

Explaining State-Level Differences in Women-Owned Business Performance

By

StratEdge

For

**National Women's Business Council
409 Third Street, SW, Suite 210
Washington, DC 20024**

Under contract number SBAHQ-05-M-0498

March 13, 2006

This research study was prepared for the National Women's Business Council (NWBC; 409 Third Street, SW, Suite 210; Washington, DC 20024; Tel. 202 205 3850; Fax. 202 205 6825; www.nwbc.gov; info@nwbc.gov) by StratEdge (info@strat-edge.com), a small, woman-owned research and consulting firm focusing on economic analysis of competitiveness, innovation, and other major forces shaping the global economy.

The opinions and recommendations of the authors of this study do not necessarily reflect official policies or positions of the National Women's Business Council, the U.S. Small Business Administration or any other agency of the U.S. Government.

I. Executive Summary

Background

The National Women’s Business Council (NWBC) contracted StratEdge to carry out a creative, secondary analysis of the U.S. Census Bureau’s special tabulations of 1997-2001 data on women-owned businesses’ (WOB) performance. These special tabulations, which track changes in the number of firms and the number of employees in WOBs between economic census years, show that the performance of WOBs varied significantly across the country—from a high survival rate of 74% in New York and Connecticut to a low of 60% in Tennessee. Yet, little systematic research has been done to evaluate the influence of factors that underlie these state-level differences. This study has sought to help fill this research gap by combining the special Census tabulations with other available indicators of the business environment in which WOBs operate and compete.

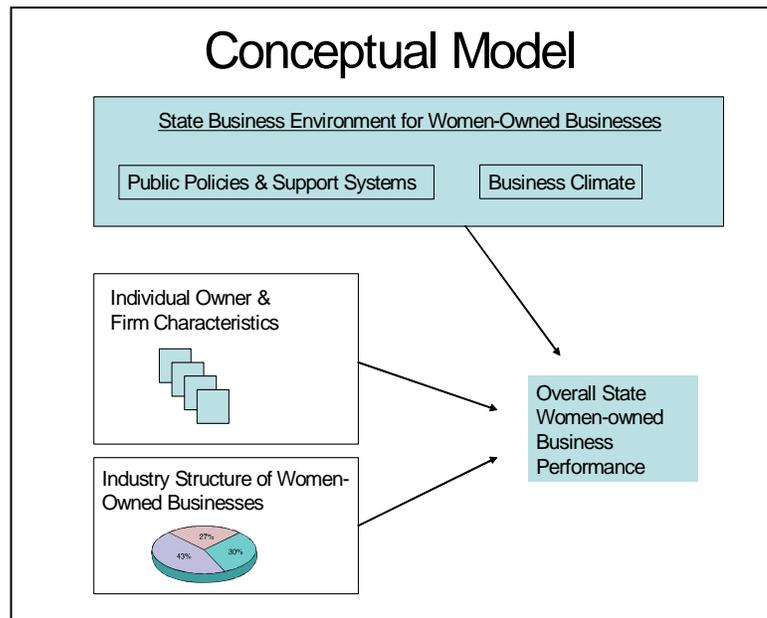
Data and Approach

StratEdge collected data on three broad sets of factors thought to influence WOB performance: (1) individual owner and firm characteristics (age, education level, etc.), (2) industry structure (choice of business activity and firm size), and (3) state business environment factors (tax rates, infrastructure, business support programs, etc.). Using a series of regression analyses and correlation calculations, StratEdge tested the importance of these variables in explaining observed differences in WOB survival rates and changes in employment across the 50 states between 1997 and 2001.

Findings and Policy Implications

This study was exploratory in nature and several data gaps were encountered. In particular, there are very few data sets of business environment variables specifically relevant to WOBs. Nevertheless, this analysis was suggestive of several interesting findings organized below by the broad category of factors that influence WOB performance.

- *Individual owner and firm characteristics—Women business owners’ level of education is important to better WOB performance across states. States with higher proportions of self-employed women with higher degrees had higher WOB survival rates and better employment performance.*



- *Industry structure*—While the distribution of WOBs among different industries does not appear to affect a state’s overall WOB performance, the size of WOBs does. Despite previous evidence, the type of business that women entrepreneurs choose to enter does not appear to affect state WOB performance. However, states with higher concentrations of smaller WOBs had lower survival rates.
- *State business environment*—The “knowledge economy orientation” of a state (a statistical construct measuring the combined effect of the level of venture capital investment, educational level of the workforce and degree of broadband penetration) had a positive and statistically significant influence on both WOB survival rates and growth. Surprisingly, higher personal tax rates (ratio of personal income tax revenue to total personal income) are associated with better WOB performance. This could be due to some combination of low income-tax states having higher sales, property or other taxes that impede business performance, or could indicate that such states lack sufficient government revenues to fund policies supporting WOB startup and expansion (e.g., higher education, health and other public services).

Assembling these factors into a comprehensive model to explain WOB performance was complicated by limitations in the data. Specifically, a rigorous statistical assessment is constrained by having so many explanatory variables with only 50 observations of state-level WOB performance. Nevertheless, our analysis suggests that, when controlling for other factors, a state’s knowledge economy orientation is one of the most significant predictors of WOB performance.

Conclusion and Recommendations

Women entrepreneurs and business leaders contribute significantly to the country’s economic growth and dynamism. Enhancing the environment within which WOBs operate should be premised on a rigorous, objective identification of which specific factors contribute to performance and, hence, can enhance the country’s competitiveness.

This analysis represents one of the first attempts to evaluate systematically the influence of factors that underlie state differences in performance. The results of this exploratory research reaffirm some things that were previously suggested. For example, the education level of women business owners matters, small WOBs perform more poorly than large firms, and having access to an educated workforce, venture capital and technology infrastructure all contribute to better business performance. While earlier studies had emphasized the importance of these factors to WOB performance without specific reference to regional differences, this analysis confirms that state-level discrepancies in WOB performance can be partially explained by these issues. These findings support continued efforts to provide women entrepreneurs access to education, mentoring, financial and technological resources and to invest in enhancing the quality of our nation’s workforce more broadly.

