

11-2014

When Do Female-Owned Businesses Out-Survive Male-Owned Businesses? A Disaggregated Approach by Industry and Geography

Arturs Kalnins

Cornell University School of Hotel Administration, atk23@cornell.edu

Michele Williams

Cornell University, michele-williams@uiowa.edu

Follow this and additional works at: <https://scholarship.sha.cornell.edu/articles>

Part of the [Entrepreneurial and Small Business Operations Commons](#)

Recommended Citation

Kalnins, A., & Williams, M. (2014). *When do female-owned businesses out-survive male-owned businesses? A disaggregated approach by industry and geography* [Electronic version]. Retrieved [insert date], from Cornell University, School of Hospitality Administration site: <http://scholarship.sha.cornell.edu/articles/654>

This Article or Chapter is brought to you for free and open access by the School of Hotel Administration Collection at The Scholarly Commons. It has been accepted for inclusion in Articles and Chapters by an authorized administrator of The Scholarly Commons. For more information, please contact hotellibrary@cornell.edu.

When Do Female-Owned Businesses Out-Survive Male-Owned Businesses? A Disaggregated Approach by Industry and Geography

Abstract

Studies have invoked several theoretical perspectives to explain differences between female-owned businesses and male-owned businesses. Yet, few have considered the possibility that differential outcomes between female-owned businesses and male-owned businesses vary from setting to setting, an insight that we derive by combining social constructionism with feminist theory. We articulate hypotheses regarding the outcome of business survival duration based on this insight. Then, using a dataset of one million Texan proprietorships, we test these hypotheses by estimating separate gender effects for many individual industries and geographic areas. We find that female-owned businesses consistently out-survive male-owned businesses in many industries and areas.

Keywords

entrepreneurship, heterogeneous industries, gender

Disciplines

Entrepreneurial and Small Business Operations

Comments

Required Publisher Statement

© [Elsevier](#). Final version published as: Kalnins, A., & Williams, M. (2014). When do female-owned businesses out-survive male-owned businesses? A disaggregated approach by industry and geography. *Journal of Business Venturing*, 29(6), 822-835. doi:10.1016/j.jbusvent.2013.12.001

Reprinted with permission. All rights reserved.

When do female-owned businesses out-survive male-owned businesses?

A disaggregated approach by industry and geography

Arturs Kalnins
Cornell University

Michele Williams
Cornell University

Abstract

Studies have invoked several theoretical perspectives to explain differences between female-owned businesses and male-owned businesses. Yet, few have considered the possibility that differential outcomes between female-owned businesses and male-owned businesses vary from setting to setting, an insight that we derive by combining social constructionism with feminist theory. We articulate hypotheses regarding the outcome of business survival duration based on this insight. Then, using a dataset of one million Texan proprietorships, we test these hypotheses by estimating separate gender effects for many individual industries and geographic areas. We find that female-owned businesses consistently out-survive male-owned businesses in many industries and areas.

1. Executive summary

Many studies in entrepreneurship have analyzed the relative survival duration of female-owned businesses and male-owned businesses. However, the results have been inconsistent. Some studies have found that female-owned businesses survive for shorter periods than those owned by men; these studies have often invoked differences between men's and women's traits, skills or preferences as an explanation. Other studies have found no difference in survival duration between female-owned businesses and male-owned businesses; these have often drawn one of two conclusions: (1) that male and female business owners do not differ in their traits, skills, and preferences or (2) that they do differ in their traits, skills, and preferences but that these differences cancel each other out. Importantly, all of the studies reaching these typical conclusions make the assumption, implicitly or explicitly, that any differences between female-owned businesses and male-owned businesses apply consistently throughout the economy. This assumption is embedded in the typical research design that estimates only a single female-owned business coefficient because the coefficient is necessarily constrained to be equal across an economy-wide or sector-wide data set regardless of the possible heterogeneity present.

Our study contributes to the debate about gender and business ownership by exploring the possibility that neither the typical conclusions nor the underlying assumption of economy-wide applicability are accurate. Motivated by social constructionism and feminist theory, we argue that different industrial and geographic contexts might provide differing opportunities and constraints for women business owners. These opportunities and constraints may, in turn, shape the relative survival duration of female-owned businesses and male-owned businesses. Using these arguments, we hypothesize that industries and geographic areas will exist where female-owned businesses systematically out-survive male-owned businesses.

