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Logit analysis of Montana firm survival during a recessionary period

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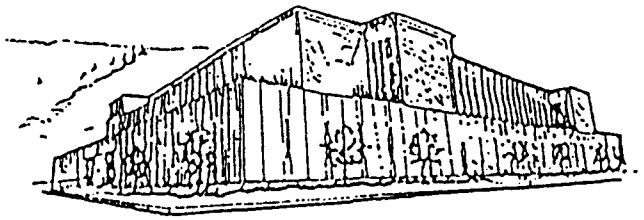

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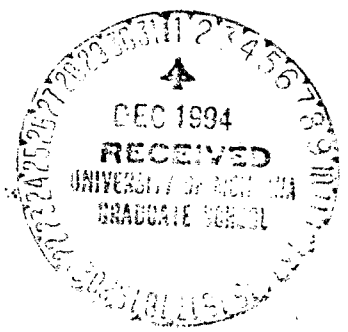

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A LOGIT ANALYSIS OF MONTANA FIRM SURVIVAL DURING A RECESSIONARY PERIOD

By

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A Logit Analysis of Montana Firm Survival During a Recessionary Period (104 pp.)

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This thesis analyzes Montana new business survival rates by describing and quantifying relationships between firm characteristics and the probability of surviving five years during a recessionary period (1983-1988). The results reveal that there are three factors that have a strong influence on the chances a new Montana enterprise will still be operating after five years. The first factor involves the interaction of localization and industry growth rates in which the new firm operates. For industries moderately dependent on the local economy, a 10 percent change in the national industry growth rate causes a 7.2 percent change in Montana firm survival. Even locally dependent firms have survival probabilities significantly enhanced when their industries prosper nationally.

The second firm characteristic that influences firm survival is the number of potential customers in the new firms market area. Increases in the number of potential customers has the largest impact on survival for firms in a highly localized industry. A 10 percent increase in potential customers increases survival probability by 1.64 percent. In addition, increases in potential customers has a positive influence on survival, albeit a small influence, for firms with little dependence on the local economy.

The property tax rate is the third factor with significant influence over firm survival. Surprisingly, the higher the tax rate, the higher the probability of survival. The property tax elasticity indicates that a 10 percent increase in millage rate leads to a 1.9 percent increase in survival probability.

This thesis has also demonstrated that there are three factors that do not have a systematic influence over the probability a firm is successful. The most intriguing is initial size since previous work, usually in single-industry and/or large-firm studies, has found initial size to be an important factor. At least in recessionary times, an increase in the initial employment level does not enhance or detract from Montana firm survival odds. Next, county growth, measured by either wage or employment growth, does not impact firm survival in a systematic way. Finally, a measure of the relative growth of a Montana firm compared to a national firm in the same industry does not enhance survival. Programs to raise the relative efficiency of Montana firms may or may not increase the odds of firm survival.

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CHAPTER I

INTRODUCTION

In the past decade, Montana lagged behind the nation in terms of its wages, employment, and business survival rates. These business conditions resulted in educated people exiting the state, fewer new business starts, small firm closures, and the collapse of small towns, especially in Eastern Montana. To promote economic security in the future, the underlying reasons for this depressed growth must be understood. In particular, this study focuses on business survival rates and firm and economic characteristics that raise or diminish the likelihood of a firm surviving.

The inferior performance of Montana businesses compared to businesses nationally becomes evident when one examines earlier studies. The Montana Department of Labor and Industry's 1990 Birth-Death Study calculated a five-year survival rate of 43 percent for Montana firms with covered employees[1] beginning operations in 1983. Researchers at Massachusetts Institute of Technology (MIT) pegged the five-year survival rate of U.S. businesses from 1969 to 1986 at

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[1]Covered employees are those workers whose employer pays unemployment insurance for them. The employer is required by law to file. The law requirements are touched upon later in the study.

approximately 50 percent.[2] These studies use different time periods with differing classifications of firms, therefore the numbers are not completely comparable. However, they do suggest Montana's poor performance relative to the national average.

This thesis focusses on the survival rate of Montana firms but differs from the 1990 Birth-Death Study by trying to predict the probability a firm will survive five years after inception. Through recognition of the characteristics which contribute to or detract from survival, informed business decisions can be made prior to commencement. Firms with the highest risk of failing can be identified.

The balance of the introduction is separated into four parts. The first examines employment trends in Montana and the United States for the 1970 and 1980 decades. The second analyzes the role that small firms play in employment growth. In the third, the study's particular objectives and implications are addressed. The final section describes the organization of the remaining chapters.

1.1 Employment: Montana and U.S.

The 1969-1979 period in Montana was one of sustained employment growth. While the nation as a whole suffered

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[2]David Birch, (1987). Job Creation in America: How our Smallest Companies put the Most People to Work. pp 18-19.

recessions in 1970 and 1974-75, Montana was only slightly affected. Total jobs in Montana grew by almost 36 percent while jobs nationally increased a more moderate 25 percent. Total personal income, adjusted for inflation, increased by 57 percent in Montana as compared with 44 percent for the nation.[3] North Dakota and South Dakota, with similar economic bases, also only minimally felt the national recessions.

Despite apparent economic health and/or resilience in the service and goods-producing industries, some Montana sectors declined in the 1970's. Agriculture and metal mining decreased in earnings and employment, foreshadowing a more significant decline in Montana in the 1980s.

In the early 1980s the nation experienced two recessions, one during the first half of 1980 and another in the latter part of 1981 and most of 1982. The national economy recovered from both recessions, but growth in the 1984-1986 period was slow.

Montana was hit harder than the nation during the first half of the 1980s. The state did not fully recover and experienced an additional recession in 1985 while the nation was slowly growing. In the 1979-1985 period, employment increased by 3 percent in Montana compared with an 11 percent increase nationwide. Total personal income, adjusted for inflation, decreased by 0.5 percent in Montana

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[3]Bureau of Economic Analysis, U.S. Department of Commerce.

while it grew nationally by 15 percent.

Montana's future growth is predicted to follow this pattern. Prospects for Eastern Montana are especially bleak. David Birch[4] has projected Montana's employment growth at 4.4 percent from 1987 to 1997, while during the same period the predicted growth for the United States is 15.7. Western Montana's employment is predicted to grow at 13.4 percent while Eastern Montana will lose 4.2 percent of its employment. Drought, lack of business starts, and decreased oil and gas activity all contribute to this loss.

Montana's growth depends on the health of businesses and industries in the state. To design policies to foster growth and mediate business failures, more information about firm characteristics that are associated with failure is needed.

1.2 Small Firms and Employment

Small business is a vital part of Montana's economy and employs a large portion of its workers. The state's well being is closely tied to small firm success.

In the nation, as in Montana, small- to medium-sized firms generate substantial economic growth and are primary sources of technological innovation and job creation. From

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[4]David Birch, (1987) Job Creation in America: How our Smallest Firms put the Most People to Work. pp 125-133.

1981 to 1985, firms with fewer than 20 employees provided 88 percent of new job creation in the United States.[5] Such firms are vital to economic stability and their importance as employers should not be overlooked. Table 1.1 presents for the United States, the percentage of establishments and level of employment in each firm size classification.

Table 1.1
National Establishments and Employees by Firm Size
1969-1986

Firm Size: Number of Employees	Percent of Establishments	Percent of Employees
0 - 19	83.4	25.2
20 - 99	9.9	19.8
100 - 499	3.2	16.7
500 - 4,999	1.9	18.3
5000 or more	1.5	19.8
Totals:	99.9	99.8

Source: David Birch, Job Creation in America.

In the United States, 83 percent of all businesses have fewer than 20 employees. Moreover, these same small firms employ approximately 25 percent of the entire workforce. Although this may seem to undermine their importance, small firms create a substantial foundation in terms of employment and number of firms, and are often the area of greatest growth.

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[5]ibid. pp 15-17.

In Montana, small firms are even more important than nationwide in providing employment. Tables 1.2 and 1.3 demonstrate this dependency on small firms for 1984 and 1986.

Table 1.2
Enterprises by Firm Size in Montana
1984 and 1986

Year		Total	Firm Size (number of employees)			
			<20	20-99	100-499	500+
1984	Number of Firms:	18,752	17,417	1,193	123	19
	Percent	100	92.9	6.4	.7	.1
1986	Number of Firms:	18,369	17,053	1,165	131	20
	Percent	100	92.8	6.3	.7	.1

Source: U.S. Small Business Administration, Office of Advocacy, Small Business Data Base

Table 1.3
Establishment Employment by Firm Size in Montana
1984 and 1986

Year		Total	Firm Size (number of employees)			
			<20	20-99	100 - 499	500+
1984	# of Employ	201,726	78,000	43,716	23,582	56,428
	Percent	100	38.7	21.7	11.7	28
1986	# of Employ	208,319	76,372	43,013	25,906	63,028
	Percent	100	36.7	20.7	12.4	30.3

Source: U.S. Small Business Administration, Office of Advocacy, Small Business Data Base.

For both years, almost 93 percent of Montana firms have fewer than 20 employees. Only 7 percent of Montana firms have 20 or more employees.

There is little difference in the distribution of employment by each category for each year. In 1984 approximately 39 percent of Montana's workforce was employed in firms with fewer than 20 employees. Nationally only one fourth of the employees worked in firms this small.

With more than a third of its workforce for both years in small establishments, the survival of small firms is particularly important to Montana's economy. Not only do workers depend on the success of firms for jobs, but secondary effects such as self-esteem and community involvement rely on a stable working environment.

1.3 Objectives and Implications

With over a third of the state's labor force dependent upon small firm success, policies that increase survival probability are critical. In order to develop programs for Montana, factors that enhance small firm's ability to survive must be known. Most studies on survival rates have relied on data for large firms. Since a substantial number of Montana firms are small, many of these studies are not useful for developing state programs.

The objective of this research is to develop a

straightforward analysis of Montana business survival. This is accomplished by describing and quantifying the relationships between a firm's measurable characteristics and probability of survival.

As shown in the prior section, Montana's economy relies on small business. The sample available for this research consists primarily of firms with an initial size of fewer than 6 employees. A data set of this sort is important when creating a model to represent Montana's business environment.

All but one of the measurable characteristics represent the business environment in which the firm operates. These external characteristics are primarily based upon each firm's industry and county. The only characteristic not external to the firm is initial size.

A variety of state and federal programs have focused on helping small firms in Montana survive. For example, in 1988 the Business Assistance Division of the Montana Department of Commerce gave technical assistance for development in financial analysis, financial planning, loan packaging, industrial revenue bonding, state and private capital sources, and business tax incentives. The Business Assistance Division encouraged the use of additional programs including Community Development Block Grants, Economic Development Administration Grants, Small Business Administration loan guarantees, and the Montana Board of

Investments' in-state investment funds.

For the time period of this study (1983-1988) the programs above are only a small sample of state programs designed to aid small businesses. The programs administered in these years were usually in the form of training, loans, and loan guarantees. A complete listing of the programs that were available in 1983 and 1988 is located in Appendix A.

All of these policies were designed and implemented without systematic knowledge of which firms fail and why. To improve policies which foster business survival in Montana requires identification of the characteristics which lead to higher rates of survival (or failure). This thesis focuses upon the identification of these characteristics. Once information is known about the determinants of firm survival, effective policy can be developed.

There are several potential uses of systematic survival information. First, if high property taxes were detrimental to the health of the firms, legislation could be directed to raise revenue from other sources or give tax breaks to new or struggling firms. Another possibility lies in helping a new firm locate. If the firm is dependent on the local economy, programs could inform the entrepreneur which local economies are faring the best. Finally, if the establishment with a larger initial size has a better chance of surviving, state capital assistance programs could help

businesses acquire the resources needed to think big.

This thesis predicts the likelihood of firm survival given numerous measurable characteristics. Currently, the relationship between firm characteristics and firm survival is only hypothesized. This research will help in the development of better policies to foster increased business survival in Montana.

1.4 Structure of the Study

This study is split into six chapters. Chapter II contains a discussion of existing research in the area of firm survival. Chapter III presents the general problem along with a discussion of the estimation methods. Chapter IV describes the data set and Chapter V reports the empirical results. The final chapter summarizes the results and their implications.

CHAPTER II

LITERATURE REVIEW

Business survival literature covers an extensive range of topics. Most of this literature falls into two broad categories: work that focuses on internal organizational factors, and work that focuses on business environment factors. Internal organizational factors (micro-economic) are those specific to a firm and over which a firm has some control. Some examples include: finances, growth, and age. On the other hand, business environment (macro-economic) factors lie outside the control of the firm. Examples of business environment variables are industry and state characteristics and aggregate market indicators such as GNP or personal income. Internal factors are described in section 2.1, external factors in 2.2.

2.1 Internal Organizational Factors and Survival

Studies using internal organizational factors to predict firm survival are of three types. First, many studies in the past two decades have used financial ratios for firms as determinants of firm health. Not only have researchers used these ratios, but financial brokers and private investors also use these ratios to recommend

investments in the asset markets. Section 2.1.1 discusses this literature.

Section 2.1.2 explores the internal organizational literature which uses game theoretical techniques to characterize firm survival.

The third class of internal organizational studies posits a relationship between firm survival and the firm growth rate, age and/or size. Section 2.1.3 addresses these studies.