While data were available on a number of indicators, we encountered significant data gaps along the way. Filling in these gaps will enhance the productivity of future research efforts to better understand what factors lead to improved performance of WOBs and what

state/national policy interventions may improve WOB outcomes. Specifically, StratEdge offers two key recommendations:

First, NWBC should direct attention to already administered surveys to expand the number of indicators focused on WOBs and to collect this data by state and by industry. For example, data on firm-level characteristics such as reliance on venture capital by women entrepreneurs may be collected relatively easily using the Money Tree Survey administered by the National Venture Capital Association. Similarly, the Federal Reserve Board and Census Bureau could be requested to compile and make available more detailed data by state on women business owners, including personal wealth (average household income), use of financial instruments, participation in government contracting, etc. Furthermore, more detailed data sets could be developed over time, and at finer geographic levels (county or metropolitan areas), which would permit more rigorous statistical studies.

Second, to support more effective research by related and unrelated parties, NWBC should consider supporting the establishment of a data clearinghouse or repository of research data sets. The current research effort has highlighted the lack of readily accessible, detailed data sets at the firm, regional, and industry level relevant to the analysis of WOBs. Simply collecting such data sets and making them more accessible could catalyze further research on these issues, leveraging a broader research community to investigate these important issues.

II. Introduction

Representing half of the potential pool of entrepreneurs and business leaders, women are important contributors to the nation's economic growth and dynamism. In 2004, there were approximately 10.6 million privately held businesses that were at least 50% woman-owned. From 1997 to 2004, U.S. women-owned businesses (WOBs) appear to have grown at rates exceeding the national average for all privately held firms.¹ This has not been the case historically and continues not to be the case in many industries and many parts of the country where WOBs have been found to be less successful, on average, than those owned by men, even when they operate in the same industries.²

Indeed, the U.S. Census Bureau's special tabulations, which track changes in the number of firms and number of employees in WOBs from 1997 to 2001 by state, show that the performance of WOBs varied significantly across the country—from a high survival rate of 74% in New York and Connecticut to a low of 60% in Tennessee. It is also observed that employment in the average WOB in existence in 1997 had declined by 9.3% by 2001 and that the rate of employment contraction or expansion of WOBs varied by state. However, little research has been done to evaluate systematically the influence of factors that underlie these regional differences.

StratEdge was contracted by the National Women's Business Council (NWBC) to carry out a creative, secondary analysis of U.S. Census Bureau data on issues pertinent to WOB. We proposed to identify factors that may partially explain differences in the state-by-state performance of WOBs. The existing literature has generally ascribed gender-based business performance discrepancies to three broad sets of factors: (1) the overall business environment within which the firm operates; (2) the firm owner's choice of business activity; and (3) individual factors, such as the entrepreneur's skills, experience, and financial strength. Several studies find that female small business owners' failure to achieve levels of success comparable to those of male owners stems from less work experience and the tendency for WOBs to be concentrated in the least profitable, highly-competitive, and low-growth industries.³ Others find that women opt to start small businesses because of workplace disadvantages.⁴ Some take the

¹ The number of women- and equally-owned firms grew by 17% compared to 9% among all privately held firms, while employment in women- and equally-owned firms increased by 24% compared to 12% among all privately held firms. Meanwhile, revenues of women- and equally-owned firms rose by 46% compared to 34% among all privately held firms. National Women's Business Council. 2005. "Women Business Owners and Their Enterprises," *Fact Sheet*, March.

² Loscocco, K.A., and J. Robinson. 1991. "Barriers to Small Business Success Among Women," *Gender and Society* 5(4): 511-532.

³ Loscocco, K.A., J. Robinson, R.H. Hall, and J.K. Allen. 1991. "Gender and Small Business Success: An Inquiry into Women's Relative Disadvantage." *Social Forces* 70 (1): 65-85; and Kalleberg, A.L., and K.T. Leicht. 1991. Small Business Success and Survival: Individual and Structural Determinants of Organizational Performance. *Academy of Management Journal*.

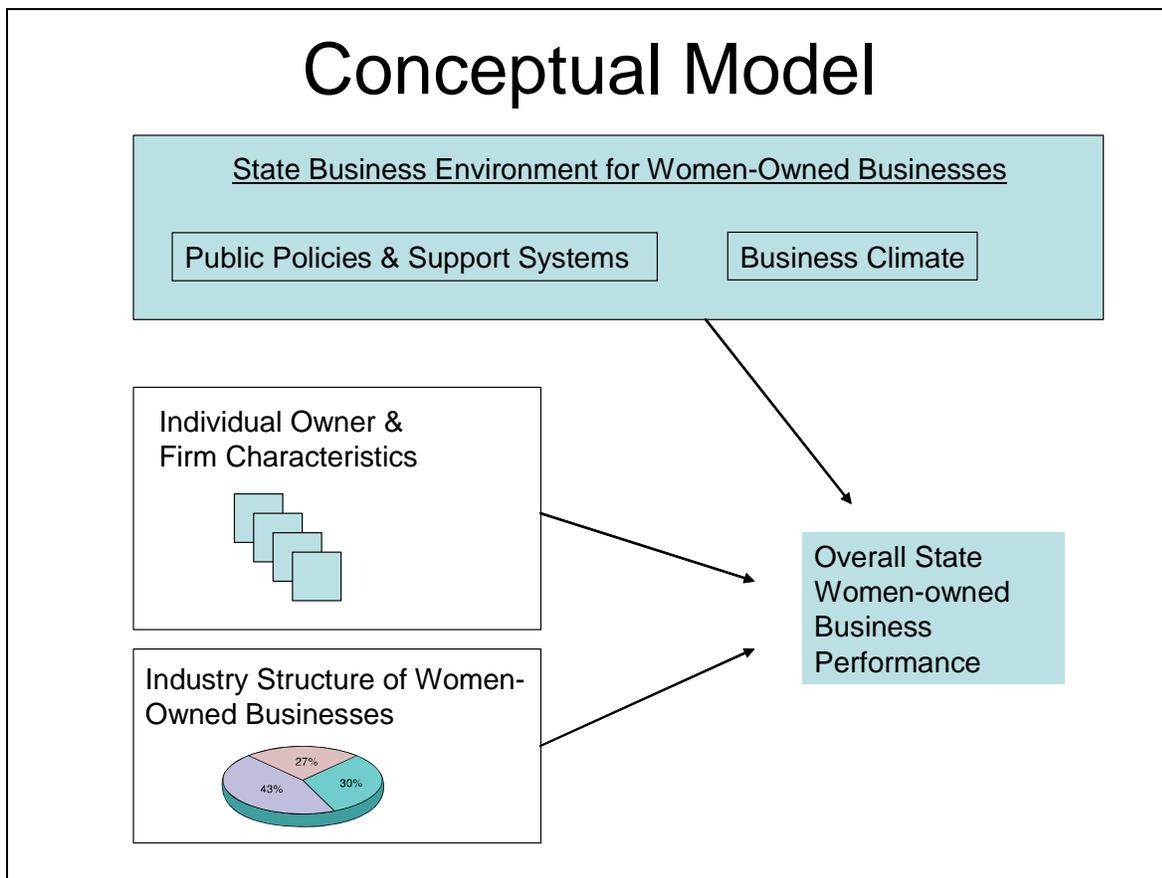
⁴ England, P., G. Farkas, B. Kilbourne, and T. Dou. 1988. Explaining Occupational Sex Segregation and Wages: Findings from a Model with Fixed Effects. *American Sociological Review*, 53:544-58; and Bender, H. 1980. Report on Women Business Owners. American Management Association.

