, 1989, 103-126.

"The Dynamics of Export Competition," with Leo Sleuwaegen and Hideki Yamawaki, in D. Audretsch, L. Sleuwaegen and H. Yamawaki (eds.), *The Convergence of International and Domestic Markets and Policy Responses in Europe, Japan, and the U.S.*, North-Holland, Amsterdam, 1989, 211-245.

"U.S. Markets in the Global Economy," with Michael P. Claudon in David B. Audretsch and Michael P. Claudon (eds.), *The Internationalization of U.S. Markets*, New York University Press, New York, 1989, 1-8.

"R&D and U.S.-Japanese Bilateral Trade," with Hideki Yamawaki in David B. Audretsch and Michael P. Claudon (eds.), *The Internationalization of U.S. Markets*, New York University Press, New York, 1989, 75-96.

"Innovation Strategy and the Presence of Small Firms," with Zoltan J. Acs in Gary B. Roberts (ed.), *Entrepreneurship: New Direction for a Global Economy*, International Council for Small Business, Marietta, GA, 1988.

"An Evaluation of Horizontal Merger Enforcement," in J. Craven (ed.), *Industrial Organization and Antitrust*, Kluwer Academic Publishers, Boston, MA, 1982, 69-88.

Other Publications:

"A Review of the New Initiatives at the NASA Ames Research Center," Charles W. Wessner, editor, National Academy Press, Washington, D.C., 2001.

"Germany, Along with Europe, Is Embracing the New Economy," *European Affairs*, Vol. 1, No. 3, Summer 2000, pp. 46-51.

"Das Small Business Innovation Research der USA – Eine oekonomische Bewertung," *Inernationale Forschungs-Technologie- und Innovationspolitik*," March 2000, pp. 8-10.

"How Germany Can Create Jobs," *Wall Street Journal*, (Editorial) January 12, 1999.

"Per Computer in die Dezentralizierung," *Das Parlament*, No. 33/34, August 1996.

"America's Challenge to Europe," *Wall Street Journal*, (Editorial) July 31, 1989.

"Small Firms and Technology," BTE Series on Technology and Economy, Dutch Ministry of Economic Affairs, Directorate of Technology Policy, The Hague, Netherlands, 1989.

Book Reviews:

"Building High-Tech Clusters, Silicon Valley and Beyond," Timothy Bresnehan and Alfonso Gambardella, *Journal of Economic Literature*, 2005.

"The Free Market Innovation Machine," by William Baumol, *Journal of Economic Literature*, 2004.

"Changing Innovation in the Pharmaceutical Industry: Globalization and New Ways of Drug Development," by Andre Jungmittag, Guido Reger and Thomas Reiss, *Journal of Technology Transfer*, Vol. 27, 2002.

"Innovation, Investment and the Diffusion of Technology in Europe: German Direct Investment and Economic Growth in Postwar Europe," by R. Barrell and N. Pain (eds.), *Economica*, Vol. 69, No. 274, May 2002, 345-346.

"New Perspectives on Economic Growth and Technological Innovation," by F.M. Scherer, *Journal of Economic Literature*, Vol. 37, No. 4, 2000.

"Innovation in Production, The Adoption and Impacts of New Manufacturing Concepts in German Industry," by Guenter Lay, Philip Shapiro and Juergen Wengel (eds.), *Journal of Technology Transfer*, Vol. 25, 2000.

"International Technology Transfer by Small and Medium-Sized Enterprises," by Peter J. Buckley, Jaime Campos, Hafiz Mirza and Eduardo White (eds.), *Transnational Corporations*, Vol. 7, No. 2, 1998.

"A Comparative Analysis of Japanese and German Economic Success," by Info Institute for Economic Research, and Sakura Institute of Research, *Economic Systems*, Vol. 22, Issue 2, 1998.

"Pasteur's Quadrant: Basic Science and Technological Innovation," by Donald E. Stokes, *The Journal of Technology Transfer*, 23, 1998.

"International Technology Transfer by Small and Medium-Sized Enterprises," by Peter J. Buckley, Jaime Campos, Hafiz Mirza and Eduardo White (eds.), Macmillan Press, 1997.

"The Dynamics of Industrial Competition," by John Baldwin, *Journal of Economic Literature*, Vol. 34, 1996.