2.1.1 Financial Reports, Ratios and Strategies

Firm financial reports include balance sheets, income statements and annual reports. A myriad of financial ratios can be computed from data in these financial reports. Examples of financial ratios are: profitability ratios (net income to net assets), operating ratios (working capital to sales), leverage assessments ratios (total liabilities to total assets), solvency ratios (cash flow to total liabilities), and coverage ratios (earnings before interest and taxes to interest).

Studies based on financial ratios assert that, on an ex post basis, failed firms can be correctly identified 90 percent of the time by the nature of their financial ratios in the year prior to bankruptcy. What is at question, however, is not that the ratios are different for failed firms in the period prior to failure, but rather, whether or

not the differences in financial ratios are causal factors in the failure of the firm. It may be that differences in financial ratios are merely reflective of the firm's overall decline caused by other market or firm characteristics.

Altman (1968) was among the earliest to employ internal financial information to predict firm failure. Altman uses discriminant analysis on five types of financial ratios: financial, leverage, activity, liquidity, and solvency to predict bankruptcy for large, publicly-held corporations. One financial ratio from each ratio category calculates a single discriminant score which in turn classifies the firm as either bankrupt or non-bankrupt. Altman's ratios predict bankruptcy up to two years prior to the event with a 95 percent accuracy rate.

Beaver's (1968) study is similar to Altman's, save that he used different financial ratios, and predicted firm failure up to five years prior to the event.

Chamberlain (1990) examines the relationship between firm survival and the risk a corporation undertakes by its financing method. Risk is measured by either the debt-equity ratio or the interest-coverage ratio. Using time series data from 1955 to 1981 for 25 large, industrial corporations, Chamberlain finds that firm survival is positively related to monopoly profits. Monopoly profits are positively related to high interest coverage and low debt-equity level. Thus, monopoly profits encourage

management to adopt a conservative capital structure in order to increase likelihood of firm survival.

Deily (1988) proves the common assertion that firms disinvest from, and then close, their highest-cost plants first. Her study differs from others by measuring exit from an industry using investment data rather than plant-closing data. In an earlier study, Deily (1988a) established that plant closings underestimate exit activity because immobile capital or exit barriers significantly delay shutdowns. Firms that stop investing in a plant are in essence preparing to close that plant. The data for Deily's work results from multi-plant steel company investments between 1960 and 1981.

The above studies are a small sample of research which uses financial ratios to examine firm failure. All of these studies share a common flaw. Clearly, failed firms will have financial ratios that are systematically different from the financial ratios of healthy firms. The relevant question is to what extent these ratios are causal factors which predicate firm failure, or mere reflections of the failure caused by other factors. Suppose, for example, that business failure is caused by market or other firm characteristics. An ex post observation of how financial ratios for failed firms differ from those of healthy firms would not identify the underlying causal characteristics of business failure. Further, most of these studies focus on

large, often multi-plant, corporations. This research, while valid, has less value in studying a regional mixture of small firms in many industries.

2.1.2 Game Theory Models of Failure

The second type of business failure studies is based on game theory. Game theoretic approaches are found in Friedman (1979), Ghemawat and Nalebuff (1985), Reynolds (1988), and Thietart (1988). The first three studies are pure theory, while, Thietart combines a theoretical model with an empirical validation.

Friedman (1979) uses a supergame approach to address the strategic issues related to exit.[1] He indicates firms are not necessarily forced to exit by bankruptcy; they choose to exit when variable operating costs exceed revenues. Friedman proves the existence of a non-cooperative entry-exit equilibrium for a broad class of time-dependent, non-stationary supergames.[2]

Ghemawat and Nalebuff (1985) develop a game theoretical model of a declining industry of single plant firms. They find that larger firms exit before small firms.

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[1] A supergame is a game played over time in which the players play a pre-set sequence of constituent games.

[2] A non-cooperative equilibrium indicates that no player can unilaterally alter his own behavior and increase his (supergame) payoff. A player will choose to exit at some finite time if doing so is better than remaining in the game indefinitely.

Reynolds' (1989) work is similar to Ghemawat and Nalebuff. Reynolds examines the plant-closing and exit behavior of oligopolists in a declining industry. There are two main results. First, when multi-plant firms have the same number of plants, high-cost plants close before lower-cost plants. Second, a larger firm, one operating more plants, begins closing plants before a smaller firm, as long as cost differences between the larger and smaller firms are not great. Since the remaining plants get the revenues of a closing plant, there is an incentive for large plants to acquire and retire the plant of a smaller, rival firm.

Thietart (1988) examines strategies to save rather than pare down a plant or close a firm. He determines that a strategy is effective depending upon the firm's objective. Firm objectives are either to maximize profit or increase market share. From a long list of business strategies, Thietart finds the firm is effective in achieving their objective depending on the industry characteristics, the firm's strategic posture, the competitive nature of the market, and, of course, the strategy actually chosen. Strategic options for the firm include: asset reduction, changes in marketing expenses, changes in product quality, backward integration and price reductions.

The above studies develop an economic theory of business failure. Most of these studies assume perfect information among all firms. Further, they consider only a

single industry with a declining aggregate demand. They provide, unfortunately, no ranking of the importance of the failure causing factors they identify. Finally, these studies are modelled on firm failure for large, multi-plant manufacturing firms. Hence, while these are valuable indicators of some factors that may influence Montana business failure rates, they are inadequate for designing the Montana policies to enhance firm survival.

2.1.3 Effects of Firm Age and Size on Growth.

This section presents general studies of firm growth as it is influenced by firm size and age. Business failure is a special case of a growth analysis where the firm growth rate is negative to the point of extinction. General studies of growth are important as well since factors that make a firm grow also keep it from failing.

Singh and Whittington (1975) study the growth experience of 2000 firms in 21 industries over two time periods: 1948-1954 and 1954-1960. Singh and Whittington's study reaches five conclusions.

1) There is a weak positive relationship between the firm size and average rate of growth.

2) The dispersion of growth rates declines with an increase in firm size. However, large firms do not have a high degree of uniformity of growth rates.

3) Firms which had an above (or below) average growth rate over one 6-year period also tended to have an above (or below) average growth rate in

the subsequent 6-year period.

4) Persistence of the growth rates (3 above), is a major cause of the positive correlation between size and growth (1 above).

5) a. The number of entrants into the industry decreases for each increasing size classification. However, there are still many births in each size classification.

b. Firm closures decline as the firm size expands. There is a negative, non-linear relationship between size and the probability of death.

For the purpose of this thesis, 5b is the most important result--a negative, non-linear relationship between size and probability of death. Similar results are found in Mansfield (1962), and Du Rietz (1975).

Jovanovic (1982) develops a theoretic model of the evolution of firms in an industry. The model posits a homogenous product, an infinite number of competing firms, a one-time entry cost, and factors of production supplied at constant prices. The production costs are random and differ among firms. A firm does not know its true costs, but it knows the population distribution of true costs. Firms differ in size not because of fixed capital, but because some discover they are more efficient than others due to location, managerial ability, or technology. The model predicts that efficient firms survive and grow while inefficient firms decline and fail. Firms that fail are typically smaller than their counterparts. Average profits increase as an industry ages, as does concentration, as long

as the product price does not drop. Finally, the variability of the growth rates is larger among young and hence, smaller firms.

Frank (1988) extends Jovanovic's model to focus more strongly on firm exit. Frank finds that after an initial lag, which is positively related to sunk costs, newer firms begin to exit faster than the older, more-established firms. Low revenue causes an increase in the likelihood of exit, and past good performance never guarantees continuation.

Frank's model differs from Jovanovic's in several ways. In Jovanovic's model, two simultaneous entrants hold the same beliefs and enter at the same scale. Entry drives down market price so that the most any prospective entrant could earn is zero expected profits. In contrast, Frank considers entrants with differing beliefs concerning their own productivity. They enter the market at different scales of operation. Only the last entrant needs to be a marginal entrant. Second, Jovanovic's model has entry costs and expectations equal for all firms. In Frank's model entry costs differ. The larger the sunk cost the higher the firm profit expectations. Thus, it takes a high sunk cost firm longer to leave the market than a low sunk cost firm due to their expectations.

Evans (1987a, 1987b) analyzes firm growth in two separate studies using data from the Small Business Data Base (SBDB). In his 1987a study, he tests alternative

growth theories by estimating the relationship between firm growth and firm size and age. Evans estimates the partial derivatives of growth with respect to both age and size. He finds firm growth decreases with firm age when firm size is held constant for young firms. Further, firm growth decreases with firm size.

In his 1987b study, Evans estimates second-order logarithmic functions of growth, survival, and the variance of growth for both young and old firms. He finds the following results for both groups. First, firm growth decreases with size and age. Second, the probability of survival increases with size and age. Finally, the variability of firm growth decreases with firm age. The age relationships identified by Evans are consistent with the predictions of Jovanovic's theory of firm growth.

The Evans' work differs from prior research for two reasons. First, Evans has smaller-sized firms in his sample rather than the larger, publicly-traded corporations in many studies. Second, Evans controls for sample selection bias. The sample selection error occurs because small firms with slow or negative growth are more likely to fail and disappear from the sample than large firms.

Hall (1987) uses two firm samples drawn from publicly-traded manufacturing firms from the Compustat files. He finds that firm size and growth have a negative relationship not attributable to measurement error in employment or to

sample selection bias. Hall finds the variation in growth rates across firms is uncorrelated with the probability of survival. He shows the probability of firm survival is positively related to size, and firms with large asset commitments to research and development are less likely to exit than firms with small research commitments.

Dunne, Roberts and Samuelson (1988, 1989) use a newly developed firm-level panel data set of the manufacturing sector to examine firm entry, growth and exit. They examine 200,000 firms which entered the manufacturing sector between 1967 and 1977. These researchers separate entering manufacturing plants into three groups: new firm-new plant, diversifying firm-new plant, and diversifying firm-old plant. The prevalence of entries, exits, and output is computed for each group.

Dunne, Roberts, and Samuelson find a significant variation in the entry and in the resulting size and output patterns for different categories of entrants. For example, the new firm-new plant category account for 55 percent of the entrants. In addition, new firms are only 28 percent as large as existing firms yet contribute 50 percent of entrant output. The researchers also detect a high degree of correlation across the industries between entry and exit rates. Thus, an industry with a higher number of entrants also has a higher number of firms exiting. In addition, the market share of each generation of firms declines as the

generation ages due to high exit rates that overwhelm the growth in average size of surviving firms. The younger the firm, the higher the probability it will fail.

In 1989, Dunne, Roberts, and Samuelson identify the characteristics that are statistically related to the failure of firms. The researchers group firms into cells based on their characteristics. After establishing the cells, the researchers calculate five sample statistics: 1)failure rate, 2)mean growth rate for all plants, 3)mean growth rate for all non-failing plants, 4)variance of growth rates for all plants, and 5)variance of growth rates for non-failing plants. They use weighted-least squares regressions to examine across-cell patterns for each statistic.

The empirical results were several. First, failure and growth rates decline with age. Next, relative to small plants, large plants have lower failure rates and lower growth rates. Finally, large multi-unit plants have lower failure rates, and higher growth rates than large single-unit plants. Large single-unit plants have negative average growth rates.

2.2 External Characteristics

This section presents work which identifies factors external to the firm having an impact on firm survival.

These external characteristics shape the business environment and are not subject to firm control.

2.2.1 External Characteristics - National Studies

Altman (1983) studies the relationships between business failure rate and macroeconomic indicators of the economy's performance. He uses quarterly, first difference, regression models which emphasize the distributed lag structure of the explanatory variables. The dependent variable is the Business Failure Rate (BFR) as compiled by Dunn and Bradstreet for 1951-1978. The independent variables are growth rates for: real Gross National Product, money supply (M_2), Standard & Poor's Index of stock prices, and new business formation (number of new incorporations). Altman reveals the business failure rate to be negatively related to real economic growth, money supply growth, and stock market performance. Business failure rate is positively related to new business formations. New business formations increase the business failure rate only after a considerable lag time.

Rose, Andrews, and Giroux (1982) also analyze relationships between macroeconomic variables and business failure. Rose, Andrews and Giroux find variables that correlate with the firm failure rate, however, they do not develop a theory to link these macroeconomic variables to the firm. Thus, we can not conclude that their factors

cause business failure. Using all independent variables, a stepwise regression identifies those macroeconomic variables highly correlated with the failure rate. The authors suggest that the failure process is complex since variables from each of the three business cycle models appear in the final equation. Of the six independent variables, the following had a positive relationship with the failure rate: Standard & Poor's 500 composite index, ninety-day treasury bill rate, and retail sales/GNP. The following had a negative relationship with the failure rate: profits after tax/income originating in corporation, prime rate, and gross private domestic investment/GNP.

MacDonald (1986) examines the entry and exit of businesses in a mature industry using the Small Business Data Base for 46 food manufacturing industries between 1976 and 1982. Focusing on smaller firms that make up the competitive fringe, MacDonald finds industry growth attracts entry while capital commitments deter entry and exit.

Bartik (1988) assesses the impact of state characteristics on small business formations using panel data. Bartik's study has the following results. First, business starts are positively correlated with a high market demand for a firm's services, proxied by population and industrial density, and per-capita income. Next, property tax has a negative effect on small business starts unless tax cuts reduce business-related public services. An

increase in competitiveness of a state's financial market encourages more business starts and finally, an increase in the number of high-school graduates increases small business formations.

One study examines whether there is a difference in business failure rates between 18 major U.S. cities. Post and Moon (1988) take economic data from the cities, control for population and differing economic conditions, and create a pooled cross-section/time series data set. The researchers estimate the business failure rate as a function of personal income, labor costs, interest rate, price index, proprietor income, and costs in prior periods. Post and Moon find a significant difference in failure rates among their 18 cities. That is, some cities had higher failure rates, than others. Post and Moon did not identify the causal factors to explain the differential failure rates.