view that enhancing public services may be the most effective short-term approach for states and regions concerned with small business retention and expansion.⁵

However, there has been relatively little systematic research addressing the overall business environment as it relates specifically to WOBs—what types of policies, investments, or support systems are most advantageous to women entrepreneurs and business leaders. And most importantly, how do these factors affect the performance of WOBs?

III. Data and Methodology

Based on existing literature, our conceptual model illustrated below relates the overall WOB performance in a state to three broad categories of factors: (1) the overall business environment within which the firm operates, including public policies, business support systems and the overall business climate in the state; (2) individual owner characteristics, such as the entrepreneur’s education, experience and personal wealth; and (3) the firm owner’s choice of business activity, or the structure of industries in which WOBs operate.



⁵ Seley, J.E. 1981. Targeting Economic Development: An Examination of the Needs of Small Businesses, *Economic Geography* 57 (1):34-51.

We constructed a simple, linear regression model to evaluate the importance and influence of these many factors on state WOB performance. Before constructing the final model, each group of variables was tested for their individual influences using a series of correlation and bivariate regression tests. Only those variables that had statistical significance as individual predictors were included in the final step-by-step regression model. The remainder of this section discusses each of the variables used in the model and their data sources. (See Appendix 1 for more detailed data citations and Appendix 2 for actual data for select variables.)

Dependent Variables: WOB Performance—The U.S. Census Bureau’s special tabulations contain two performance measures of WOB establishments in each state: *survival rates* and *employment change* between 1997 and 2001. State-level data for these two variables collected from the February 2005 *NWBC Issue in Brief* publication⁶ show wide variation across states. For example, while the national average business survival rate was 68.5%, Connecticut and New York had the highest survival rate of 74.4% and Tennessee had the lowest rate of 60.5%. Similarly, while employment in WOBs in New Jersey grew at an impressive 18.7% between 1997 and 2001, New Mexico witnessed the worst rate of employment contraction (23.5%) during the same period.

Independent Variables—Independent variables were grouped under three primary influence categories: individual owner and firm characteristics, industry structure, and state business environment for WOBs.

- *Individual Owner and Firm Characteristics*—Business owners bring different skills and resources to bear on their companies. For example, to the extent that the women business owners in some states are better educated and have greater financial resources (e.g., wealth, household income, access to credit), we would expect the WOBs in those states to perform better. One would like to have comprehensive data on the specific characteristics of women business owners in each state in order to account for these differences, ideally from the same source or a source using data comparable to the Census special tabulations. Unfortunately, the Census’s Survey of Business Owners contains only limited firm and business owner characteristics data. In lieu of this data, we obtained microdata on women respondents who identified themselves as being “self-employed” in the 1997 Current Population Survey (CPS) from the Bureau of Labor Statistics (BLS).⁷ Two sets of data were examined, one relating to the education level of women business owners and the second relating to her experience proxied by age.

Regarding education, we examined two variables: (1) the percentage of self-employed women that have at least an associate degree and (2) the percentage of self-employed women in the state with at least a 4-year college degree. The level of education of women entrepreneurs varies significantly across the United States. In Indiana, only 13.0% of all self-employed women had a college degree whereas the ratio was 40.6% for New Jersey and 69.6% for District of Columbia.

⁶ "Trends in Women-Owned Employer Establishments: 1997-2001" *Issue in Brief*, NWBC, Feb. 2005, Table 1.

⁷ It should be noted that the extract includes some small sample sizes for some of the states, somewhat limiting the statistical reliability of this data.

Years of business experience was not available. In its place, we use age as a proxy—the percentage of self-employed women 45 years or older in the total population of self-employed women in the state. Like educational attainment, this variable varies widely across states. For example, 60.8% of all self-employed women in Alabama were 45 years or older, whereas only 34.0% of Alaskan self-employed women were in this age category. We would expect less experienced (younger) women business owners to be less successful than their more experienced (older) counterparts.

The study team would have liked to include other variables relating to owner and firm characteristics, including household income or wealth (a measure of the financial resources an entrepreneur is able to bring to a venture), true measures of business experience (such as years in the labor force, or better yet, years as a business owner). Unfortunately, we were unable to locate data on these issues in a format useful for this analysis. In some instances, existing data sets were identified, such as the CPS and the Census Bureau's Integrated Longitudinal Business Database, both of which contain rich data on business owners. However, these resources require significant manipulations and/or special access, which put them out of the scope of this study.

- *Industry Structure*—The business activity (i.e., type of industry) women entrepreneurs choose to enter into may also affect state WOB performance. For example, if all of a region's WOB were in the construction industry, we would expect the state's overall WOB performance to reflect the performance of the construction industry in that state. To account for this influence, we consider the share of WOBs in manufacturing and services because of the higher rate of survival of WOBs in manufacturing noted in the literature and the high degree of intensity of WOBs in service industries (over 55% of all WOBs in the United States). This data was available directly from the Census Bureau's 1997 Survey of Minority and Women-Owned Business Enterprises, the same foundation source for the special tabulations used as indicators of WOB performance (which track how these 1997 firms performed between 1997 and 2001).