"Competitors in Alliance: Industry Associations, Global Rivalries and Business-Government Relations," *The Annals of the American Academy of Political Science*, 1995.

"Betriebswirtschaftslehre der Klein- und Mittelbetriebe," by Josef Mugler, *Small Business Economics*, Vol. 6, 1994.

"The Fading Miracle: Four Decades of Market Economy in Germany," by Herbert Giersch, Karl-Heinz Paque, and Holger Schmieding, *Industrial Relations Journal*, 1994.

"Small Business Dynamics: International, National and Regional Perspectives," edited by Bengt Johannisson, Charlie Karlsson, and David Storey, *Kyklos*, Vol. 47, 1994.

"The Technological Specialization of Advanced Countries," by Daniele Archibugi and Mario Pianta, *Journal of Economic Literature*, Vol. 32, 1994.

"Small Business Enterprise: An Economic Analysis," by Gavin C. Reid, *Kyklos*, 1993.

"Antitrust Economics on Trial," by Walter Adams and James W. Brock, *Journal of Institutional and Theoretical Economics*, Vol. 148, 1992.

"The Competitiveness of Small Firms," by Cliff Pratten, *Kyklos*, 1992.

"Concentration and Price," edited by Leonard W. Weiss, in *International Journal of Industrial Organization*, Vol. 9, 1991.

"Industry Policy after 1992: An Anglo-German Perspective," edited by Keith Cowling and Horst Tomann, *The Manchester School of Economic and Social Studies*, Vol. 59, 1991.

"Economic Analysis of Production Innovation: The Case of CT Scanners," by Manuel Traitenberg, *Journal of Evolutionary Economics*, Vol. 1, 1991.

"Microcosm: The Quantum Revolution in Economics and Technology," by George Gilder, *Kyklos*, Vol. 44, 1991.

"Corporate Takeovers: Causes and Consequences," by Alan J. Auerbach, *Business History Review*, Winter 1990.

"Made in America: Regaining the Productive Edge," by Michael L. Dertzouzas, Richard K. Lester, and Robert M. Solow, *Kyklos*, Vol. 43, 1990.

"The Small Entrepreneurial Firm," by Gavin Reid and Lowell Jacobson, *International Journal of Industrial Organization*, Vol. 7, 1989.

"Wettbewerbsbeschränkungen auf internationalen Märkten," by Franz Steiner, *Business History Review*, Fall 1989.

"The Second Industrial Divide," by Michael Piore and Charles Sabel, *The Eastern Economic Journal*, June 1985.

"The Changing Structure of the U.S. Economy," by Zoltan Acs, *Southern Economic Journal*, April-May 1985.

"A Theory of Multinational Enterprise," by Jean Hennart, *Business History Review*, Fall 1983.

REFERENCES

REFERENCES

Acs, Zoltan, Pia Arenius, M Hay, and Maria Minniti. 2004. Global Entrepreneurship Monitor 2004 Executive Report. Babson Park, MA and London, UK: Babson College and London School of Business.

Acs, Zoltan, and Catherine Armington. 2006. *Entrepreneurship, Geography and American Economic Growth*. New York: Cambridge University Press.

Acs, Zoltan, and David Audretsch. 1987. Innovation, Market Structure, and Firm Size. *The Review of Economics and Statistics* 69 (4):567-574.

———. 1989. Small firm entry in US manufacturing. *Economica* 56 (222):255-265.

———. 2003. *The Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction*. New York: Springer.

Acs, Zoltan, David Audretsch, Pontus Braunerhjelm, and Bo Carlsson. 2003. The Missing Link: The Knowledge Filter and Endogenous Growth. In *CREATING, SHARING AND TRANSFERRING KNOWLEDGE: The role of Geography, Institutions and Organizations.* Copenhagen, Denmark: DRUID Summer Conference 2003.

Aldrich, Howard. 1990. Using an Ecological Perspective to Study Organizational Founding Rates. *Entrepreneurship Theory and Practice* 14 (3):7-24.

———. 1999. *Organizations Evolving*. London: Sage.

Audretsch, David. 1991. New firm survival and the technological regime. *Review of Economics and Statistics* 73 (3):441-450.