Many of the studies in this section are useful for large firms and for areas of the country which reflect national trends. Historically, however, Montana's economy does not perfectly follow national trends. Further, since more than 90 percent of the Montana firms have fewer than 20 employees, Montana businesses are not a microcosm of national patterns. Therefore, information in these external characteristics models is suggestive rather than definitive of the analysis needed to design Montana policy.

2.2.2 External Characteristics - Regional Studies

The Montana Department of Labor has published two studies on Montana business births and deaths. Both of these studies use data from Unemployment Insurance Files. The first study presents one and two year survival rates for the businesses started in 1984. The second study reports one to five year survival rates for new firms in 1983. Neither studies attempts to predict survival rates using business characteristics.

The first birth-death study presents entry and exit patterns, finding a positive correlation between entry and exit rates across industries. That is, industries with a higher (lower) number of entrants also have a higher (lower) number of firms exiting. Dunne, Samuelson and Roberts (1988) also reports this pattern.

In a North Dakota study, Buss and Popovich (1988) chose a sample of all firms that began business between 1980 and 1987. They calculate a survival rate for these new firms by dividing the number of firms still in businesses in 1987 by the total number of firms in the sample. The survival rate is equal to 65.1 percent. Since the survival rate is for a period of years, no trends are discernable. There is not a one-or five-year measure of survival, and thus the results are not easily comparable to the results found in the two Montana studies cited earlier.

The researchers for the North Dakota study also

surveyed successful and discontinued businesses. They reported that a slightly higher proportion of retail and wholesale trade businesses discontinued operations. Further, discontinued businesses had used more bank loans and less personal savings than had successful firms. Finally, discontinued firms began business with lower initial capital levels than did successful firms.

The above literature does not predict for Montana's industrial mix of large and small firms which factors bode well for firm survival and which factors bode ill. In chapter III a methodology is developed to isolate the state specific internal and external factors that increase the probability of firm survival.

CHAPTER III

METHODOLOGY

This chapter builds a reduced form model of firm survival based on firm characteristics, market, and environmental factors. Each of the independent variables is described and hypotheses are formed as to their role in enhancing survival probability. Finally, we derive the logit model for estimation of a dichotomous variable.

3.1 General Model and Hypotheses

Although no definitive picture of the determinants of firm survival emerges from the literature in Chapter II, some firm and market characteristics surface as influencing the probability of survival. According to Chapter II, firm survival is related to its size, age, growth, and other variables associated with industry and market characteristics.

This thesis seeks to predict the survival probability of new firms in Montana. This approach is unique in several ways. First, the study focuses on a mixture of small firms in many output markets rather than large, corporate or stock-issuing firms. In addition, this study uses new firms over a five year period, not established firms. Finally,

the study identifies causal factors for survival or failure, not factors simply correlated with survival or failure.

Because we focus on new firms in many output markets for a single five year period, we do not have age or growth rate of existent firms as independent variables. For Montana's mix of small firms, internal financial information is also not available.

An implicit model predicting the probability of a firm's survival is given by:

$$P_s = f[SIZE, CTYGRO, COMP, TAX, INDGRO, CUST, LOCAL] \quad (3.1)$$

P_s represents the probability of a firm's survival.

SIZE is firm size measured by initial number of employees. All of the studies in Chapter II found that size enhanced the likelihood of firm survival.

CTYGRO is the growth rate of county economies as measured by either growth in county employment or county wage income. By hypothesis, survival and county growth should be positively related.

COMP measures firm competitive efficacy for each particular industry in Montana. Some industries in Montana grow more (less) rapidly than the national average growth rate of that industry. As the competitive

performance of the industry in Montana improves, the probability of a firm's surviving increases.

TAX represents the putative negative role that high property tax rates have for firm survival. Tax is measured by 1985 county property tax rates for the county in which a firm operated. Some studies indicate high property tax rates harm businesses and reduce the probability of firm survival. Other studies claim property tax is such a small proportion of total costs that it has little impact on firms. Whatever its magnitude, the correlation between taxes and the survival of a business is hypothesized to be negative. Property tax by itself, disassociated from the public services funded by these taxes will be expected to negatively impact firm survival rates. However, we are unable to separate taxes paid from the benefits produced by these taxes. Instead, we examine whether or not the level of county taxes, however used, is an important predictor of new firm survival.

INDGRO for each firm measures national industry growth rate. If a firm enters an industry which is rapidly growing nationally, the probability of that firm surviving increases. INDGRO should be positively related to firm survival probability.

CUST is a firm's potential market share relative to the competition measured by county population divided by the number of existing firms in the industry within that county. CUST estimates the level of demand for goods or services sold by the firm and the extent their competition serves that demand. An increase in demand (number of potential customers) should increase a firm's survival probability.

LOCAL is a localization coefficient measuring the degree to which employment in an industry is concentrated in certain areas rather than being geographically distributed in the same way as employment. The larger the number, the more geographically concentrated its employment and the less dependent an industry is on local conditions. LOCAL is the variance of a local industry employment concentration relative to the employment concentration in that industry statewide. It is measured by:

$$LC_i = \sum_{j=1}^{56} \frac{\left(\frac{StateIndustry_i Employment}{TotalStateEmployment} - \frac{County_j Industry_i Employment}{TotalCounty_j Employment} \right)^2}{n}$$

(3.2)

for i = 1 to 51

n = 56 is the number of counties in Montana

LOCAL will be used as an interaction variable with

INDGRO and CUST. The localization coefficient is separated into 3 groups using 2 dummy variables. The groups measure industries that have a low, medium, and high level of localization. It is hypothesized that the more locally oriented the firm, the greater the impact of CUST and the smaller the impact of INDGRO.

3.2 Logit Estimation Method

Because new firms at the end of our observation period had either survived or failed, the dependent variable to be estimated is dichotomous. We use the logical model for estimation, logit.

The dependent variable in logit is dichotomous and qualitative in nature.[1] The qualitative dependent variable is Y.

Where

Y = 1 When the firm survived at least five years.

Y = 0 When the firm failed before five years passed.

To derive the logit model estimation equation, begin with the cumulative logistic distribution function.

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[1]The discussion and derivation of the logit model was obtained from the following text: Basic Econometrics, Damodar N. Gujarati.

$$P_s=E(Y=1 \mid X_{1i}, X_{2i}, .. X_{ni}) = \frac{1}{1+e^{-Z_i}} \quad where \; Z_i=\alpha_1+\beta_1 X_{1i}+..+\beta_n X_{ni} \qquad (3.3)$$

e is the base of the natural logarithm.
P_s is the probability that Y = 1.

Here, Z_i is a linear combination of independent variables and ranges between $-\infty$ to $+\infty$. P_s ranges between 0 and 1, and P_s is not linearly related to Z_i. However, an intrinsic, linear relationship can be found as follows. If P_s is equal to the probability of a firm surviving, then $1-P_s$ measures the probability of a firm NOT surviving. $P_s/(1-P_s)$ represents the odds ratio in favor of the firm surviving. For example, if P_s = .75, odds are three to one in favor of a business surviving five years after inception.

Divide (3.3) by $(1-P_s)$ and take the natural log of the result to obtain the logit estimation equation.

$$L_i=\ln\left(\frac{P_s}{1-P_s}\right)=Z_i=\alpha_1+\beta_1 X_{1i}+..+\beta_n X_{ni} \qquad (3.4)$$

L_i is the log of the odds ratio and is called the logit. L_i is linear in both the vector of independent variables, X, and in the estimated parameters. In the model above, as P_s goes from 0 to 1, L_i goes from $-\infty$ to $+\infty$.

Although L_i is linear to X_{ji}, the probabilities themselves are not. This attribute enables the log-linear model to estimate nonlinear relationships.

The interpretation of (3.4) is straightforward. Each β_i is the adjustment in the log of the odds ratio for firm

survival that is made when there is a one unit change in the independent variable X_i. The intercept, α, is the value of the log of the odds ratio in favor of the firm surviving five years if all the independent variables are zero.

The data consists of a vector of independent variable values for each firm. A firm that survived 5 years has $P_s=1$. If the firm failed within five years, $P_s=0$. To directly estimate L_i for either firm outcome would entail:

$L_i = \ln(1/0) = +\infty$ if the firm survived.

or

$L_i = \text{Ln}(0/1) = 1$ if the firm ceased operations.

Hence, the data must be grouped into cells according to the ranges of the independent variables. Estimates can then be made from the aggregate data. For each cell, an estimated value for P_s denoted P_s is computed as:

$$\hat{P}_s=\frac{n_i}{N_i} \qquad (3.5)$$

Where

n_i = the number of firms surviving.
N_i = the number of firms in this grouping.

If N_i is fairly large, P_s will be a good estimate of P_s and can be used to estimate the logits, L_i.

$$\hat{L}_i=\ln\left(\frac{\hat{P}_s}{1-\hat{P}_s}\right)=\alpha_1+\beta_1 X_1+\ldots+\beta_n X_n+u_i \qquad (3.6)$$

Unless N_i is significantly large and each observation in each cell is distributed independently as a binomial variable, the error term is heteroscedastic. To overcome heteroscedasticity, a weighted least squares approach is applied to equation (3.6) to estimate the parameters. For empirical purposes, the unknown P_s is replaced by P_s and the error term distribution is:

$$u_i \sim N\left[0, \frac{1}{N_i \hat{P}_s (1-\hat{P}_s)}\right] \qquad (3.7)$$

Once the estimates of α and the β's for the logit model are known, the next step is to test the coefficients for significance using a t-test. One and two tailed tests are used depending upon the independent variable.

To test the model for overall fit of the data, the Hosmer-Lemeshow Chi-Square Goodness-of-Fit test is used. This test is designed for data with fewer than five observations per cell. The sample here has approximately three firms per cell.

The economic interpretation of the estimated coefficients, β_i, is easier if one defines survival elasticities for each independent variable. A survival elasticity, E_i, measures the percentage change in probability of firm survival due to a percentage change in the value of variable X_i.

$$E_i = \frac{\%\Delta \hat{P}_s}{\%\Delta X} = \frac{\Delta \hat{P}_s}{\Delta X} \times \frac{X}{\hat{P}_s} \qquad (3.8)$$

Where E_i = survival elasticity of variable X.

Using the property tax rate as an example, it follows from equation (3.6) that

$$\hat{L}_i = \Delta \ln \left[\frac{\hat{P}_s}{1-\hat{P}_s} \right] = \beta_{Tax} \Delta Tax \qquad (3.9)$$

From the properties of natural logarithms:

$$L_i = \Delta \ln \frac{\hat{P}_s}{1-\hat{P}_s} = \left[\frac{1}{\hat{P}_s} + \frac{1}{1-\hat{P}_s} \right] \Delta P_s \approx \frac{1}{\hat{P}_s [1-\hat{P}_s]} \Delta P_s \qquad (3.10)$$

Hence from (3.9) and (3.10) we have:

$$\left(\frac{1}{\hat{P}_s (1-\hat{P}_s)} \right) \Delta P_s = \beta_{tax} \Delta tax \Delta P_s \approx \beta_{tax} [P_s (1-P_s)] \Delta Tax \qquad (3.11)$$

By the definition of the tax survival elasticity (3.8)

$$E_{tax} = \frac{\beta_{tax} (\hat{P}_s (1-\hat{P}_s)) \Delta tax}{\Delta tax} * \frac{tax}{\hat{P}_s} \qquad (3.12)$$

Equation (3.12) can be reduced to:

$$E_{tax}=\beta_{tax}(1-\hat{P}_s)\,tax \qquad (3.13)$$

Thus, the survival elasticity for the property tax variable is the estimated coefficient times the probability of failure times the tax level. For P_s estimated by the survival or non-survival of all the sample firms, we can compute survival elasticities for internal or external firm characteristics.

The elasticity measure E_i is valid for each of the continuous variables which are not logarithmic values. An independent variable which is a logarithmic value has an estimated coefficient β where

$$\Delta\ln\frac{\hat{P}_s}{1-\hat{P}_s}=\beta_i\Delta\ln(X_i) \qquad (3.14)$$

$$\Delta\ln\frac{\hat{P}_s}{1-\hat{P}_s}\cong\frac{1}{\hat{P}_s(1-\hat{P}_s)}\Delta\hat{P}_s=\beta_i\Delta\ln X_i \qquad (3.15)$$

Solving for the change in P_s provides

$$\Delta\hat{P}_s=\beta_i[\hat{P}_s(1-\hat{P}_s)]\Delta\ln(X_i) \qquad (3.16)$$

Dividing through by P_s provides

$$\frac{\Delta\hat{P}_s}{\hat{P}_s}=\beta_i(1-\hat{P}_s)\Delta\ln(X_i) \qquad (3.17)$$

and solving for the natural logarithm of X_i provides

$$\frac{\frac{\Delta P_s}{P_s}}{\Delta \ln(CUST)} \approx \beta(1-P_s) \qquad (3.18)$$

The survival elasticity for the logged independent variable X_i is:

$$E_i = \frac{\frac{\Delta \hat{P}_s}{\hat{P}_s}}{\frac{\Delta \ln(X_i)}{\ln(X_i)}} = \beta(1-\hat{P}_s) \qquad (3.19)$$

For variables like potential customers which is measured by the natural logarithm, the survival elasticity is independent of the value of the variable.