Smaller firms are typically more volatile than larger, more established enterprises. To isolate the effects of firm size, we constructed and used two variables: (1) the share of WOBs with receipts less than \$500K and (2) the share of WOBs with receipts less than \$100K as a percentage of all WOBs in the state. Estimation and modeling of these two variables were based on the premise that challenges and opportunities for business growth affect firms differently based on their size. Wide variations were observed for these two variables across the 50 states, with the portion of WOBs with receipts less than \$500k ranging from 61.6% in Hawaii to 85.4% in North Dakota.

- *State Business Environment for Women-Owned Businesses*—There are a multitude of variables that collectively constitute the business environment in which WOBs operate. We group those variables into two main influence categories: (1) public

policies⁸ and (2) state business climate. Public policies include such aspects as state and local taxes that business owners are subjected to in each state. For this analysis we considered two tax-related variables: (1) the state corporate tax rate and (2) the state and local personal income tax rate. The corporate tax rate was calculated as the ratio of total state corporate tax revenues collected to the total state business income. Similarly, the personal tax rate was calculated as total state and local personal income tax revenues as a percentage of total state personal income.

Business climate is a broader term that we use to refer to the overall ease of conducting business, particularly for WOBs, in a state. In this analysis, we have included:

- Access to financing—(1) small business loan intensity measured as the value of small business loans (< \$1m in size) per worker, (2) commercial and industrial loan intensity measured as total commercial and industrial loan values as a percentage of total bank assets for FDIC institutions, and (3) venture capital investments measured as total venture capital investment dollars in the state per establishment.
- Access to a quality workforce—(1) education level of potential workforce measured as the number of persons 25 and older with a college degree or higher and (2) women’s participation in the labor force measured as the percentage of civilian female population in the civilian labor force.
- Access to technological and physical infrastructure—(1) broadband penetration measured as the number of high-speed Internet lines over population and (2) highway miles in the state per 1,000 population.
- Small business climate score measuring the degree to which the policy environment supports entrepreneurship. This variable is, itself, a composite of indicators including tax policies, regulatory costs, workers compensation and others called the “business survival index.” It was developed by the Small Business and Entrepreneurship Council.

We encountered particular data gaps related to state business environment factors that are specific to WOBs. Available data for many state business environment factors did not distinguish between the gender of business owners. While it is true that WOBs operate in the same business environment as other firms, there could be differences in the way these factors impact WOBs. It would be interesting to analyze

⁸ One additional policy-relevant line of inquiry is to examine the role of state support systems for women business owners, such as mentoring programs and other women-focused business extension services within states’ small business development offices. Some data are available, such as the number of SBA-sponsored Women’s Business Centers, state chapters of the National Association of Women Business Owners (NAWBO), and state chapters of the Women Presidents’ Organization (WPO). However, the number of such organizations in each state is, at best, a rough indication of the reach of these organizations. A better indicator would be a measure of the degree of assistance provided to women entrepreneurs by these organizations and the number of women business owners assisted. Preliminary tests were run on the number of organizations and found to have no statistically significant influence on WOB performance. However, this indicator was not included in this study because of the aforementioned measurement issues.

whether there are particular business environment characteristics that are more advantageous to WOB performance or more serious impediments to WOB performance than for men-owned businesses. One example of this might be the cost of healthcare and whether this affects WOB expansion more than men-owned businesses. Similarly, data on financial resources was either unavailable at the state level (e.g., Survey of Small Business Finance which captures data on women business owners' use of institutional credit) or unavailable by gender (e.g. Money Tree Survey of venture capital investment).

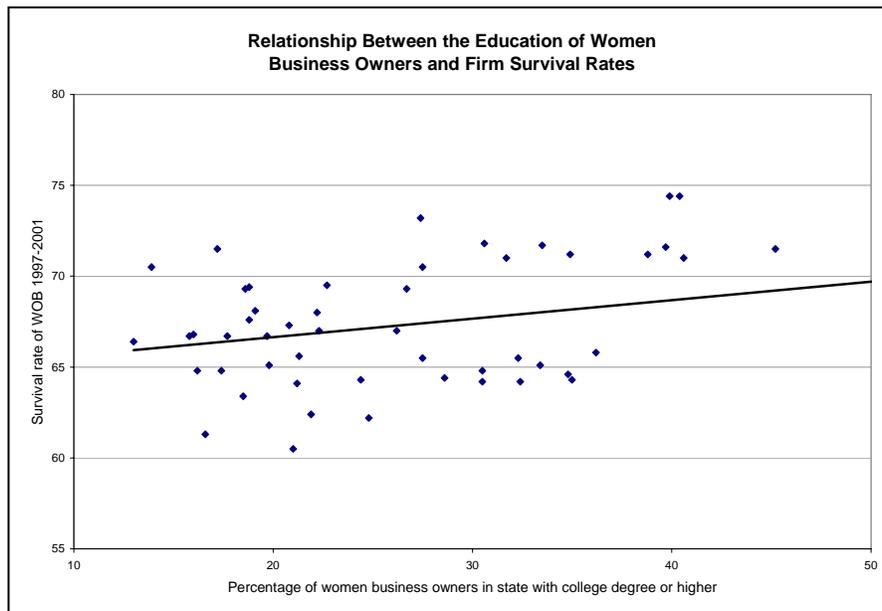
IV. Findings

This section presents the findings of the two models used in this analysis. Both models use the same set of independent variables, but examine their impact on the two different WOB performance indicators. The first model predicts the state-level performance of WOB in terms of the survival rates of those businesses (i.e., how many WOB in existence in 1997 were still in existence in 2001). The second model predicts the performance of WOB in terms of the rate of change of employment between 1997 and 2001 by state.

Explaining Survival Rates of Women-Owned Businesses

Bivariate regressions relating each independent explanatory variable to state WOB survival rates were performed. The table on the following page summarizes the statistical significance and regression coefficients of these individual variables.

The level of education of women entrepreneurs in a state is a key predictor of state-level differences in WOB survival rates. The percentage of self-employed women in a state with at least an associate degree exhibited a positive and statistically significant impact ($B=11.45$, $p=0.015$) on WOB survival rates. A similar positive influence was observed when the percentage of self-employed women in a state with at least a college degree was used to predict the state-level WOB survival rate ($B=10.17$, $p=0.027$). (See chart below.)