Audretsch, David, and Zoltan Acs. 1994. New firm startups, technology and macroeconomic fluctuations. *Small Business Economics* 6 (6):439-449.

Audretsch, David B. 1995. *Innovation and Industry Evolution*. Cambridge: MIT Press.

Audretsch, David, Barry Bozeman, Kathryn L. Combs, Maryann Feldman, Albert N. Link, Donald S. Siege, Paula Stephan, Gregory Tassey, and Charles Wessner. 2002. The Economics of Science and Technology. *Journal of Technology Transfer* 27 (2):155-203.

Audretsch, David, and Max Keilbach. 2004. Entrepreneurship Capital and Economic Performance. *Regional Studies* 38 (8):949-959.

Audretsch, David, L. Klomp, E. Santarelli, and A. Roy Thurik. 2004. Gibrat's Law: Are the Services Different? *Review of Industrial Organization* 24:301-324.

Audretsch, David, and Talat Mahmood. 1995. New Firm Survival: New Results Using a Hazard Function. *The Review of Economics and Statistics* 77 (1):97-103.

Bain, Joe S. 1956. *Barriers to New Competition: Their Character and Consequences in Manufacturing Industries*. Cambridge: Harvard University Press.

Bartik, Timothy. 1991. Who Benefits From State and Local Economic Development Policies? Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Bates, T. 1995. Self-employment entry across industry groups. *Journal of Business Venturing* 10 (2):143-156.

Baum, Donald N. 1987. The Economic Effects of State and Local Business Incentives. *Land Economics* 63 (4):348-360.

Baumol, William. 1990. Entrepreneurship: Productive, Unproductive, and Destructive. *The Journal of Political Economy* 98 (5):893-921.

Baumol, William J., and Wallace E. Oates. 1975. *The Theory of Environmental Policy: externalities, public outlays, and the quality of life.* Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Baumol, William, Robert Litan, and Carl Schramm. 2006. *Good Capitalism Bad Capitalism*. Bridgeport, CT: Yale University Press.

Bernhardt, Irwin. 1994. Comparative Advantage in Self-Employment and Paid Work. *The Canadian Journal of Economics* 27 (2):273-289.

Birley, Sue. 1984. Finding the New Firm. In *SoM Working Papers*. Bedford, United Kingdom: Cranfield University School of Management.

Black, Sandra E., and Lisa M. Lynch. 1996. Human-Capital Investments and Productivity. *The American Economic Review* 86 (2):263-267.

Blakely, Edward J. , and Ted K. Bradshaw. 2002. *Planning Local Economic Development: Theory and Practice*. 3 ed. Thousand Oaks, CA: Sage.

Blanchflower, D. , and S. Oswald. 1998. What makes an entrepreneur? *Journal of Labor Economics* 16 (1):26-60.

Boden, Richard J., and Alfred R. Nucci. 2000. On the Survival Prospects of Men's and Women's New Business Ventures. *Journal of Business Venturing* 15:347-362.

Brnovich, Mark. 2005. In the Supreme Court of the United States - Kelo v. City of New London, Connecticut. (04-108), http://www.ntu.org/pdf/Amicus_Kelo.pdf.

Brown, Charles, Curtis Gilroy, and Andrew Kohen. 1982. The Effect of the Minimum Wage on Employment and Unemployment. *Journal of Economic Literature* XX:487-528.

Brunetti , Michael J., Kamran Nayeri, Carlos E. Dobkin, and Henry E. Brady. 2000. Health Status, Health Insurance, and Worker Mobility: A Study of Job Lock in California. Berkley, CA: University of California.

Brynjolfsson, Erik, and Lorin M. Hitt. 1996. Paradox Lost? Firm-Level Evidence on the Rturns to Information Systems Spending. *Management Science* 42 (4):541-558.

———. 2003. Computing Productivity: Firm-Level Evidence. *The Review of Economics and Statistics* 85 (4):793-808.

Buchmueller, T.C., and R. Valletta. 1996. Employer-Provided Health Insurance and Worker Mobility: 'Job-lock' or not? *Industrial and Labor Relations Review* 49 (3):439-455.

Burton, Wayne N., Daniel J. Conti, Chin-Yu Chen, and Alyssa B. Schultz. 1999. The Role of Health Risk Factors and Diseases on Worker Productivity. *Journal of Occupational and Environmental Medicine* 41 (10):863-877.