The aggregate data set used for estimation of (3.6) is described in chapter IV.[2]

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[2]The model was first estimated using regression analysis and assuming a linear relationship between the dependent variable and the independent variables. The dependent variable was the percent of firms that survived while the independent variables were the survival factors. This method did not provide significant estimators of firm survival.

CHAPTER IV

DATA SOURCES

This chapter describes the nature and sources of the data used for estimation in sections 4.1 and 4.2. Section 4.3 presents variable distributions and the final section discusses variable transformations.

4.1 Firm Characteristics

In 1990, the Montana Department of Labor and Industry began a study of survival rates of new businesses using state unemployment insurance applications. A firm must register with the Montana Unemployment Insurance Division if wages paid to all employees for the current or preceding calendar year exceeds $1000. For each new firm which registered with the Montana Unemployment Insurance Division in 1983, the agency recorded an ID number, Standard Industrial Classification (SIC) code, county code, and the initial number of covered employees.

The study's sample contains only the businesses which were new in 1983. A new firm is one which had not had an owner prior to 1983 or an earlier unemployment insurance account number, active or inactive. This criterion eliminated establishments that arose from mergers, takeovers, splits, and other ownership changes, as well as

seasonal businesses.

Many of the unemployment insurance files did not contain the necessary information to indicate a firm's actual closing date. An inactive date in the unemployment insurance files does not always signify a firm has closed; it may simply indicate the firm is no longer required to file under that account number. The firm may have ceased operations or undergone an ownership change and have a new account number. Further, the firm may still be open but paying less than $1000 in wages and, thus, have a closed unemployment insurance account.

Since the inactivation date does not always correspond with the date the business ceased operations, the researchers surveyed most of the businesses with inactive accounts. However, they did not survey businesses with information in their files indicating bankruptcy, closure, or a new account number. Firms that filed for bankruptcy were classified as closed on the bankruptcy date.

When a business closed, the actual closing date was used as the failure date rather than the inactivation date of the unemployment insurance account. Actual closing dates provide a more accurate measure of firm survival. 1,224 businesses with terminated unemployment insurance accounts were sent surveys. Of the 225 that responded, 59 percent of the businesses with terminated accounts were still open and, therefore, successful in surviving 5 years.

The post office returned 336 questionnaires as not deliverable with "closed" written on many of the envelopes. For these businesses, the closure date was the cancellation date of the unemployment insurance account.[1]

Similarly, researchers sent questionnaires to a sampling of businesses with active unemployment insurance accounts. These surveys were to clarify beginning and ending dates when necessary, and covered additional topics not relevant to this thesis.

After compiling the sample, two final adjustments were made. First, every firm without a specific SIC was excluded because they could not be accurately assigned to a particular industry. Secondly, household employers of domestic servants were eliminated as not constituting a business. This does not mean that domestic servants do not earn wages. Rather, policies to encourage firm survival and economic development in Montana have traditionally focused on non-household employers.

The final sample of 2,214 firms has two limitations. First, it includes only those firms whose employees were covered by unemployment insurance. Examples of businesses not represented in the sample are: self-employed worker-firms, railroads, most agricultural establishments, and firms paying out less than $1000 in wages. The survival of

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[1]Montana Department of Labor and Industry, Research and Analysis Bureau, 1990 Birth-Death Study, 1990.

agricultural firms has been extensively studied elsewhere.

A second limitation is that the sample covers only a single five-year period, 1983-1988. For most of this period Montana was in a recession. Examining another five-year non-recessionary period might produce different results.

In addition to data specific to each firm, estimation of the model in Chapter III requires data describing the environment in which the firms operate.

4.2 Business Environment Characteristics

This section describes the business environment data which influences firm survival. The model requires information on six characteristics external to the firm. These characteristics are: county growth rates, competitive efficacy, county property tax, national industry growth rate, potential customers, and localization coefficient

4.2.1 County Growth Rates

Economic growth in each firm's local market is measured as either the real total wage growth rate or the employment growth rate in each county from 1983 to 1988. This data comes from the Research and Analysis Bureau of the Montana Department of Labor and Industry, Annual Average: Employment, Wages, and Contributions. Wages were adjusted

for inflation using the Consumer Price Index (CPI-U) figures published by the Bureau of Labor Statistics of the United States Department of Labor.

4.2.2 Competitive Efficacy

Montana's competitive efficacy variable measures how well a Montana industry performed relative to the industry nationally. A mix-and-share analysis computes the change in employment opportunities in Montana as a result of the changes in the industries due to their industrial structure. Appendix B contains a description of how the competitive efficacy variable is calculated. Data for the calculation is from the Bureau of Economic Analysis of the Montana Department of Commerce.

4.2.3 County Property Tax

The measure of county property taxes in millage rates for 1985 were complied using the Biennial Report of the Montana Department of Revenue for 1984-1986.

The effective property tax is the product of the millage rate and tax base, with the base dependent on assessed property value. To proxy a firm's tax burden, the study uses average county mill rates for the county in which the firm operates. The average county mill rate is used for three reasons. First, the composition of the firm's assets (tax base) is unknown. Further, the assessment of the

unknown tax base is also not available. Finally, the tax rate varies within a county depending on the location of the firm within the county. Therefore, even though the average county tax millage rate somewhat misstates the tax burden, it is the best estimate generally available for each firm.

4.2.4 National Industry Growth

The national industry growth rates for the 1983 to 1988 period were provided by the Bureau of Economic Analysis at the Montana Department of Commerce. These are contained in Appendix B Table 2 Column F.

4.2.5 Potential Customers

The customer variable represents the potential level of demand for a firm, given the industry and county in which it operates. The demand proxy is calculated by dividing the 1985 population in the firm's county by the number of businesses in that same county and industry.

In a few cases, the number of establishments by industry and county was too small to disclose without violating privacy rights of individual firms. Therefore, the author estimated the missing data in the specific industries by using the subtotals for each major group of industries. When there was one or more missing pieces of

data, we substituted a reasonable number in order to reach the subtotal. In almost all of the cases, the undisclosed number of firms equalled one.

County population statistics for 1985 are available from the United States Department of Commerce, Bureau of the Census. The number of establishments in each industry by county is from Annual Average: Employment, Wages, and Contributions published by the Research and Analysis Bureau of the Montana Department of Labor and Industry.

4.2.6 Localization Coefficient

The localization coefficient measures the degree to which employment in an industry is concentrated in certain areas rather than being geographically distributed in the same way as employment. A firm's industry determines the localization coefficient, calculated as the variance.

$$LC_i = \sum_{j=1}^{56} \frac{\left(\frac{StateIndustry_i Employment}{TotalStateEmployment} - \frac{County_j Industry_i Employment}{TotalCounty_j Employment} \right)^2}{n}$$

(4.1)

for i = 1 to 51

n = the number of counties (56 in this case)

The larger the number, the more geographically concentrated its employment and the less dependent an industry is on local conditions.

Data for estimating LC_i is from County Business Patterns published by the Department of Commerce with unpublished estimates for undisclosed data made by William Beyers, Department of Geography at the University of Washington.

4.3 Variable Distribution

The distributions of the above independent variables reveal a great deal about Montana firms.

Table 4.1
Distributions of the Explanatory Variables

Variable	Minimum	Maximum	Mean	Standard Deviation
Initial Size	0	163	3.4	7.3
County Employment Growth	-.311	.453	.051	.102
County Wages Growth	-.408	.852	-.002	.137
Competitive Efficacy	-.444	.744	-.174	.181
Property Tax	97.1	433.87	321.7	77.3
National Industry Growth	.800	1.51	1.23	.129
Potential Customers	151	80,800	1,902	4,240
ln Potential Customers	5.02	11.3	6.82	1.05
Survival rate	926 of 2,214 (41.8%) firms survived			

Table 4.1 indicates some firms had an initial size of zero. This initial size means the owner was the only employee at the start of the business year. A firm with initially no hired workers would file with the Unemployment Insurance Division if they plan to hire employees. The average initial size of a new Montana firm was 3.4 covered employees. Montana firms start small. Approximately 90 percent of new covered firms began with fewer than 6 employees. Most of the firm growth studies of chapter II considered only large firms. Thus, these studies do not

reflect economic reality for Montana businesses.

The economic growth for each county is measured two ways. The first measure in Table 4.1 is the average growth in annual number of people employed in each county. For the period 1983 to 1988, mean employment growth rate was .051 with a range of -.311 to .453. Approximately 71 percent of sample firms operated in counties with a positive employment growth rate. The growth rate for real total annual wage income was -.002 with a range of -.408 to .852. In 55 percent of the sample, county real wage income fell; in 42 percent of the sample, county real wage income grew.

Competitive efficacy measures how well a Montana industry fared relative to its national counterpart. A negative value indicates the Montana industry grew slower than the national industry. The larger the positive number, the better the Montana industry fared relative to the national average. The mean -.174 shows that on average, Montana industries grew more slowly than their national counterparts. Of sample firms, 87 percent operated in industries that grew slower than did the national industry.

Property tax mill rates range between 97.1 and 433.87 mills with a mean of 321.7 mills. Approximately 50 percent of the firms operate in counties with millage rates greater than 337.

For the sample firms, the national industry growth rate indicates the performance of the industries nationally. The

average national industry growth rate is .23. Approximately 95 percent of the sample firms were in industries with positive national growth rates. Most Montana firms between 1983 to 1988 operated in industries which nationally expanded at a modest rate.

The potential customer value for a firm is a proxy for the sales a firm might expect in its location given the county population and the number of similar establishments. The average potential customer variable was 1,902. Within the sample, the firm with the lowest potential customer value had 151 potential customers. The natural logarithm of the potential customer variable minimizes its large range and leads to better estimation results. The logarithm of customers for the sample ranges between 5.02 and 11.3 with a mean of 6.82.

Finally, of 2,214 firms in this sample, 926, or 41.8 percent, survived at least 5 years. This survival rate is slightly lower than the 43 percent rate reported in Montana Department of Labor and Industry's 1990 Birth-Death Study which used the same data. The difference stems from our exclusion of firms with incomplete data records or firms which only hired domestic laborers.

4.4 Variable Transformations

Initial estimates using the independent variables of

Table 4.1 showed that the model was improperly specified. To improve the predictive power of the model, three variables were modified.

First, the initial size variable was strongly skewed toward small employment firms. Ninety percent of the firms began operation with fewer than six employees. The initial size was replaced with a dummy variable using the name SIZE. SIZE equals one when initial size was greater than 40 employees and SIZE equals zero otherwise. This transformation of the size variable improved the overall model fit. A change in the number of initial employees from 3 to 5 or from 10 to 20 did not have a significant impact on the log of the odds of firm survival. However, comparing firms with fewer than 40 initial employees with firms having over 40 employees improved the predictive power of the logit model.

The localization coefficient was partitioned into three roughly equal sized groups of firms. As shown in Table 4.2, 746 firms had high coefficient values to indicate a low level of dependence on the local economy. Similarly 731 firms with low localization coefficients were grouped into the high locally dependent group.

Table 4.2
Distribution of the Localization Coefficient development of the dummy variables

Degree of Localization:	Range Values: LOCAL	Value of DL:	Value of DM:	Number of sample firms:
High	.0200 to .0272	0	0	731
Moderate	.0273 to .0483	0	1	737
Low	.0484 to .2240	1	0	746

DL is the dummy variable which is one for a firm with a low level of dependence on the local economy and zero otherwise. DM is the dummy variable which is one for a firm moderately dependent on the local economy and zero otherwise. When both DM and DL are zero, this indicates a firm which is highly dependent upon local economic markets.

The dummy variables DL and DM had the greatest predictive power when coupled with either the natural logarithm of potential customer values or with the national industry growth values.

Three variables depict the interaction of the localization coefficient dummy variables with the national industry growth rate while three other variables represent the localization coefficient dummy variables and natural logarithm of potential customers variable interactions: INDGRO*DL; INDGRO*DM; HINDGRO; CUST*DL; CUST*DM; and HCUST. Table 4.3 shows which interaction each variable defines.

Table 4.3
Variable Defining each Interaction

	INDGRO	ln(CUST)
High Localization	HINDGRO	HCUST
Moderate Localization	INDGRO*DM	CUST*DM
Low Localization	INDGRO*DL	CUST*DL

The interactive variables measure the impact of national industry growth (or customers) on survival depending upon how localized the industry is. However, the incorporation of industry localization changes the impact of these variables and improves the model's ability to predict survival. For the modified and interactive variables, the sample produced the following distributions.

Table 4.4
Distributions of Transformed Variables

	Minimum	Maximum	Mean	Standard Deviation
HCUST	5.018	11.3	7.445	1.144
CUST*DM	5.916	9.367	6.948	.591
CUST*DL	5.247	10.082	6.074	.827
HINDGRO	.80	1.51	1.23	.203
INDGRO*DM	1.06	1.37	1.21	.085
INDGRO*DL	1.22	1.29	1.264	.032
SIZE	15 firms had greater than 40 employees.			

Using the variables now specified, the logit equation to be estimated is:

$$L_i = \ln\left(\frac{\hat{P}_s}{1-\hat{P}_s}\right) = \alpha_i + \beta_1 SIZE + \beta_2 CTYGRO + \beta_3 COMP + \beta_4 TAX + \beta_5 (HINDGRO) + \beta_6 (INDGRO*DM) + \beta_7 (INDGRO*DL) + \beta_8 HCUST + \beta_9 (CUST*DM) + \beta_9 (CUST*DL) + u_i \quad (4.2)$$

Chapter V presents the estimation results and their economic interpretation.