Explaining Survival Rates of Women-Owned Businesses Bivariate Regression Results		
Independent Variable	Statistical Significance	Unstandardized Regression Coefficient B
Individual Owner and Firm Characteristics		
Education (associate and higher)	Yes (p=.015)	11.45
Education (college grad and higher)	Yes (p=.027)	10.17
Experience	Not Significant	
Choice of Business Activity and Industry Structure		
Manufacturing Concentration	Not Significant	
Services Concentration	Not Significant	
Proportion of Small WOB (<\$500k)	Yes (p=.016)	-26.98
Proportion of Small WOB (<\$100k)	Yes (p=.004)	-24.02
Public Policies & Business Climate in the State		
Public Policies		
Corporate Taxes	Not Significant	
Personal Income Taxes	Yes (p=.003)	118.48
Access to Financing		
Small Business Loan Intensity	Not Significant	
Commercial & Industrial Loans	Not Significant	
Venture Capital Investments	Yes (p=.022)	0.001
Access to Workforce		
Workforce Education Level	Yes (p=.017)	0.24
Women's Labor Force Participation	Not Significant	
Access to Infrastructure		
Broadband Penetration	Yes (p=.001)	61.66
Transportation Infrastructure	Not Significant	
Small Business Climate Score		
Small Business Climate Index	Yes (p=.002)	0.161

With regard to variables representing industry structure, the share of WOBs in manufacturing or services in the state did not have statistical significance. However, the structure of the state economy with regard to the size of WOBs did have a noticeable effect on WOB survival rates. Both of the WOB size variables considered had a significant, negative influence on the survival rates of WOBs. In other words, states with larger proportions of small WOBs had lower WOB survival rates.

When modeled as individual predictors of survival rates of WOBs, the personal income tax rates to which women business owners are subjected turns out to be statistically significant with the unstandardized coefficient of 118.48. In other words, a higher personal tax rate had a positive and significant effect on WOB performance (i.e., a higher state personal tax rate is associated with better WOB survival rates). On the other hand, corporate tax rates do not show any statistically significant influence on the survival rates of WOB across states.

Venture capital investment is positively associated with WOB survival rates although the degree of influence is marginal. The other two measures of access to financing, namely, the small business loan intensity in the state and the commercial and industrial loan availability to businesses, do not have any statistical significance in predicting the survival rate of WOB.

The level of education of the available workforce shows a high degree of positive association ($B=0.24$, $p=0.017$) with WOB survival rate. However, women's participation in the labor force, signifying the degree of availability of women workers to businesses in the state (and consequently to WOB in the state) does not have any significant association with the survival rate of WOB.

With regard to access to infrastructure, broadband penetration has a significant, positive effect ($B=61.66$, $p=0.001$) on the survival rate. However, transportation infrastructure does not have any statistically significant effect on the WOB survival rate. In addition, the small business climate score (small business climate index measuring the degree of policy environment support for entrepreneurship in the state) revealed a positive influence ($B=0.161$, $p=0.002$) on the WOB survival rate.

Those variables that showed statistically significant influences individually on the survival rate of WOBs were included in a step-by-step, multivariate regression model. At the first step, it was evident that venture capital investment was strongly and positively correlated with the level of education of the workforce and broadband penetration, suggesting possibly that a highly educated workforce is strongly associated with a robust technological infrastructure and attracts higher levels of venture capital. These indicators are the typical indicators of the knowledge economy. A factor analysis was performed on these three variables. The test yielded very high eigenvalues, suggesting that they are measuring the same core issue. Therefore, we combined these three variables into one construct representing the “knowledge economy orientation” of the state. The newly constructed factor variable, along with the small business climate index and personal tax rates, were modeled in a multivariate regression model. *In the combined model, of all the policies and business climate related variables, only the knowledge economy orientation construct retained statistical significance.* (Model results can be found in Appendix 3.) This model explained 34.2% of the differences in WOB survival rates across the 50 states.

Subsequent models, incorporating owner and industry characteristics failed basic statistical tests for model validity, but were still suggestive that the knowledge economy orientation is associated with better WOB performance.

Explaining Employment Changes of Women-Owned Businesses

Changes in employment in WOBs capture a different aspect of business performance as compared to the survival rate of WOBs. Changes in employment reflect the strategic choices—expansion or reduction of workforce—taken by business owners when faced with business opportunities and challenges. Those strategies, and the consequent effect on employment change, may have different levels of dependence on variables representing the business climate and competitive forces in the states. Therefore, in this study, we take a parallel path to analyzing the effects of public policies and business climate variables as well as the industry structure variables on state-level changes in employment for WOBs between 1997 and 2001.

We begin this analysis by conducting individual bivariate regressions on the independent variables as in the previous case. The following table summarizes these results.

Explaining Employment Changes of WOB Bivariate Regression Results		
Independent Variable	Statistical Significance	Unstandardized Regression Coefficient B
Individual Owner and Firm Characteristics		
Education (associate and higher)	Yes (p=.009)	28.12
Education (college grad and higher)	Yes (p=.022)	24.34
Experience	Yes (p=.016)	-43.58
Industry Structure		
Manufacturing Concentration	Not Significant	
Services Concentration	Not Significant	
Proportion of Small WOB (<\$500k)	Not Significant	
Proportion of Small WOB (<\$100k)	Not Significant	
Public Policies & Business Climate		
Public Policies		
Corporate Taxes	Not Significant	
Personal Income Taxes	Yes (p=.049)	185.06
Access to Financing		
Small Business Loan Intensity	Not Significant	
Commercial & Industrial Loans	Not Significant	
Venture Capital Investments	Yes (p=.042)	0.001
Access to Workforce		
Workforce Education Level	Yes (p=.009)	0.61
Women's Labor Force Participation	Not Significant	
Access to Infrastructure		
Broadband Penetration	Yes (p=.001)	136.63
Transportation Infrastructure	Yes (p=.007)	-0.39
Small Business Climate Score		
Small Business Climate Index	Not Significant	

The level of education of women entrepreneurs emerges as closely associated to observed state-level differences in changes in employment for WOB. (For associate degree or higher, B=28.12, p=0.009; for college degree or higher, B=24.34, p=.022.)

With regard to variables representing industry structure, shares of WOBs in manufacturing or services did not have statistical significance on employment changes. However, contrary to the analysis of business survival rates which were associated with the size of WOBs, the proportion of WOBs that are small does not have a noticeable effect on employment performance.