Butler, John Sibley , and Cedric Herring. 1991. Ethnicity and Entrepreneurship in America: Toward an Explanation of Racial and Ethnic Group Variations in Self-Employment. *Sociological Perspectives* 34 (1):79-94.

Caroll, G., and M. Hannan. 2000. *The Demography of Corporations and Industries*. Princeton, NJ: Princeton University Press.

Carree, Martin A., and A. Roy Thurik. 1996. Entry and Exit in Retailing: Incentives, Barriers, Displacement and Replacement. *Review of Industrial Organization* 11:155-172.

Caves, R. E. , and Michael Porter. 1977. From Entry Barriers to Mobility Barriers: Conjectural Decisions and Contrived Deterrence to New Competition. *The Quarterly Journal of Economics* 91 (2):241-262.

Census. 2006. Metropolitan New England City and Town Areas and Components, December 2006, With Codes, Population Division, edited by U. S. Census: Population Division.

———. 2007. Methodology for Subcounty Total Resident Population Estimates for Vintage 2006, edited by http://www.census.gov/popest/topics/methodology/2006_su_meth.html. Washington DC: US Census Bureau.

———. 2008. *Health Insurance Coverage for Hawaii Counties, 2000: Experimental Estimates*. US Census Bureau 2008 [cited 2-20-2008 2008].

Clemans-Cope, Lisa, Bowne Garrett, and Catherine Hoffman. 2006. Changes in Employees' Health Insurance Coverage, 2001-2005. In *Kaiser Commission on Medicaid and the uninsured*. Washington, DC: Kaiser Family Foundation

Cobb, Charles W. , and Paul H. Douglas. 1928. A Theory of Production. *The American Economic Review Supplement, Papers and Proceedings of the Fortieth Annual Meeting of the American Economic Association* 18 (1):139-165.

Cook, Anna, and Scott Harrison. 1996. How the Medicaid Rebate on Prescription Drugs Affects Pricing in the Pharmaceutical Industry, edited by C. B. Office: Congressional Budget Office.

Cooper, Arnold. 2003. Entrepreneurship: The Past, the Present, the Future. In *Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction*, edited by Z. Acs and D. Audretsch. New York: Springer.

Cooper, Arnold C., and W.C. Dunkelberg. 1987. Entrepreneurial research: Old questions, new answers, and methodological issues. *American Journal of Small Business* 11 (Winter):11-23.

Currie, Janet, and Brigitte C. Madrian. 1999. Health, health insurance and the labor market. In *Handbook of Labor Economics*, edited by O. Ashenfelter and D. Card: Elsevier.

Curtis, Neuschler, Richard Curtis, and Ed Neuschler. 2006. Masschusetts-Style Coverage Expansion: What Would It Cost in California: California Healthcare Foundation.

Damberg, Cheryl L. 1996. Health Care Reform: Distributional Consequences of an Employer Mandate for Workers in Small Firms, Doctoral Dissertation, RAND Graduate School, Santa Monica.

Devine, Theresa J. 1994. Changes in Wage-and-Salary Returns to Skill and the Recent Rise in Female Self-Employment. *The American Economic Review* 84 (2):108-113.

Dukakis, Michael. 1994. Employer Mandate? We Already Have One. *New York Times*, August 14, 1994.

Economist. 2007a. Arguing over the cure. *The Economist*, http://www.economist.com/world/na/displaystory.cfm?story_id=10254622.

———. 2007b. A soaring price-tag. *The Economist*, http://www.economist.com/world/na/displaystory.cfm?story_id=10254606.

Evans, David S. , and Linda S. Leighton. 1989. Some Empirical Aspects of Entrepreneurship. *The American Economic Review* 79 (3):519-535.

Florida, R. 2005. The World is Spiky. *The Atlantic Monthly* October.

Freeman, J. 1982. Organizational life cycles and natural selection processes. *Research in Organizational Behavior* 4:1-32.

Friedman, J., and C. Weaver. 1979. *Territory and Function: The evolution of regional planning*. Berkley, CA: University of California Press.