CHAPTER V

EMPIRICAL RESULTS

The first section of this chapter presents the two logit estimates of the model. The second section interprets these results and discusses their economic implications.

5.1 Two Logit Estimates of the Model

The logit model as specified in Chapter IV is estimated in two forms. The first uses employment growth as the county growth variable and the second uses wage growth.

BioMathematical Data Processing (BMDP) statistical software was used to generate both model formulations. We chose this package because it employs the Hosmer-Lemeshow goodness-of-fit Chi-square statistic. This goodness-of-fit statistic is designed for data sets with fewer than five values per cell. The thesis sample has an average of three firms per cell.

Table 5.1 presents estimation results for equation (4.2) using employment as the measure of county growth.

Table 5.1
Model Estimate 1 (with Employment Growth)

Variable	Coeff.	Std. Error	T-Test Stat.	Level of Signif.	Elasti-city
Constant	-.938	.65	-1.45	Not Signif.	Not Applic.
Initial Size	-.602	.59	-1.02	Not Signif.	Not Applic.
Employment Growth	.476	.462	1.03	Not Sig.	.014
Compet. Efficacy	.388	.37	1.05	Not Signif.	-.04
Property Tax	.00103	.000609	1.68	95%	.19
HINDGRO	-1.181	.65	-1.83	95%	-.86
INDGRO*DM	1.002	.89	2.44	99%	.72
INDGRO*DL	0.095	.56	2.30	97.5%	.07
HCUST	.281	.09	3.09	99.9%	.162
CUST*DM	-.095	.16	-2.36	99%	-.056
CUST*DL	-.012	.1	-2.65	99.5%	-.007

Goodness-of-Fit Chi-Square (Hosmer-Lemeshow)
DF = 8 P-Value = .615

The Hosmer-Lemeshow test generates a P-value which indicates the goodness of fit. A P-value greater than .05 indicates a good fit and the larger the P-value, the better the model fits the data. The P-value of .615 indicates the logit model fits the data quite well.

When total real wage earnings rates are used as the measure of county growth, logit estimation produces a different set of coefficients but a similar pattern of variable significance. These results are in Table 5.2.

Table 5.2
Model Estimate 2 (with Wage Growth)

Variable	Coeff.	Std. Error	T-Test Stat.	Level of Signif.	Elasti-city
Constant	-.961	.65	-1.49	Not Signif.	Not Applic.
Initial Size	-.603	.59	-1.02	Not Signif.	Not Applic.
Wage Growth	.289	.328	.882	Not Sig.	-.003
Compet. Efficacy	.381	.37	1.03	Not Signif.	-.04
Property Tax	.001	.0006	1.95	95%	.19
HINDGRO	-1.184	.65	-1.83	95%	-.86
INDGRO*DM	1.016	.89	2.46	99%	.72
INDGRO*DL	0.096	.56	2.30	97.5%	.07
HCUST	.283	.09	3.11	99.9%	.164
CUST*DM	-.097	.16	-2.38	99%	-.056
CUST*DL	-.013	.1	-2.66	99.5%	-.0075

Goodness-of-Fit Chi-Square (Hosmer-Lemeshow)
DF = 8 P-Value = .488

The Hosmer-Lemeshow P-Value for this second estimation indicates a good fit. However, the first estimates (Table 5.1) that used employment growth as a proxy for county growth provides a better fit.

Both estimates of the model have similar patterns of significant coefficients, with seven significant coefficients and four insignificant coefficients. It is reasonable that the constant term be insignificant. If all the independent variables equalled zero, the odds that a

firm would survive should be zero.

The interactions between the customer proxy and the localization coefficient attain the highest levels of significance. These interaction terms have the highest predictive power for determining firm survival odds.

Most of the coefficients carry the expected signs, with two notable exceptions. First, the average county property tax variable has a positive sign. As stated in Chapter III, the relationship between firm survival and property tax was hypothesized to be negative. The positive coefficient for the tax variable means that higher property taxes enhance firm survival odds. The other sign surprise is a negative coefficient for initial size. This coefficient indicates that a firm with more than 40 initial employees is less likely to survive. A detailed explanation for the estimation results, variable by variable, is found below.

5.2 Model Results and Implications

This section discusses the estimation results for each internal and external firm characteristic. These results are the specific guidelines that should aid an informed policy maker in designing programs to foster economic development in Montana.

5.2.1 Initial Size

Almost all the studies of firm growth and/or survival in Chapter II found that a large initial size significantly abetted firm survival. The Montana small firms sample drawn from many industries shows that initial size does not significantly influence firm survival.

The coefficients in both model estimates are negative which indicates the larger the firm, the lower the probability of survival. The insignificance of the coefficients, however, means that initial size did not have a strong bearing on survival. Therefore, this study would not support public policies which promote a larger initial employment commitment, other things being equal.

5.2.2 County Growth Rate

The county growth rate is measured by either employment growth or wage growth. As an initial hypothesis, one would expect a higher county growth rate would make it more likely that a new firm in that county survives. While the t-test statistic for the employment growth variable is larger than that for the wage growth variable, neither coefficient is a significant indicator of firm survival.

The interesting point here is that local economic growth does not affect survival chances. Recall that 1983-88 was a recessionary period in Montana making the growth rates for wages and employment low during this time.

In a non-recessionary period, it is possible that county growth rate variables may have had a higher significance. Tables 5.1 and 5.2 show that at least in recessionary periods county growth rates have no systematic impact on firm survival rates.[1]

5.2.3 Competitive Efficacy

Competitive efficacy compares Montana industrial performance with average national industrial performance. The competitive efficacy variable has a positive impact on firm survival for both models estimated. However, since the coefficient is not statistically significant, its impact is questionable. The 1983-1988 recession may partially explain the poor performance of Montana firms compared with national firms and account for this variable's weak predictive power.

The survival elasticity term for competitive efficacy is estimated using the average competitive efficacy value and the average survival rate of P_s=.42. The competitive efficacy elasticity is .04 for both estimated models. This means a 10 percent increase in Montana industries relative to the national industry would cause a .4 percent rise in

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[1]An interaction between the localization variable and the county growth rate variable did not produce as good results as the estimated model. The number of significant variables and the goodness of fit tests were lower in all the model estimates incorporating a localization/county growth interaction.

firm survival odds.

5.2.4 Property Tax

The property tax rate is the first variable with a significant influence on firm survival. Surprisingly, a higher tax rate increased the odds a firm would survive, and the coefficients are significant in both model estimations.

The elasticity of the tax rate is .19 for both models. This figure indicates that a 10 percent increase in millage rate leads to a 1.9 percent increase in probability of survival. Property tax has a small to moderate impact on survival measured at the mean.

This result does not indicate, however, that a county should increase its millage rates to help keep businesses alive. Several other explanations for the positive relationship exist. First, counties with higher millage rates may have better public services paid for by higher tax revenues. Alternatively, local economies that are doing well for some exogenous reason may have higher tax rates than those doing poorly. Finally, most of the counties with the higher rates were urban rather than rural. Therefore, the data may indirectly measure the effect of urban versus rural location on firm survival. These urban counties have a larger private market compared to rural counties.

Table 5.3 below illustrates the tendency of urban counties to have higher property tax millage rates. The

table shows the ten counties with the highest millage rates.

Table 5.3
The Top Ten Counties with the Largest Average Millage Rate.

Major City	Rank by MT Pop.	County	1985 Total Mills
Helena	6	1. Lewis and Clark	433.87
Anaconda	20	2. Deer Lodge	431.93
Miles City	15	3. Custer	429.94
Butte	7	4. Silver Bow	416.91
Great Falls	3	5. Cascade	402.39
Billings	1	6. Yellowstone	353.15
Missoula	2	7. Missoula	346.46
Livingston	12	8. Park	342.93
Superior	39	9. Mineral	338.21
Lewistown	14	10. Fergus	337.53

Most of Montana's larger cities: Helena, Anaconda, Butte, Great Falls, Billings, Missoula, Libby, Miles City, and Lewistown, are located in the high millage rate counties of Table 5.3. The positive impact of property taxes on firm survival may indicate that new firms in cities are more likely to survive than new firms in rural areas.

5.2.5 National Industry Growth Rate

The outcome for the industry growth-localization terms was similar in both model estimates. Each interaction term had the same level of statistical significance. The interaction variables also have similar elasticity values as shown in Tables 5.1 and 5.2.

Before discussing the coefficient estimates, we verify that the interaction variables are significantly different from each other. There are three interaction variables that involve the national industry growth rate. Having partitioned firms into high, moderate, and low localization firms, we check that there are three distinct interactive terms: HINDGRO, INDGRO*DM, and INDGRO*DL. The T-test for the distinctness of HINDGRO and INDGRO*DM, for example, is

$$t = \frac{\hat{\beta}_5 - \hat{\beta}_6}{var(\hat{\beta}_5) + var(\hat{\beta}_6) - 2cov(\hat{\beta}_5, \hat{\beta}_6)} \qquad (5.1)$$

where β values correspond to those in equation (4.2). Test results are in Table 5.4.

Table 5.4
Testing for Differences Between the Indgro and Localization Interactions

	Model with Emp. gro.		Model with Wage gro.	
	Covariance	T-test	Covariance	T-test
HINDGRO INDGRO*DL	-.29965	-1.827	-.3000	-1.832
HINDGRO INDGRO*DM	-.31313	-2.283	-.31386	-2.298
INDGRO*DL INDGRO*DM	.27024	-.947	.27096	-.965

The coefficients for the low and moderately localized industry interactions with Indgro are significantly different from HINDGRO's coefficient at the 95% level of significance. This result indicates separating national

industry growth rate into categories according to each industry's localization level is important when predicting Montana firm survival rates. The coefficients for the interactions of the national industry growth rate with a low or moderate localization are not significantly different from each other (INDGRO*DL and INDGRO*DM). Therefore, separating INDGRO*DL from INDGRO*DM may have been unnecessary.

To simplify interpretation of the estimates for these interaction terms in Tables 5.1 and 5.2, each variable is examined separately. The first variable, HINDGRO, is significant at the 95 percent level. The sign of HINDGRO is negative. This negative coefficient indicates that when a firm's industry is highly localized, as the national industry does better, Montana firms fared worse.

The HINDGRO elasticity also exhibits a negative impact on survival, given its negative coefficient. The absolute value of the elasticity indicates HINDGRO's large impact on survival. For example, if the national industry growth rate changes by 10 percent, the probability of survival changes by 8.6 percent.

One possible explanation for HINDGRO's negative impact is the 1983-88 Montana recession. Examples of repressed industries in the state are construction, and eating and drinking establishments which are both locally oriented. Montana local performance in these industries did not

reflect the growth of their national cohorts. Construction experienced a severe decline during this period due, in part, to decreases in oil and gas prices, decline in agriculture, increases in interest rates, and a general poor Montana economy. Nationally, construction grew by almost 30 percent while Montana construction employment declined 33 percent. Eating and drinking places also did not follow the national trend. In Montana, this industry employment grew by 4 percent compared to a 24 percent national growth rate. The above examples also indicate some interaction with competitive efficacy.

Since the INDGRO*DM uses dummy variables, the actual INDGRO*DM coefficient is calculated by adding together the given coefficients for HINDGRO and INDGRO*DM. This actual coefficient is approximately equal to 1 (-1.181 + 2.179 for Table 5.1 estimates and -1.184 + 2.2 for those in Table 5.2). The elasticity for INDGRO*DM indicates a large difference in firm survival with increases in the national growth rate. An elasticity of .72 predicts that a 10 percent increase in the national industry growth rate leads to a 7.2 percent increase in the five year firm survival rate.

Table 5.4 shows a significant difference between INDGRO*DM and HINDGRO coefficients. The INDGRO·DM interaction has a strong positive impact on survival while HINDGRO has a significant negative impact (see Tables 5.1

and 5.2). Thus, a Montana business operating in a moderately localized industry has a better chance of surviving than one operating in a highly localized industry, as this industry grows nationally when the local economy is in decline.

A business in an industry with low local economy dependency, represented by the INDGRO·DL interaction, had a more moderate positive impact on survival probability. The INDGRO*DL coefficient equals 0.1 in both model estimates. This positive sign was anticipated, however, the smaller impact on survival compared to a moderately localized industry was not expected. Given the recessions experienced in Montana during the studied time period, the results are understandable.

HINDGRO has a larger impact on survival than INDGRO·DL with elasticities given by -.86 and .07 respectfully. The elasticity for INDGRO·DL shows little impact on survival of Montana firms with an increase in national firm growth in an industry with low local economy dependency.

The INDGRO*DL variable indicates that even when firms focus on outside economies, they are not guaranteed success. On the contrary, the results indicate that Montana firms are not very competitive with national firms in national markets. The results also reflect the decline experienced by the local economies from 1983 to 1988.

Tables in Appendix C present national industry growth

rates between 1983 and 1988 and each industry's calculated localization coefficient. Table C1 ranks the industries in the order of fastest to slowest growing (nationally) while Table C2 ranks these industries by their level of dependence on the local economy.

The estimates of Table 5.1 and 5.2 coupled with Appendix C provides a first qualified prescription for a state government seeking higher firm survival rates. When the national economy is growing and Montana lags behind, it is moderately and low level localized firms which have the greatest 5-year survival probabilities. These are the industries ranked 4 to 46 in Appendix C2. Since INDGRO*DM and INDGRO*DL are composite variables the localization term must be multiplied by the National Industry Growth rate. A person using this information would need forecasts for industry growth like those in Appendix C1 and the localization data of C2 to provide guidance in Montana business survival and failure.