When modeled individually, the state and local personal income tax rates to which women business owners are subjected again turns out to be positively related to WOB performance ($B=185.06$, $p=0.049$). As in the analysis of survival rates, corporate tax rates did not have any statistically significant influence on change in employment in states.

Among the three variables representing access to financing, only venture capital investment is positively associated with the survival rate of WOBs albeit a marginal degree of influence. The other two measures of access to financing, namely, the small business loan intensity in the state and commercial and industrial loans do not have any statistical significance in predicting WOB changes in employment.

Similar to the case of survival rates, while employment changes of WOBs appear to be strongly associated with the workforce's overall level of education, they are not associated with higher women's participation in the labor force.

With regard to access to infrastructure, broadband penetration, has a significant, positive effect ($B=136.63$, $p=0.001$) on changes in employment. Unlike the case of business survival rate, transportation infrastructure does have a statistically significant, though negative effect on the change in employment at WOBs ($B= -0.386$, $p=0.007$). (Although the model does not explain causal relationships, it is intriguing that a more significant transportation infrastructure is associated with declining or lower job growth among WOBs. In addition, the small business climate score (small business climate index measuring the policy environment support to entrepreneurship in the state) does not reveal a statistically significant influence on change in employment.

Those variables that showed a statistically significant influence on employment changes in WOBs were included in a step-by-step, multivariate regression model. When treated together, the public policy and business climate related variables had a different combined effect on change in employment of WOBs than when treated separately. Once again, to address the strong correlation among venture capital investments in the states, the level of education of the workforce and broadband penetration, a "knowledge economy orientation" construct was used in the model. In the combined model, of all the policies and business climate related variables, only the knowledge economy orientation construct retains statistical significance ($p=0.022$). Together, this model explained 28.7% of the differences in changes in employment in WOB. (Model results can be found in Appendix 4.)

V. Conclusions and Recommendations

Women entrepreneurs and business leaders contribute significantly to the country's economic growth. If WOBs are less successful, on average, in some states than in others, there may be policy interventions that can be taken to better support them. Such interventions should be premised on a rigorous, objective identification of which specific factors are contributing to these performance differences.

This analysis represents one of the first attempts to evaluate systematically the influence of factors that underlie regional differences in the performance of WOBs. This analysis, though

exploratory and limited by data gaps and shortcomings, was nevertheless suggestive of several interesting findings:

- *Individual owner and firm characteristics*—*Women business owners' level of education is important to better WOB performance across states.* The percentage of self-employed women in a state with higher degrees (associate level and above) exhibited a positive and statistically significant impact on both WOB survival rates and changes in employment.
- *Industry structure*—*While the distribution of WOBs among different industries does not appear to affect a state's overall WOB performance, the size of WOBs does.* Despite previous evidence, the type of business that women entrepreneurs choose to enter does not appear to affect state WOB performance. However, states with higher concentrations of smaller WOBs had lower survival rates.
- *State business environment* —The “knowledge economy orientation” of a state (a statistical construct measuring the combined effect of the level of venture capital investment, educational level of the workforce and degree of broadband penetration) had a positive and statistically significant influence on both WOB survival rates and growth. Surprisingly, personal income tax rates are significantly and positively related to WOB performance (higher tax rates are related to better WOB performance). This finding merits further study, though it is important to note that the effect is insignificant in the full regression model. One interpretation is that states with higher income taxes have the resources to provide other services and support systems that enhance WOB performance, such as greater investments in education and health and other public services. Another possibility is that low income-tax states actually have higher rates for other taxes (sales, property, etc.) that impede WOB performance. Our results do not support causal conclusions and given the significant research suggesting that high tax rates either impede or have little impact on business performance, it is likely that there is something else behind these results.

Assembling these factors into a comprehensive model to explain WOB performance was complicated by limitations in the data. Specifically, a rigorous statistical assessment is constrained in this instance by the necessity of using so many explanatory variables to account for the complexity that is business performance, with only 50 observations of state-level WOB performance. Nevertheless, our analysis suggests that, when controlling for other factors, a state's knowledge economy orientation is one of the most significant predictors of WOB performance.

In summary, the results of this exploratory research reaffirm some things that were previously suggested. For example, the education level of women business owners matters, small WOBs perform more poorly than large firms, and having access to an educated workforce, venture capital and technology infrastructure all contribute to better business performance. While earlier studies had emphasized the importance of these factors to WOB performance without specific reference to regional differences, this analysis confirms that state-level discrepancies in WOB performance can be partially explained by those factors. These findings support continued efforts to provide women entrepreneurs access to education,

mentoring, financial and technological resources and to invest in enhancing the quality of our nation's workforce more broadly.

While the results of this exploratory research are illuminating, significant data gaps were encountered along the way. Addressing these gaps can enhance the productivity of future research efforts to better understand what factors lead to improved performance of WOBs and what state/national policy interventions may improve WOB outcomes. Specifically, StratEdge offers two key recommendations:

First, NWBC should direct attention to already administered surveys to expand the number of indicators focused on WOBs and to collect this data by state and by industry. For example, data on firm-level characteristics such as reliance on venture capital by women entrepreneurs may be collected relatively easily using the Money Tree Survey administered by the National Venture Capital Association. Similarly, the Federal Reserve Board and Census Bureau could be requested to compile and make available more detailed data by state on women business owners, including personal wealth (average household income), use of financial instruments, participation in government contracting, etc. Furthermore, more detailed data sets could be developed over time, or at a finer geographic level (county or metropolitan areas), which would permit more rigorous statistical studies.

Second, to support more effective research by related and unrelated parties, NWBC could establish a data clearinghouse, or repository of research data sets. This research has highlighted the lack of readily accessible, detailed data sets at the firm, regional, and industry level relevant to the analysis of WOBs. By collecting and making such data sets more readily available, NWBC could catalyze further research on these issues, leveraging a broader research community to investigate these important issues.