Fritsch, Michael, Udo Brixy, and Oliver Falck. 2006. The Effect of Industry, Region, and Time on New Business Survival - A Multi-Dimensional Analysis. *Review of Industrial Organization* 28:285-306.

Garrett, T. A. , and H. J. Wall. 2006. Creating a Policy Environment for Entrepreneurs. http://research.stlouisfed.org/wp/2005/2005-064.pdf.

Geroski, P.A. 1995. What do we know about entry? *International Journal of Industrial Organization* 13 (4):421-440.

Goodridge v. Mass. Department of Public Health. 2003. In *440 Mass 309*.

Gottlob, Brian J. 2006. Trends in New Hampshire County Government Finances 1996-2004. Concord, NH: New Hampshire Center for Public Policy Studies.

Gruber, Jonathan, and Fames M. Poterba. 1994. Tax incentives and the decision to purchase health insurance: Evidence from the self-employed. *Quarterly Journal of Economics* 109 (August):707-733.

Gujarati, Damodar N. 2003. *Basic Econometrics*. 4 ed. Boston, MA: McGraw Hill.

Gurley-Calvez, Tami. 2006. Health Insurance Deductibility and Entrepreneurial Survival. Washington DC: Small Business Administration, Office of Advocacy.

Gwartney, James, and Robert Lawson. 2003. The Concept and Measurement of Economic Freedom. *European Journal of Political Economy* 19:405-430.

Helms, Robert. 2001. Positive Economics and Dismal Policies: The Role of Tax Policy in the Current Health Policy Debate. In *The Political Economy of Healthcare Reform*, edited by H. Zhou. Kalamazoo: W. E. Upjohn Institute for Employment Research.

Herrick, Devon M. 2006. Crisis of the Uninsured: 2006 Update. In *Brief Analysis*. Dallas, TX: National Center for Policy Analysis.

Holtz-Eakin, D., J. Penrod, and H. Rosen. 1996. Health Insurance and the Supply of Entrepreneurs. In *Working Paper*. Washington, DC: NBER

Horvath, M., F. Schivardi, and M. Woywode. 2001. On industry life-cycles: delay, entry, and skaheout in beer brewing. *International Journal of Industrial Organization* 19:1023-1052.

Ilmakunnas, P. , and V. Kanniainen. 2001. Entrepreneurship, Economic Risks, and Risk Insurance in the Welfare State: Results with OECD Data 1978-93. *German Economic Review* 2 (3):195-218.

InfoUSA. 2007. Business Database: Database Support Document Omaha, Nebraska: InfoUSA.

Johnson, P. 1986. *New Firms: An Economic Perspective*. London, UK: Allen and Unwin.

Johnston, Jack, and John Dinardo. 1997. Panel Data. In *Econometric Methods*. New York, NY: McGraw-Hill.

Karakaya, Fahri, and Michael J. Stahl. 1989. Barrier to Entry and Market Entry Decisions in Consumer and Industrial Goods Markets. *Journal of Marketing* 53:80-91.

Kelo v. New London, CT. 2005. In *545 U.S. 469*.

Klerman, Jacob A., and Dana P. Goldman. 1994. Job Loss Due to Health Insurance Mandates. *Journal of the American Medical Association* 272 (7):552-556.

Kronick, Richard. 1991. Can Massachusetts Pay for Health Care for All? *Health Affairs* 10 (1):26-44.

Legislature, Massachusetts. 2006b. Presentation: Healthcare Reform Conference Committee Bill. Boston, MA: Health Care For All.

———. 2006d. Summary and Fact Sheet: Health Care Access and Affordability Conference Committee Report. Boston, MA: Health Care For All.

Levie, Jonathan, and Erkko Autio. 2007. Entrepreneurial Framework Conditions and National-Level Entrepreneurial Activity: Seven-Year Panel Study. In *Third Global Entrepreneurship Research Conference*. Washington, D.C.: George Mason University.

Lind, Douglas A., William G. Marchal, and Robert D. Mason. 2001. *Statitical Techniques in Business & Economics*. 11 ed. Boston, MA: McGraw-Hill Irwin.

MDR. 2007. A Guide to Sales and Use Taxes 2007. Place Published: Massachusetts Department of Revenue. http://www.mass.gov/Ador/docs/dor/Publ/PDFS/sales_use_07.pdf (accessed 2/02/2008).