The important qualification here is that no state recession or national recovery is identical. The mix of high industry growth industries in the next economic boom may not reflect the same pattern as Appendix C1. Further, all industries have input-output ties to other industries. Changing technology may change legal services from a medium localization industry to a high localization or low localization category over time.

State agencies do not have the power to change national industry growth rates However, these results indicate highly localized industries will be hurt by local recessions no matter what happens nationally. State agencies can be prepared to help during these recessions.

The survival elasticity of .72 for INDGRO*DM was larger than the elasticities for HINDGRO, or INDGRO*DL during this time period. Future research might well explore the factors that most influence Montana firm survival when the state is not experiencing recessionary times.

5.2.6 Customers

The most significant variables identified in this thesis for predicting the survival odds for new Montana businesses are the potential costumer-localization variables. The two estimation tables (5.1 and 5.2) present similar coefficients for HCUST, CUST*DM, and CUST*DL. All three coefficients are statistically significant predictors of firm survival.

Table 5.5 presents the test results to determine if the coefficients for ln(CUST)-localization interactions are significantly different from each other.

Table 5.5
Testing for Differences between the Customer and Localization Interactions

	Model with emp. gro.		Model with wage gro.	
	Covariance	T-Test	Covariance	T-Test
HCUST CUST*DL	-.00735	1.221	-.00736	1.222
HCUST CUST*DM	-.00909	1.268	-.00909	1.281
CUST*DL CUST*DM	.00934	.218	.00936	.224

None of the ln(CUST)-localization coefficients are significantly different from each other. Therefore, separating anticipated customers by degree of industry localization is not critically important for predicting survival. However, each of the three coefficients themselves are highly significant.

HCUST is the first ln(CUST)-localization variable we examine. For a firm in a highly localized industry, HCUST, the number of potential customers is important to its survival. The elasticity for HCUST has the largest positive impact on survival of the three ln(CUST)-localization interaction variables. The elasticity equals .164 so that a 10 percent increase in the number of potential customers increases the survival probability by 1.64 percent.

The above result does not make the county with the largest population the best place to start every business. There may be enough firms already established in a large

city to satisfy existing demand. Identifying which areas with a large number of potential customers (with few similar firms) could help determine which areas to allocate resources or encourage business starts in policy making.

Surprisingly, while CUST*DM's hypothesized impact on survival was positive, the estimated coefficient is -.1. Because the localization measure is a dummy variable, the actual coefficients for CUST*DM is the sum of HCUST and CUST*DM. The estimated coefficient is significant at the 99% level, but in the opposite direction of what was hypothesized. The elasticity, measured in absolute terms, equals .056 and indicates the variable's small impact on survival odds.

One possible explanation for CUST*DM's negative coefficient is in the firm's accurate or inaccurate perception of its market. A business operating in a non-localized industry would not worry much about the number of local market potential customers. For such a firm other factors such as prevailing wage rates, transportation costs, or operating costs would be greater concerns to the firm. Alternatively, a firm operating within an industry moderately dependent upon the local economy may focus too much or not enough attention on potential customers in the local market. To ensure the highest probability of survival, a firm must be aware of its true market and the size of its customer pool.

It may be that an unusually large number of new firms began in 1983 in moderately localized industries. In addition, many of these firms may Thus, a larger number of these moderately localized firms would be expected to fail. A business school or policy maker can enhance firm survival by providing potential entrants with better information on the role of local customers in firm survival probability.

The CUST*DL coefficient equals -.01. This coefficient indicates that if the industry has a low level of localization, an increase in the potential (local) market-size decreases a firm's probability of survival. This increase is small, however, as indicated by an elasticity of -.0075. Once again the negative impact on firm survival is partially explained by the recessionary period examined.

The ln(CUST)/localization coefficient interactions have a strong influence on Montana firm survival. New firms can best increase survival odds by properly identifying their target market and, if possible, locating in an area with a strong customer base for its product or service.

CHAPTER VI

CONCLUSION

This thesis has analyzed Montana new business survival rates by describing and quantifying relationships between firm characteristics and the probability of surviving five years. Identification of the characteristics which enhance survival should result in better policies to foster long term business formation and efficient state economic growth.

The results in Chapter V reveal that there are three factors that have a strong influence on the chances a new Montana enterprise will still be operating after five years.

The most important factor involves the interaction of localization and industry growth rates in which the new firm operates. For industries moderately dependent on the local economy, a 10 percent change in the National Industry Growth Rate causes a 7.2 percent change in Montana firm survival. Even locally dependent firms have survival probabilities significantly enhanced when their industries prosper nationally. These results must be qualified by recalling that they were derived when Montana was, in general, in a recessionary period and the national economy growing. In a similar period in the future, a policy maker should concentrate economic development efforts in those industries which are growing nationally and are moderately dependent on the local economic market.

The second important firm characteristic that influences firm survival is the number of potential customers in the new firms market area. Increases in the number of potential customers has the largest impact on survival for firms in a highly localized industry. A 10 percent increase in potential customers increases survival probability by 1.64 percent. In addition, increases in potential customers has a positive influence on survival, albeit a small influence, for firms with little dependence on the local economy. The elasticity of the variable indicates that a 10 percent increase in potential customers increases survival odds by .7 percent. These results do not indicate that the counties with the highest absolute population levels as the best places to start a new business. Rather, new firms should be encouraged to locate in counties with a high number of potential customers relative to the number of competing firms. Such locations enhance survival odds.

A policy maker concerned with firm survival should foster better information about the "true" number of potential customers and the "true" nature of local competition among potential entrants. This might take the form of information through the Small Business Administration, state business schools, or local incubator programs.

The third factor that has a significant influence over

firm survival is the property tax rate. Surprisingly, the higher the tax rate, the higher the probability of survival. The property tax elasticity indicates that a 10 percent increase in millage rate leads to a 1.9 percent increase in survival probability. Fortunately, this does not argue that county governments can enhance firm survival by increasing taxes. Rather, we conclude that urban counties may be better prospects for potential firms than rural counties. These counties can provide public services with the increased tax revenue. In addition, a larger private market is found in urban versus rural counties.

This thesis has also demonstrated that there are three factors that do not have a systematic influence over the probability a firm is successful. The most intriguing is initial size since previous work, usually in single-industry and/or large-firm studies, has found initial size to be an important factor. At least in recessionary times, an increase in the initial employment level does not enhance or detract from Montana firm survival odds.

County growth, measured by either wage or employment growth, does not impact firm survival in a systematic way. This lack of significance is partially explained by the decline experienced by the local economies during 1983 through 1988. An interaction between localization and county growth provided models with fewer significant coefficients and a worse overall fit.

Finally, a measure of the relative growth of a Montana firm compared to a national firm in the same industry does not enhance survival. Programs to raise the relative efficiency of Montana firms may or may not increase the odds of firm survival.

This thesis has identified those firm and economic characteristics that impede or promote firm survival rates. Further, the size of the elasticities provide a gauge of how large an impact each significant variable will have on survival odds. This measure allows a policy maker to not only design an effective set of programs for long term economic growth but to estimate the impact of these programs. In addition, a level of risk can be assigned to new businesses given their firm and market characteristics.

APPENDIX A

The following lists the government programs and activities designed to help Montana firms. First listed are the programs for 1983. Help that was available in 1988 follows.

The Department of Commerce

Business Assistance Division

The Division has specific responsibility for assisting new and existing small businesses. Funding for the division by the 1983 legislature substantially increased the variety of services technical assistance, marketing, international trade, financial, procurement, etc. The division also functions as an advocate for small business in the deliberations of the Governor's Sub-Cabinet on Economic Development.

Business Development Assistance Program

This program, greatly expanded by the legislature, increased the state's capacity to provide technical assistance and information to small businesses, especially small manufacturers. Information included training opportunities, leads on Federal contracts, and sources of loan and grant funds. Technical assistance to businesses was provided by contracting with private sector consultants. This assistance included financial packaging, marketing, and product testing and development. The program also provided for loan packaging training and development in cooperation with the Small Business Economic Revitalization Program.

Assistance to Local Development Organizations

This program expanded the capacity of the Department of Commerce to deliver technical assistance training and grants to communities in their efforts to work with small businesses at the local level. Training was geared to two different groups:

1. Local leaders who organize and maintain local development efforts; and

2. Professional staff of local organizations who provide technical skills to local development efforts.

Special emphasis was placed on assisting the existing small business community rather than focusing on recruitment. Technical assistance was of two types: assistance from state staff in assembling the basic "tools" necessary in the community, and cost-sharing grants for specialized expertise

necessary to carry out a specific local development project.

University Business Management Development Program

This program, approved by the Board of Regents and funded by the legislature, established a university coordinator for business training, research and technical assistance to small businesses. The program worked with resources of the six units of the University of Montana system to deliver business skill training to business and agri-business firms, as well as coordinating internships and technical assistance.

Small Business Institute

This program uses senior level undergraduate business majors who work one on one with small businesses. The students complete an analysis of the firms in areas such as finance, industry, customers, operations or personnel. They determine the small businesses' strengths and weaknesses and what opportunities are available to these firms at their location. This program is sponsored by the Small Business Administration and is being performed at Montana State University, Eastern Montana, Montana Tech, and Northern Montana.

Bureau of Business and Economic Research

The Bureau of Business and Economic Research conducts analyses on business and economic trends in Montana. In addition, they publish a quarterly magazine titled Montana Business Quarterly. The magazine contains articles concerning businesses in Montana along with economic data compiled by the Bureau.

Montana Product Promotion and International Export Assistance

Montana Product Promotion was a new program. Both programs were designed to enhance the marketability of manufactured and agricultural products of small Montana businesses. Montana Product Promotion consists of an in-state campaign to elevate the status of Montana products, a clearinghouse to help match manufacturing capabilities, and an aggressive program to assist Montana firms soliciting Federal government procurement contracts. International trade assistance provided direct one-stop technical assistance to small businesses wishing to enter foreign markets.

Montana Economic Reporting and Forecasting System

This was a new program to compliment the existing economic research programs of the Bureau of Business and Economic Research (BBER). A committee of university economists representing all major units was created to

supervise the development and implementation of a new economic reporting and forecasting model that provided the small business community more timely, accurate, and comprehensive information than was historically available.

Business Licensing and Small Business Ombudsman

The 1983 legislature created a Small Business Licensing Center to distribute information concerning state licensing requirements for starting and operating a business, and to provide assistance to the business owner in applying for a license. The licensing center was given the responsibility to serve as ombudsman for small businesses. (Department of Commerce)

Labor Training Program

The 1983 legislature funded an on-the-job training program for employees of new or expanding small Montana businesses. (Department of Labor and Industry)

Minority business Development

The Montana Department of Highways had a Minority Business Enterprise Office which was responsible for identifying and assisting minority contractors successfully bidding on highway construction contracts. The office also served as an advocate for minority businesses with other state agencies.

The Governor's Director of Indian Affairs, in cooperation with the Department of Commerce, was aggressively seeking the establishment of a Minority Business Development Center. This center was operational the end of 1983.

Small Business Procurement Set-Asides

The Montana Small Business Purchasing Act, enacted in 1974, was written to ensure that a fair portion of state purchases and contracts for supplies and services be placed with small businesses. The act, which is found in Sections 18-5-301 and 18-5-308 of the Montana Code Annotated, details how state agencies proceed in awarding contracts to small businesses.

The basic procedure outlined in the Act allows each state department to designate specific commodities, equipment, or services as small business "set-asides". Under the law, a small business set-aside is defined as "a purchase request for which bids are to be invited and accepted only from small businesses." A department may designate a "set-aside" when there is a reasonable expectation that bids will be obtained from three small businesses capable of furnishing the desired property or service at fair and reasonable price. Any set-aside

designation must be made prior to an advertisement for bids, and any advertisement for bids for a set-aside must state that the purchases have been so designated. Services rendered and furnished by registered professionals, including but not limited to accountants, attorneys, architects, engineers, physicians, and pharmacists, may not be designated as small business set-asides. (Dept. of Administration)

U.S. Government Procurement Assistance in State

The Business Development Program of the Department of Commerce distributed government procurement literature to local development efforts. The development program also provided technical assistance on a one-to-one basis to small businesses dealing with expansion and problem areas in contracting.

II Governors Advisory Council/Task Force

Governor's Small Business Advisory Council

Formed in 1981 and was charged by the Governor with the responsibility of identifying the critical state legislative and economic concerns of the small business community. The Council is made up of 26 members appointed by the Governor. Staff services to the Council's activities were provided by the Montana Department of Commerce. Among the activities by the Council were six local small business conferences and one statewide small business conference.

Governor's Council on Economic Development

New program funded by the legislature. The council was appointed by the Governor and included 20 members representing the following sectors of the economy: natural resources extraction and processing industries, small business, tourism, agriculture, education, conservationists, public interest, financial, professional, economic development, and organized labor. At least four must represent small business. The council sponsors, reviews, and evaluates state economic development problems and programs, develops a biennial economic conditions report, and sponsors appropriate research and action on economic development issues. (Dept. of Commerce)

Council on Science and Technology

New program funded by the legislature. The council was appointed by the Governor and had nine members, all with scientific and business backgrounds. The council had the following responsibilities: to develop a short-term (1-5 years) and a long-term(5-20 years) list of research priorities related to economic development; to identify

current scientific work related to economic development; and to evaluate the need for new industrial-research facilities. Special emphasis was placed on commercializing existing research and on the process of agricultural products.