Appendix 1. Data Sources

Variable	Description	Time Coverage	Industry Coverage/Detail	Source
PERFORMANCE VARIABLES				
1. WOB survival rates 1997-2001	Survival rate of WOBs in existence in 1997 between 1997 and 2001	1997-2001	By state, by gender and by industry at national level.	NWBC (2005) "Trends in Women-Owned Employer Establishments: 1997-2001" <i>Issue in Brief</i> , NWBC, Feb.; Table 1.
2. WOB employment change 1997-2001	Percent change in employment for WOBs	1997-2001	By state, by gender and by industry at national level.	NWBC (2005) "Trends in Women-Owned Employer Establishments: 1997-2001" <i>Issue in Brief</i> , NWBC, Feb.; Table 1.
INDIVIDUAL BUSINESS OWNER CHARACTERISTICS				
Education	Percentage of women business owners (self-classified in survey as self-employed women in own incorporated or unincorporated business) with at least a college (a) or graduate degree (b)	1997	By state, by gender	Current Population Survey microdata extracted by BLS. Caveat: sample size is small so findings may not be statistically robust
Experience	Percentage of women business owners who are 45 years or older in State (see definition above)	1997	By state, by gender	Current Population Survey microdata extracted by BLS. Caveat: sample size is small so findings may not be statistically robust
Industry Structure of Women-Owned Businesses				
Industry Concentration – Manufacturing and Services	Percentage, by number of firms, of WOBs in manufacturing and services industry segments. (calculated)	1997	By 2-digit SIC code, by state, by gender	Census Bureau, 1997 Survey of Minority and Women-Owned Business Enterprises; Table 3.
Proportion of WOB that are small	WOBs with receipts <\$500k and with receipts <\$100k as % of all WOBs in state.	1997	By state, by industry for country	StratEdge calculations based on Census, Special Tabulations for Women-Owned Businesses, 2003.

STATE BUSINESS ENVIRONMENT FOR WOMEN-OWNED BUSINESSES				
Public Policies & Support Systems				
State Corporate Tax Rate	Total state corporate tax revenues/total state business income	2001	By state	Census Bureau & Bureau of Economic Analysis: http://www.census.gov/govs/www/statetax.html http://www.bea.doc.gov/bea/regional/data.htm
State Personal Income Tax Rate	Total personal income tax revenues as % of personal income	2001	By state	Census Bureau, State and Local Gov Finances http://www.census.gov/govs/www/estimate.html BEA Annual State Personal Income – www.bea.doc.gov/bea/regional/spi/
Small Business Loan Intensity	Value of small business loans (<\$1m) per worker in the state	2000	By state, not by gender	SBA, Office of Advocacy; Small Business & MicroBusiness Lending in the United States (CRA data, Table 4) http://www.sba.gov/advo/stats/lending/2001/sbl_study.pdf
Commercial & Industrial Loan Intensity	C&I loan values as % total bank assets (FDIC institutions)	2000	By state, not by gender	Federal Deposit Insurance Corporation (FDIC), Statistics on Depository Institutions, http://www2.fdic.gov/SDI/SOB/
Venture Capital Investments	Total VC investments per establishment in state (\$/establishments)	2001	By state, not by gender	PriceWaterhouse Coopers, Moneytree Survey, http://www.pwcmoneytree.com/moneytree/index.jsp ; U.S. Census Bureau for number of establishments per state.
Workforce Education Level	Persons 25 years or older with college degree or more.	1998	By state, by gender	Census Bureau; Current Population Reports, P20-513. (from Statistical Abstract 1999 - http://www.census.gov/prod/www/statistical-abstract-1995_2000.html)
Women's Labor Force Participation	Percent of civilian non-institutional female population in the civilian labor force (percentage)	1997	By state, by gender	Census Bureau, 1999, Statistical Abstract of the US, Table 654. http://www.census.gov/prod/www/statistical-abstract-1995_2000.html
Broadband Penetration	# of high-speed lines per 1,000 people	2003	By state, not by gender	Federal Communications Commission (FCC), http://www.fcc.gov/wcb/iatd/comp.html
Transportation Infrastructure	Highway miles per 1,000 people	2002	By state, not by gender	Department of Transportation, <i>Highway Statistics 2002</i> , Sect. V, Table HM-20 www.fhwa.dot.gov/ohim/ohimstat.htm .
Small Business Climate	Small business survival index for "policy environment in support of entrepreneurship"		By state, not by gender	Small Business and Entrepreneurship Council, <i>Small Business Survival Index</i> , http://www.sbsc.org

Appendix 2. Data Table of Statistically Significant Variables Affecting WOB Performance