Mikesell, John L. 1999. *Fiscal Administration: Analysis and Applicaitons for the Public Sector*. 5th ed. Fort Worth, TX: Harcourt Brace College Publishers.

Minniti, Maria, and Pia Arenius. 2003. Women In Entrepreneurship. In *The Entrepreneurial Advantage Of Nations: First Annual Global Entrepreneurship Symposium*. United Nations Headquarters.

Monheit, Alan C., and P. Holly Harvey. 1993. Sources of health insurance for the self employed: Does differential taxation make a difference? *Inquiry (Rochester)* 30 (3): 293-305.

Moon, Marilyn, Len M Nichols, and Susan Wall. 1996. Medical Savings Accounts: A Policy Analysis. Washington DC: Health Policy Center of the Urban Institute.

Morris, Michael H. , Nola N. Miyasaki, Craig E. Watters, and Susan M. Coombes. 2006. The dilemma of growth: understanding venture size choices of women entrepreneurs. *Journal of Small Business Management* 44 (2):221-224.

Morrisey, Michael A. 2003. Health Insurance. In *National Small Business Poll*, edited by W. J. Dennis Jr. Washington DC: National Association of Independent Business.

Muchmore, Lamont, Wendy D. Lynch, Harold H. Gardner, Todd Williamson, and Tom Burke. 2003. Prevalence of Arthritis and Associated Joint Disorders in an Employed Population and the Associated Healthcare, Sick Leave, Diability and Workers' Compensation Benefits Cost and Productivity Loss for Employers. *Journal of Occupational and Environmental Medicine* 45 (4):369-378.

Myrdal, Gunnar. 1957. *Economic Theory and Underdeveloped Regions*. London: Duckworth.

Neuschler, C. 2006. Massachusetts-Style Reform in California? We Start From Different Places. In *Discussion Paper*. Sacremento, CA: Health Access California.

NH. *New Hampshire State General Election November 7, 2006*. Government of the State of New Hampshire 2006 [cited 2-24-2008. Available from http://www.sos.nh.gov/general2006/index.htm.

Oliver, Thomas. 2005. State Employer Health Insurance Mandates: A Brief History. Oakland, CA: California Healthcare Foundation.

OMB. 2007. OMB Bulletin No. 08-01 Update of Statistical Area Definitions and Guidance on Their Uses, edited by E. O. o. t. President: Office of Managment and Budget.

Pauly, Mark V. 1997. *Health Benefits at Work: An Economic and Political Analysis of Employment*. Ann Arbor, MI: University of Michigan Press.

Pennings, J. M. 1982. The Urban Quality of Life and Entrepreneurship. *Academy of Management Journal* 25 (1):63-79.

Perroux, François. 1983. A New Concept of Development. Paris: Unesco/University du Paris IX.

Perry, Charles W., and Harvey S. Rosen. 2004. The Self-Employed Are Less Likely to Have Health Insurance Than Wage Earners. So What? . In *Public Policy and the Economics of Entrepreneurs*, edited by D. Holtz-Eakin and H. S. Rosen. Cambridge: MIT Press.

Phillips, Bruce D., and Bruce A. Kirchoff. 1989. Firm formation growth and survival; Small firm dnamics in the U.S. Economy. *Small Business Economics* 1 (1):65-74.

Rubin, Barry, and Kurt Zorn. 1985. State Economic Incentives. *Pubic Administration Review* March/April:333-339.

Saxenian, A. 1994. *Regional Advantage*. Cambridge: Harvard University Press.

Schaffer, Steve 2007. Phone Interview with Steve Schaffer Nashua, New Hampshire, 2/7/2007.

Schiller, B., and P. Crewson. 1997. Entrepreneurial Origins: A Longitudinal inquiry. *Economic Inquiry* 35:523-531.

Schumpeter, Joseph. 1947. The Creative Response in Economic History. *The Journal of Economic History* 7 (2):149-159.

Seigfried, John J. , and Laurie Beth Evans. 1994. Empirical Studies of Entry and Exit: A Survey of the Evidence. *Review of Industrial Organizations* 9:121-155.

Shane, Scott. 1996. Explaining variation in rates of entrepreneurship in the Unites States: 1899-1988. *Journal of Management* 22 (5):747-781.