State Small Business Conference

The statewide Conference on Small Business was held in Great Falls, Mt on Sept 27 and 28, 1982. The conference delegates produced 48 recommendations in six categories dealing with legislative, policy, and rulemaking issues of concern to Montana small business people.

Small Business Offices, Programs, and Activities for 1988.

Department of Commerce, Business Assistance Division

Provided comprehensive services that constitute the direct technical assistance component of the "Build Montana" economic development program. Technical assistance for development finance was available to businesses in the areas of financial analysis, financial planning, loan packaging, industrial revenue bonding, state and private capital sources, and business tax incentives. The program also was designed to work with businesses and financial institutions to encourage the use of various public-sector programs, including Community Development Block Grants, Economic Development Administration grants, Small Business Administration loan guarantees, and the Montana Board of Investments' in-state investment funds.

Marketing Assistance and Montana Product Promotion staff members worked with individual small businesses and trade associations to develop and expand outlets for products manufactured and processed in Montana. Products of Montana manufacturers were represented at selected trade shows both in the United States and abroad.

The Montana Product Promotion Program was designed to elevate the status of Montana-made products in the marketplace. The program also served to educate Montanans about the diversity of products manufactured in their state. As part of this program, a full-color "Made in Montana" logo was made available to manufacturers of products that have a minimum of 50 percent of their value added in Montana. The department implemented an extensive public awareness campaign utilizing television, newspaper, outdoor, and radio advertising to encourage Montanans to "Look for the Label". The division published the Montana Consumer Products Buyers Directory and the Montana Manufacturers Directory.

Small business advocacy and business licensing information was available through the Business Assistance

Division. The division distributed information concerning the state licensing requirements for starting and operating a business and provided assistance to businesses in applying for licenses and permits. The division also served as an advocate for small businesses.

The International Trade Program was designed to enhance sales of Montana goods and services in international markets. The international trade staff also encouraged tourism promotion and reverse investment opportunities. One-stop technical assistance to businesses wishing to enter foreign markets was also made available. Trade opportunities were identified for exporters, and special programs conducted throughout the year to prepare more firms for export activity. The division maintained a products showroom in the Taipei World Trade Center in Taiwan and a Pacific Rim Trade Office in Tokyo, Japan.

Assistance in U.S. Government Procurement Programs and in manufacturing were available through the Business Assistance Division. The division distributed government procurement information to interested small business bidders. It also provided technical assistance, either directly or through cooperating university system units. to those small businesses having problems in production management, quality control, cost accounting, or related manufacturing areas.

The SUPERHOST Program offered training and technical assistance programs designed to meet the unique needs of firms in the states's rapidly growing visitor industry. Communities successfully completing SUPERHOST activities received road signs, employee badges, store window decals, table and room displays, and other promotional materials.

The Montana Agriculture Development Council is a public-private partnership designed to help Montana keep pace with a transforming agriculture industry, create new jobs, and expand small business opportunities. Some of the council's activities included the creation of agricultural business incubators and expanded domestic and international agricultural marketing. The council oversaw these programs and established policies and priorities to enhance the future development of agriculture in Montana.

The Montana Ambassadors program is designed to complement the Department of Commerce's business location, retention, marketing, and state promotion efforts. The program relied on the efforts of approximately 200 business and university leaders from throughout the state. Members made calls on out-of-state business executives and tour operators to familiarize them with Montana as a place to do

business and as a travel destination.

Additionally, ambassadors worked with Montana manufacturers to help them market their products outside the state, and assisted the state in hosting foreign visitors and trade delegations. The program was funded by its members and staffed by the Department of Commerce.

The business Location Program publicized and advertised Montana to firms planning relocations or expansions. The program initiated and developed relations with business interests and individual firms, and prepared and presented location data in response to inquiries received by the department. The program also worked closely with local development organizations in their efforts to locate new firms in their communities.

Through the Certified Communities Program, assistance was provided to local leaders responsible for organizing and maintaining community economic development efforts and to the professional staff of such local organizations. The division conducted the program in cooperation with the Montana Ambassadors and the Montana Chamber of Commerce. The program assisted cities, towns, counties, and tribal governments to plan and carry out effective economic development programs specifically designed to meet local needs.

The Small Business Development Center (SBDC), located in the Business Assistance Division of the Department of Commerce, with a subcenter at Dawson Community College in Eastern Montana, provided assistance to new and existing businesses, primarily through individual consulting and specific training programs and seminars.

Department of Agriculture

The Beginning Farm Loan Program provided loans for the purchase of agricultural land or depreciable assets to qualified beginning farmers and ranchers and provided for a state tax deduction to the seller of land to a first-time farmer.

The AG Finance program provided low-interest loans to rural youth, youth organizations, and first-time or beginning farmers.

Board of Investments

The Board of Investments's Office of Development Finance manages a series of small business loan programs. The board's responsibility was to strengthen and diversify

the state's economy through prudent investments in qualifying Montana businesses. The board's programs were designed to make available long-term, fixed rate financing to businesses for a variety of needs.

Coal tax loans were limited to investments in businesses that will bring long-term benefits to the Montana economy. Priority was given to businesses that will create jobs without displacing existing jobs in other Montana businesses. While a minimum or maximum loan limit was not been established, loans of $500,00 to $3 million are targeted.

Through the Federal Guaranteed Loan Program, the board could fund a small business loan by purchasing the guaranteed portion of any federally backed loan, such as those guaranteed through the Small Business Administration, the Farmers Home Administration, or the Economic Development Administration. Financing was used toward working capital, inventory, equipment, real property, or similar items. The interest rate to the board was set at 110 percent of the rate for US Treasury bonds of a like or similar maturity for monthly payment loans and 115 percent for annual payment loans.

Through the Business Loan Participation Program, the board could fund a small business loan by purchasing from the originating lender up to 80 percent of the loan amount. Unencumbered land, buildings, and equipment could be financed through this program. The financial institutions serviced the entire loan and received a servicing fee in addition to the board's quoted interest rate. The board participated in the security for the loan proportionately to the board's share of the loan.

The Economic Development Linked Deposit (EDLD) program offered businesses extended-term, fixed rate financing for working capital, inventory, or real property. The board placed a long-term deposit at the pre-established rate with the financial institution originating the qualifying business loan. The proceeds of the deposit had to be used to finance a long-term fixed rate loan to the applicant business. The rate and terms to the borrower were linked to the rate and terms of the EDLD.

The Montana Capital Company Program was designed to make private venture or equity capital available within the state. Through the program, the state offered a 50-percent tax credit incentive (up to $150,00) to investors in qualified Montana capital companies, which in turn had to invest these funds in small Montana firms. The capital companies had to be approved by the Montana Economic

Development Board. Available tax credits were limited to $5 million through 1989 and were allocated to capital companies in the order that they became "qualified" and had actual investors with at least $200,000 in equity capital.

Under the "Stand Alone" Industrial Revenue Bond Program, the Board of Investments issued bonds on a "stand alone" basis to Montana borrowers. The board acted as an issuing authority to allow exemption of interest on a qualifying loan. The originating business assumed total risk on the financed project. The project owner was required to pay bond counsel fees and the board's administrative and financing fee. The maximum loan under this program was $10 million.

Through the Pooled Industrial Development Bond Program, the Board of Investments periodically sold industrial development bonds to finance the pool of loans it had approved during the preceding month. The maximum size of an individual loan could not exceed $3 million. The originating lender provided a letter of credit for 35 percent of the original loan for at least the first five years of the loan. Borrowers contributed a minimum of 10 percent equity on projects, and federal law required that projects be approved by the board before costs were incurred. Issuing costs for the pooled bonds were pro-rated among the borrowers and the interest was established when the bonds were sold.

SBA 503/504 Certified Development Companies

There was one certified development company in Montana. The Montana Community Finance company was certified under the Small Business Administration's SBA 504 program, and lent to small and medium-sized businesses at fixed rates for terms of 10 to 20 years. Companies had to create one job for every $15,000 they received in financing. A 504 loan was funded through the sale of a debenture that was guaranteed by the Small Business Administration for up to $750,000 or 40 percent of the total cost of land, building, and equipment.

Disadvantaged Business and Women Business Procurement Assistance

The Montana Department of Highways' Civil Rights Bureau was developed to assist disadvantaged business enterprises (DBEs) and women business enterprises (WBEs) in obtaining state highway contracts. The bureau served as an advocate for minority businesses with other state agencies and published a DBE monthly newsletter and directory of area highway contractors.

Census and Economic Information Center

The Census and Information Center (CEIC) was the lead agency of the Montana State Data Center, a cooperative program of Montana and the U.S. Bureau of the Census. The CEIC served as a central location for businesses, government agencies, and the general public to obtain population and economic information for research, planning, and decision-making purposes. CEIC prepared County Profiles, which contained data on health, education, housing, and other economic statistics on Montana;s counties. The center also published the Montana Statistical Abstract, which contained detailed economic data on the entire Montana economy.

Community Development Block Grant Program

Montana's Community Development Block Grant Program is a competitive grant program designed to assist cities, towns, and counties with populations of less than 50,000 in meeting their greatest community development needs, with particular emphasis on assisting persons of low and moderate income. The program awarded approximately $5 million annually in grants to local governments for a variety of economic development, housing, and public facility projects. At least 10 percent of funds awarded was set aside for economic development projects.

Port of Montana

The Port of Montana offers U.S. Customs services, bonded and general warehouse storage in 319,000 square feet of maximum security warehousing, no inventory tax, and licensing brokerage services to shippers, wholesalers, and manufacturer. The port was a public port authority and export trading company promoted by the citizens of Butte-Silver Bow in an effort to strengthen and diversify the state and local economies. Access was provided to international and domestic shippers through both north-south and east-west shipping corridors--two mainline rail carriers and two interstate highways.

Tourism and Recreation Research Institute

The Tourism and Recreation Research Institute was established by the legislature in 1987 to provide research data needed to support the state's tourism industry. It was administered by the Montana Forest and Conservation Experiment Station at the University of Montana's School of Forestry. The institute was funded by a portion of the state accommodations tax. The research program of the institute was developed in cooperation with the Governor's Travel Advisory Council.

Governor's Council on Economic Development

The Governor's Council on Economic Development was

funded by the Legislature in 1983 to review and evaluate state economic development programs and problems, develop a biennial "economic conditions report," and sponsor appropriate research and action on economic development issues. The 20 council members were appointed by the governor for two-year terms.

Legislative Committees and Subcommittees

Small business concerns are handled in the House by the Select Committee on Development, and the Committee on Business and Labor and in the Senate by the Committee on Business and Industry.

Legislation

In Montana's 1987 legislative session, a government unfair competition bill died in committee in the final days of the session and an equal access to justice bill, making state agencies liable for unjustified legal proceedings against small businesses, was voted down in the Senate Judiciary Committee.

Joint and several liability limits were reduced. The new law states that a person judged less than 50 percent negligent cannot be sued for more than his or her share of negligence. Punitive damage judgements were limited to cases involving actual fraud, and wrongful discharge awards to ex-employees were limited to lost benefits of up to four years.

There was no legislative session in 1988.

State Small Business Conferences

Two conferences--both entitled "ACCESS '88--Access to Government for Small Business"--were held in Glendive, May 11, and Helena, May 13, 1988. The all-day conferences offered small businesses an opportunity to learn about the business assistance programs offered by key government agencies.

APPENDIX B

The competitive efficacy variable measures how well an industry performed in Montana compared with the performance of the industry nationally in the 1983 to 1988 period. A mix-and-share analysis calculates the competitive efficacy along with the Montana Employment Change, the National Average Growth Effect and the Specific Industry Effect. Table B1 presents the SIC code and their definitions.

Table B1
SIC Definitions

SIC	Industry		SIC	Industry
01-09	Agri,Forestry Fish		50-51	Wholesale Trade
01	Agri Prod Crop		50	Durable Goods
02	Agri - Livestk		51	NonDurable Goods
07	Agri Services		52-59	Retail Trade
08	Forestry		52	Bldg Mat-Garden
09	Fish-hunt-trap		53	Gen Merch
10-14	Mining		54	Food Stores
10	Metal Mining		55	Auto Dirs-Svc Station
12	Bitum coal & Lig Min		56	Apparel & Access
13	Oil/Gas Extrac		57	Furniture
14	Mining & Qry Nonmetal		58	Eating & Drinking
15-17	Construction		59	Misc Retail

Table B1
SIC Definitions

SIC	Industry		SIC	Industry
15	General Build		60-67	Finance, Insurance, Real Estate
16	Heavy Constr		60	Banking
17	Special Trade		61	Credit Agencies
20-39	Manufacturing		62	Sec-Comm-Brks-SV
20	Food Products		63	Insurance-Carriers
23	Apparel		64	Ins Agents & Brokers
24	Lumber		65	Real Estate
25	Furniture		67	Holding & Investments
26	Paper		70-89	Services
27	Printing-Publ		70	Hotel/Lodging
28	Chemicals		72	Personal
29	Petro-Coal		73	Business
30	Rubber-Misc Plast		75	Auto-Repair
31	Leather		76	Misc Repair
32	Stone-Clay-Glass		78	Motion Pict
33	Primary Metal		79	Amus & Rec
34	Fabricated Metal		80	Health
35	Non-elect Mach		81	Legal
36	Elect-Electr Equip		82	Educational

Table B1
SIC Definitions

SIC	Industry		SIC	Industry
37	Transport Equip		83	Social Services
38	Instruments		84	Museums, Zoos, etc.
39	Misc Mfg		86	Membership Org
41-49	Transportation Commercial and Public		87	Engineering Services
41	Local-Urban Trans		88	Private Household
42	Trucking-Ware		89	Misc Services
44	Water Trans		99	Non-Classifiable
45	Air Trans			
46	Pipelines			
47	Transport Serv			
48	Communication			
49	Elec-Gas-San-Ser			

A mix-and-share analysis reveals the change in employment opportunities in Montana as a result of the changes in the industries due to its industrial structure. In Table B2 below, Column A presents the SIC code, columns B and C are Montana employment levels for 1983 and 1988 respectively. Column D is the difference between Column C and B. A positive value indicates growth Montana employment between 1983 and 1988. A negative entry in column D registers the number of lost Montana jobs in that industry.