State	WOB Performance		Business Owner Characteristics		Firm Characteristics		Business Environment Factors			
	Survival Rate	Employ. Change (%)	% of self-employ. women with college degree	% of self-employ. women age 45+	% of WOB with < \$500K receipts	% of WOB with < \$100K receipts	State and local pers. tax rate	Total VC \$ invest. per estab.	Educ. level of workforce (% of 25+ pop. with college degree)	Broadband Penetration
United States	68.5	-9.3	28.3	47.9	73.6	31.0	2.3	\$5,448	24.4	0.10
Alabama	64.8	-11.4	16.2	60.8	75.7	32.3	1.9	\$982	20.6	0.08
Alaska	64.2	-13.9	30.5	34.0	76.1	28.6	0	\$5,700	24.2	0.11
Arizona	62.2	-6.5	24.8	38.0	77.0	31.6	1.5	\$1,561	21.9	0.10
Arkansas	61.3	-11.9	16.6	56.3	74.1	36.5	2.5	\$150	16.2	0.06
California	71.2	-14.5	34.9	45.8	67.9	22.1	2.9	\$15,585	26.4	0.12
Colorado	65.8	-0.4	36.2	46.2	78.0	37.0	2.3	\$8,778	34.0	0.09
Connecticut	74.4	-7.1	40.4	35.3	72.2	27.4	2.5	\$5,551	31.4	0.13
Delaware	64.3	-4.4	35.0	53.8	75.3	37.7	3.0	\$6,543	25.1	0.08
District of Columbia	66.7	-18.1	69.6	55.5	63.1	20.0	0	n/a	36.5	n/a
Florida	65.1	-13.7	33.4	47.0	76.1	30.0	0	\$2,007	22.5	0.12
Georgia	65.5	-10.1	27.5	40.0	74.1	31.3	2.7	\$4,194	20.7	0.11
Hawaii	73.2	-16.1	27.4	53.6	61.6	19.5	3.2	\$1,103	24.0	n/a
Idaho	65.1	-17.9	19.8	49.8	81.1	38.3	2.5	\$143	20.3	0.06
Illinois	71.8	-4.6	30.6	45.2	73.1	28.6	1.8	\$3,508	25.8	0.09
Indiana	66.4	-12.0	13.0	45.0	72.8	31.1	2.4	\$370	17.7	0.07
Iowa	67.6	-7.7	18.8	44.4	77.9	38.8	2.3	\$72	20.3	0.07
Kansas	67.3	-10.6	20.8	47.8	76.6	39.2	2.4	\$577	28.5	0.10
Kentucky	68.1	-13.5	19.1	44.4	77.5	33.7	3.4	\$247	20.1	0.06
Louisiana	69.3	-21.7	26.7	52.6	71.3	31.6	1.6	\$779	19.5	0.08
Maine	70.5	4.7	27.5	49.3	78.9	37.7	3.1	\$749	19.2	0.08
Maryland	71.6	-4.7	39.7	49.5	74.6	29.9	4.0	\$6,847	31.8	0.10
Massachusetts	71.5	-7.9	45.2	44.4	74.1	29.0	3.2	\$25,739	31.0	0.14
Michigan	69.4	-11.2	18.8	45.7	74.8	34.7	2.2	\$644	22.1	0.08
Minnesota	69.5	-10.0	22.7	53.2	72.9	35.1	3.3	\$3,112	31.0	0.10
Mississippi	62.4	-19.5	21.9	41.5	71.9	35.0	1.6	\$498	19.5	0.04
Missouri	65.6	-9.1	21.3	55.3	75.6	37.6	2.5	\$2,555	22.4	0.08
Montana	64.8	-6.4	30.5	48.7	83.4	45.0	2.3	\$623	23.9	0.04
Nebraska	71.5	-20.5	17.2	50.6	73.3	33.9	2.3	\$1,160	20.9	0.10
Nevada	63.4	-9.8	18.5	41.6	72.3	28.0	0	\$543	20.6	0.11
New Hampshire	71.7	-5.2	33.5	42.1	72.1	31.1	0.2	\$7,092	26.6	0.12
New Jersey	71.0	18.7	40.6	41.0	73.7	29.2	2.1	\$5,872	30.1	0.13
New Mexico	64.6	-23.5	34.8	58.6	77.1	38.0	2.2	\$310	23.1	0.05
New York	74.4	2.3	39.9	47.8	69.9	28.9	4.4	\$4,454	26.8	0.12
North Carolina	69.3	-17.9	18.6	52.1	72.6	31.9	3.2	\$3,380	23.3	0.10
North Dakota	66.7	-22.6	19.7	53.7	85.4	43.9	1.2	\$70	22.5	0.05
Ohio	68.0	-11.6	22.2	50.4	72.5	31.0	3.6	\$1,001	21.5	0.09
Oklahoma	70.5	-10.5	13.9	44.0	76.6	35.9	2.5	\$292	20.5	0.08
Oregon	64.3	-14.7	24.4	54.4	77.4	35.0	3.7	\$2,251	27.7	0.11
Pennsylvania	71.0	3.2	31.7	50.9	75.8	33.4	2.6	\$3,852	22.1	0.08
Rhode Island	71.2	-6.2	38.8	47.0	79.1	39.3	2.6	\$1,934	27.8	0.11
South Carolina	67.0	-17.5	22.3	54.6	76.2	34.2	2.3	\$88	21.3	0.07
South Dakota	64.8	-23.4	17.4	53.9	78.6	36.8	0	\$20	21.8	0.04
Tennessee	60.5	-19.8	21.0	49.3	74.0	36.9	0.1	\$1,795	16.9	0.08

– Explaining State-Level Differences in the Performance of Women-Owned Businesses –

Texas	67.0	-12.3	26.2	48.0	72.6	26.4	0.0	\$6,765	23.3	0.09
Utah	64.1	-5.4	21.2	38.9	72.4	33.8	2.8	\$3,176	27.6	0.07
Vermont	64.4	-12.7	28.6	38.0	78.4	42.2	2.3	\$525	27.1	0.07
Virginia	65.5	-6.8	32.3	53.2	74.0	35.8	2.9	\$5,611	30.3	0.10
Washington	64.2	-11.5	32.4	47.6	78.5	37.6	0	\$4,814	28.1	0.11
West Virginia	66.7	-18.3	15.8	51.9	78.2	40.6	2.5	\$40	16.3	0.06
Wisconsin	66.7	-7.5	17.7	51.4	77.3	39.5	3.1	\$683	22.3	0.09
Wyoming	66.8	-15.8	16.0	53.3	81.5	42.5	0	n/a	19.8	0.05

Appendix 3. Select Empirical Results of Analysis of Survival Rates of Women-Owned Businesses

Factor Analysis of business climate variables

Communalities

	Initial	Extraction
perstax	1.000	.110
vcinv	1.000	.708
weduc	1.000	.721
bband	1.000	.716

Extraction Method: Principal Component Analysis.

High values of communalities (eigenvalues greater than 0.7) for the level of venture capital investment, educational level of the workforce and broadband penetration indicate that the three variables are highly related and hence the validity of using one statistical construct in place of the three variables.

Multivariate Regression Analysis of Policy Environment and Business Climate Variables on WOB Survival Rates

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	61.815	2.685		23.025	.000
	perstax	26.702	46.745	.094	.571	.571
	REGR factor score 1 for analysis 2	1.261	.436	.378	2.890	.006
	sbclim	.106	.069	.256	1.541	.130

a. Dependent Variable: Survival rate for WOB 1997-2001

REGR Factor Score represents the “knowledge economy orientation,” a statistical construct derived from the level of venture capital investment, educational level of the workforce and degree of broadband penetration.

Appendix 4. Select Empirical Results of Analysis of Changes in Employment of Women-Owned Businesses

Multivariate Regression Analysis of Policy Environment and Business Climate Variables on WOB Change in Employment

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-10.860	2.593		-4.188	.000
	perstax	81.735	90.333	.122	.905	.370
	REGR factor score 1 for analysis 2	2.756	1.162	.352	2.371	.022
	hwymipp	-.184	.151	-.179	-1.217	.230

a. Dependent Variable: Percentage change in employment for WOB 1997-2001

REGR Factor Score represents the “knowledge economy orientation,” a statistical construct derived from the level of venture capital investment, educational level of the workforce and degree of broadband penetration.