———. 2003. *A General Theory of Entrepreneurship*. Cheltenham: Edward Elgar.

Sobel, Russell S. 2006. Testing Baumol: Institutional Quality and the Productivity of Entrepreneurship. In *Working Paper*. Morgantown, WV: West Virginia University Economics Department.

———, ed. 2007. *Unleashing Capitalism: Why Prosperity Stops at the West Virginia Border and How to Fix It*. Morgantown, West Virginia: The Public Policy Foundation of West Virginia.

Solow, Robert M. 1957. Technical Change and the Aggregate production Function. *The Review of Economics and Statistics* 39 (3):312-320.

Stigler, George. 1968. *The Organization of Industry*. Chicago: University of Chicago Press.

Turner, Grace-Marie. 2008a. To mandate, or not? *NewsOK.com*, http://newsok.com/article/3197288.

———. 2008b. Very Strange Bedfellows. In *Health Policy Matters*. Alexandria, Virginia: The Galen Institute.

US_DoL. 2007. *Minimum Wage Laws in the States*. U.S. Department of Labor 2007 [cited 12/17/2007 2007]. Available from http://www.dol.gov/esa/minwage/america.htm.

Wasylenko, Michael. 1997. Taxation and Economic Development: the State of the Economic Literatures. *New England Economic Review* March/April 1997:37-52.

Wellington, Allison. 2001. Health Insurance Coverage and Entrepreneurship. *Contemporary Economic Policy* 19 (4):465-478.

Wilson, William Julius. 1996. When Work Disappears. *Political Science Quarterly* III (4):567-595.

Wolf, Charles Jr. 1997. *Markets or Governments: Choosing Between Imperfect Alternatives*. 2 ed. Cambridge: MIT Press.

Zuckerman, Stephen, Jennifer Haley, and Matthew Fragale. 2001. Could Subsidiz-ing COBRA Health Insurance Coverage Help Most Low-income Unem-ployed? In *Health Policy Online: Timely Analysis of Current Trends and Policy Options*. Washington, DC: Urban Institute.

CURRICULUM VITAE

Michael Scott Jackson was born on September 12, 1965, in Meridian, Mississippi, the youngest child of six born to a Pentecostal preacher, the Reverend Benny Eugene Jackson and Betty Jule Mathis-Jackson themselves the children of a sharecropper and a mill worker. His maternal great grandmother was a Pentecostal evangelist in the early 1900s, and his maternal Grandmother was an ordained Pentecostal minister from 1957 in an era when few churches ordained women and from a community of faith on the periphery of American religious life. It is this dedicated self-reliance and independence that has shaped much of his view of epistemic communities and the role of public policy. His academic pursuits in addition to the PhD, include degrees in Economic Development and Comparative International Affairs from Indiana University's School of Public and Environmental Affairs (2003), and Chemistry from the University of Evansville, Evansville, Indiana (1987), as well as, advanced coursework in inorganic and analytical chemistry from the University of Georgia (1988).

His early professional career included environmental chemistry with Waste Management Incorporated's Environmental Monitoring Laboratory in Geneva, Illinois, before moving into pharmaceutical quality control with Eli Lilly and Company. At Eli Lilly and Company he held a variety of roles from sales to supervision, and for six years served as a geographical representative for Africa and the Middle East in Intercontinental Regulatory Affairs, responsible for planning, training, market development and processes supporting the regulatory-government interface across the region and the company's full product portfolio. This experience fueled an already powerful interest in foreign affairs and business as a vehicle for development which grew out of his experiences in Malawi as a short term missionary in a mixed Muslim-Christian community in 1991, and informed it regarding the difficulties faced by developing countries in creating economic growth and obtaining high quality medications, medical education, etc.

Prior to his arrival at George Mason University he was the principle author of a co-authored paper with David B. Audretsch which appear in the *Journal of Technology Transfer* entitled "The Indiana University Advanced Research Technology Institute: A Case Study," vol. 29, no. 2. His other interests include natural resource management, science and technology, business and international relations. He has also held professional positions in urban planning and consulting, international program management and as a technical advisor on the 2004 Indiana Governor's race for Mitchell E. Daniels, Jr.