Column E calculates the national Average Growth Effect (NAGE). The average industry growth rate in the United States for 1983 through 1988 period was 16.09 percent. If a Montana industry had grown at 16.09 percent beginning in 1983, Montana industry employment in 1988 would have grown

by the amount identified as NAGE in column E. For example, for SIC 2, Montana employment in 1983 was 4677. Had industry 2 in Montana grown at 16.09 percent as did the aggregate national industry, in 1988 Montana industry employment would have risen by 4677 x .1609 or 752.53 jobs.

Column F in Table B2 is the industry growth rate nationally for each of the 51 industries in the Montana sample. For example, for SIC 2, agriculture - livestock, the national livestock grew at .3449 or 34.49 percent between 1983 and 1988. Column F comes from the Bureau of Economic Analysis at the Montana Department of Commerce.

Next is the Specific Industry Effect (SIE). Some industries nationally grew faster than the national aggregate economy, others grew more slowly. If Montana industries happen to be concentrated among faster than average growth industries, Montana employment would rise because of this specific industrial composition. SIE measures how the composition of industries influence industrial growth. To compute SIE, multiply 1983 Montana industry employment by the difference between NAGE and INDGRO. For example, SIC 12, Bitum Coal mining, has a SIC equal to -3,063.57. This means that approximately 3,063 jobs are lost because Montana employment is concentrated in an industry which is growing slower than the national average.

Next we compute the Competitive Share Effect (CSE). CSE denotes the difference between the actual industry growth in jobs in Montana and the sum of the National Average Growth Effect and the Specific Industry Effect. A negative number indicates a shortfall in Montana businesses due to a loss of competitive advantage within this industry.

The last column, competitive efficacy is the ratio of competitive share efficacy and the Montana 1983 employment level. This ratio is the Competitive Efficacy variable COMP in the estimation equation (4.2). A negative value for COMP indicates that Montana firms became less competitive relative to their national peers in this industry.

Calculation of the Competitive Efficacy Variable
Mix and Share Calculation
Table B2

A	B	C	D	E	F	G	H	I
SIC	'83 Empl.	'88 Empl.	MT emp change	NAGE B*.1609	INDGRO	SIE B*F-E	Compet. Share D-(E+G)	Compet. Effect (H/B)
1, 2, 78	4677	5231	554	752.53	0.3449	860.57	-1,059.10	-.2264
10, 12-14	8517	7286	-1,231	1,370.39	-.1988	-3,063.57	462.18	.0543
15-17	22877	19528	-3,349	3,680.91	0.2975	3,125.00	-10,154.91	-.4439
20	3720	2768	-952	598.55	0.013	-550.19	-1,000.36	-.2689
21 *	4	3	-1	0.64	-.154	-1.26	-0.38	-.0950
23	448	561	113	72.08	-.0521	-95.42	136.34	.3043
24	9666	9386	-280	1,555.26	0.177	155.62	-1,990.88	-.2060
25	325	435	110	52.29	0.088	-23.69	81.40	.2505
26 *	868	840	-28	139.66	0.0464	-99.38	-68.28	-.0787
27	2486	2750	264	400.00	0.214	132.00	-268.00	-.1078
28	482	603	121	77.55	0.0144	-70.61	114.06	.2366
29 *	1019	756	-263	163.96	-.171	-338.21	-88.75	-.0871
30	106	121	15	17.06	0.171	1.07	-3.13	-.0295
31 *	54	60	6	8.69	-.302	-25.00	22.31	.4131
32	1255	1043	-212	201.93	0.083	-97.77	-316.16	-.2519
33	1268	1211	-57	204.02	-.07	-292.78	31.76	.0250
34	607	602	-5	97.67	0.045	-70.36	-32.31	-.0532
35	528	921	393	84.96	0.0297	-69.28	377.32	.7146
36	443	312	-131	71.28	-.0591	-97.46	-104.82	-.2366
37	158	279	121	25.42	0.178	2.70	92.88	.5878

Calculation of the Competitive Efficacy Variable
Mix and Share Calculation
Table B2

A	B	C	D	E	F	G	H	I
SIC	'83 Empl.	'88 Empl.	MT emp change	NAGE B*.1609	INDGRO	SIE B*F-E	Compet. Share D-(E+G)	Compet. Effect (H/B)
38	158	168	10	25.42	0.0528	-17.08	1.66	.0105
39	752	1319	567	121.00	0.0099	-113.56	559.56	.7441
42	7211	9017	1,806	1,160.25	0.275	822.78	-177.03	-.0245
44	21	15	-6	3.38	-.0396	-4.21	-5.17	-.2461
41, 45, 47	3197	3582	385	514.40	0.345	588.57	-717.97	-.2246
48	4843	3858	-985	779.24	-.031	-929.37	-834.87	-.1724
49	4777	4747	-30	768.62	0.094	-319.58	-479.04	-.0877
50-51	17985	15641	-2,344	2,893.79	0.139	-393.88	-4,843.91	-.2693
52	3792	3218	-574	610.13	0.186	95.18	-1,279.31	-.3374
53	5940	6674	734	955.75	0.128	-195.43	-26.32	-.0044
54	9308	9905	597	1,497.66	0.188	252.24	-1,152.90	-.1239
55	8498	9264	766	1,367.33	0.193	272.78	-874.11	-.1029
56	3146	2927	-219	506.19	0.183	69.53	-794.72	-.2526
57	2965	3093	128	477.07	0.260	293.83	-642.90	-.2168
58	24437	25346	909	3,931.91	0.238	1,884.10	-4,907.01	-.2008
59	12932	13906	974	2,080.76	0.130	-399.60	-707.16	-.0547
60-67	24596	26416	1,820	3,957.50	0.220	1,453.62	-3,591.12	-.1460
70	7973	8227	254	1,282.86	0.290	1,029.31	-2,058.17	-.2581
72	6772	9838	3,066	1,089.61	0.374	1,443.12	533.27	.0787
73	10600	15394	4,794	1,705.54	0.512	3,721.66	-633.20	-.0597

Calculation of the Competitive Efficacy Variable
Mix and Share Calculation
Table B2

A	B	C	D	E	F	G	H	I
SIC	'83 Empl.	'88 Empl.	MT emp change	NAGE B*.1609	INDGRO	SIE B*F-E	Compet. Share D-(E+G)	Compet. Effect (H/B)
75	4120	5170	1,050	662.91	0.355	799.69	-412.60	-.1001
76	2789	3424	635	448.75	0.251	251.29	-65.04	-.0233
78	948	995	47	152.53	0.270	103.43	-208.96	-.2204
79	4023	5328	1,305	647.30	0.191	121.09	536.61	.1334
80	23627	27548	3,921	3,801.58	0.22	1,396.36	-1,276.94	-.0540
81	2736	3609	873	440.22	0.31	407.94	24.84	.0091
82	3160	3561	401	508.44	0.165	12.96	-120.40	-.0381
83	4375	6555	2,180	703.94	0.384	976.06	500.00	.1143
84	76	106	30	12.23	0.46	22.73	-4.96	-.0653
86	6692	6678	-14	1,076.74	0.062	-661.84	-428.90	-.0641
89	7630	7431	-199	1,227.67	0.2096	371.58	-1,798.25	-.2357

* Denotes industries that were not in the Montana sample of firms.

APPENDIX C

Table C1
Ranking of the National Growth Rate of Industries

Number	SIC Code	Industry Name	INDGRO	LOCOEF
1	73	Business Services	1.512	L
2	84	Museums, Zoos, etc.	1.460	L
3	83	Social Services	1.384	L
4	72	Personal Services	1.374	M
5	75	Auto Repair Services	1.355	M
6	41,45,47	Transport. Air, Pipe, Local-Urban	1.345	L
7	1,2,7,8	Agric. Fish. Forestry	1.345	L
8	81	Legal Services	1.310	M
9	15,16,17	Construction	1.298	H
10	70	Hotels and Lodging	1.290	L
11	42	Trucking-Warehouse	1.275	L
12	78	Motion Pictures	1.270	M
13	57	Furn. & Home Furn.	1.260	M
14	76	Misc. Repair Service	1.251	L
15	58	Eating and Drinking	1.238	H
16	60 - 67	FIRE	1.220	H
17	80	Health Services	1.220	M
18	27	Printing-Pub.	1.214	M
19	89	Misc. Services	1.210	M
20	55	Auto Dirs-Svc Station	1.193	M
21	79	Amus. & Rec. Services	1.191	L
22	54	Food Stores	1.188	M
23	52	Bldg-Mat-Garden	1.186	M
24	56	Apparel & Access.	1.183	M
25	37	Transport. Equip.	1.178	L
26	24	Lumber	1.177	L
27	30	Rubber-Misc. Plast.	1.171	L
28	82	Educational Serv.	1.165	L
29	50,51	Wholesale Trade	1.139	M

Table C1
Ranking of the National Growth Rate of Industries

Number	SIC Code	Industry Name	INDGRO	LOCOEF
30	59	Misc. Retail Trade	1.130	M
31	53	Gen. Merch.	1.128	L
32	49	Elc-Gas-San-Services	1.094	L
33	25	Furniture	1.088	L
34	32	Stone-Clay-Glass	1.083	L
35	86	Membership Org.	1.062	M
36	26 *	Paper Mfg.	1.046	L
37	34	Fabric. Metals	1.045	L
38	35	Nonelect. Machines	1.030	L
39	28	Chemicals	1.014	L
40	20	Food Products	1.013	L
41	39	Misc. Mfg.	1.010	L
42	48	Communication	0.969	L
43	44	Water Treatment	0.960	L
44	23	Apparel Mfg.	0.948	L
45	36	Elect-Electron. Equip	0.941	L
46	33	Primary Metal	0.930	L
47	29 *	Petro. Coal	0.829	L
48	10,12-14	Mining	0.801	L
49	31 *	Leather	0.698	L

* Denotes industries that were not in the Montana sample used in this thesis.

Table C2
Ranking of Industries by Localization Coefficient

Number	SIC Code	Industry Name	LOCOEF	High, Medium or Low
1	58	Eating & Drinking	.0175	High
2	60 - 67	FIRE	.0269	High
3	15 - 17	Construction	.0272	High
4	81	Legal Services	.0273	Medium
5	55	Auto Dirs-Svc Stn	.0276	Medium
6	56	Apparel & Acces.	.0282	Medium
7	54	Food Stores	.0283	Medium
8	59	Misc. Retail	.0290	Medium
9	80	Health Services	.0299	Medium
10	72	Personal Services	.0312	Medium
11	57	Furn. & Home Furn	.0348	Medium
12	52	Bldg Mat-Garden	.0351	Medium
13	75	Auto-Repair Serv.	.0371	Medium
14	86	Membership Org.	.0389	Medium
15	89	Misc Services	.0396	Medium
16	27	Printing-Pub	.0457	Medium
17	50 - 51	Wholesale Trade	.0482	Medium
18	78	Motion Pictures	.0510	Medium
19	1,2,7,8	Agric. Fish. Forestry	.0535	Low
20	20	Food Products	.0536	Low
21	70	Hotels & Lodging	.0552	Low
22	53	Gen. Merch.	.0556	Low
23	48	Communication	.0564	Low
24	73	Bus. Services	.0570	Low
25	76	Misc. Services	.0570	Low
26	79	Amus. & Rec Serv	.0587	Low
27	83	Social Services	.0604	Low

Table C2
Ranking of Industries by Localization Coefficient

Number	SIC Code	Industry Name	LOCOEF	High, Medium or Low
28	41,45,47	Trans. Air, Pipe, Urban	.0703	Low
29	35	Non-Elec. Mach	.0788	Low
30	82	Educ. Services	.0896	Low
31	39	Misc. Mfg.	.0900	Low
32	49	Elec-Gas-San Serv	.1037	Low
33	32	Stone-Clay-Glass	.1053	Low
34	34	Fabric. Metals	.1127	Low
35	30	Rubber-Misc Plast	.1181	Low
36	38	Instruments	.1363	Low
37	37	Transport Equip	.1473	Low
38	10,12-14	Mining	.1490	Low
39	28	Chemicals	.1572	Low
40	23	Apparel	.1615	Low
41	24	Lumber	.1615	Low
42	84	Museums, Zoos, etc.	.1630	Low
43	25	Furniture Mfg.	.1654	Low
44	36	Elec.& Electron. Equip. Mfg.	.1742	Low
45	42	Trucking-Warehouse	.2066	Low
46	33	Primary Metal Mfg	.2240	Low

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