We test these hypotheses empirically using one million retail and service proprietorships in Texas and estimating separate female-owned business effects, simultaneously, for many individual industries and geographic areas. We found that female-owned businesses out-survived male-owned businesses in a wide variety of industries, most notably in educational services and dance studios. Four of the largest industries where female-owned businesses out-survived male-owned businesses were related to clothing, four were related to gift-giving, and two to alcohol sales and service. In terms of geographic area, female-owned businesses consistently out-survived male-owned businesses in the largest cities, whereas male-owned businesses out-survived female-owned businesses elsewhere.

Our study makes contributions to academic research and has implications for both policy and practice. With respect to empirical research, our findings demonstrate why it is inaccurate to interpret a negative and statistically significant coefficient of a single binary female-owned business variable within an economy-wide data set as an

indication that male-owned businesses systematically out-survive female-owned businesses throughout the economy. It is similarly inappropriate to interpret a lack of statistical significance of this binary female-owned business coefficient as a sign of gender equality in terms of survival duration. To more accurately capture the effects of business owner gender in future studies—for survival as well as other outcome variables such as incidences of discrimination, human capital variation, or preferences—we believe that scholars will benefit from adopting flexible research designs that allow gender-based effects to vary by industrial and geographic categories.

Further, both researchers and policymakers are likely to be interested in studies that examine when longer survival duration by female-owned businesses increases gender equality and when it does not. With the results of such studies in hand, combined with our findings, policymakers could refine their support for women business owners. They could either target sectors where male-owned businesses clearly out-survive female-owned businesses and directly attempt to reduce the difference. Or they could support female owners in sectors where female-owned businesses already out-survive male-owned businesses in order to indirectly compensate for the presence of the dominance of male-owned businesses elsewhere.

Finally, we believe that prospective and current female business owners will benefit from information about the relative survival duration of male-owned and female-owned businesses in their region and chosen industry.

2. Introduction

Studies in entrepreneurship have invoked a variety of theoretical perspectives to explain differences between female-owned businesses and male-owned businesses (see Jennings and Brush (2013), for an extensive review of differences, perspectives and outcomes). Focusing on the outcome of survival duration, review articles (e.g., Ahl, 2006; Marlow and McAdam, 2013) have noted that empirical studies finding that female-owned businesses survive for shorter periods than those owned by men often invoke statistically significant but often very small differences between men's and women's traits, skills or preferences as an explanation. In contrast, studies finding no difference in survival duration between female-owned businesses and male-owned businesses have often interpreted their results as consistent with: (1) the perspective that male and female owners do not differ (e.g., Kalleberg and Leicht, 1991; Watson, 2003), or (2) the perspective that male and female owners do differ in their traits, skills, and preferences but these differences offer compensating opportunities and thus cancel each other out (e.g., Fischer et al., 1993; Robb and Watson, 2012). Yet, the possibility that differences in outcomes between female-owned businesses and male-owned businesses may vary from setting to setting has received relatively little research attention (Bird and Brush, 2002; James, 2012).

We take this latter perspective and ask a new question: do industries and geographic areas exist where female-owned businesses consistently out-survive male-owned businesses? To answer this question, we attempt to reconcile the inconsistent findings and conclusions by pursuing a more nuanced approach—one motivated by social constructionism (Berger and Luckmann, 1966) and feminist theory (e.g., Ahl, 2006; Carter and Williams, 2003; Fischer et al., 1993; Marlow and McAdam, 2013). We contend that, within different industries and geographic areas, the social construction of gender-based expectations for men and women differ with respect to work-life balance, resource acquisition, and other factors (Ahl, 2004; Alvesson and Billing, 1997; Jennings and Brush, 2013), thus affording opportunities and imposing constraints on their economic activities (Ely and Padavic, 2007; Ridgeway and Correll, 2004).¹

We recognize that, from a feminist perspective, uncovering industries and geographic areas where female-owned businesses consistently out-survive male-owned businesses is a double-edged sword unless accompanied by gender equality. We emphasize that we do not directly address the societal value, economic value or social status associated with participating in entrepreneurship in differing industries or regions. Further, we recognize that evidence of longer survival duration for female-owned businesses does not necessarily signal industries or regions that have overcome traditional assumptions about sex roles that disadvantage women. Yet, we hope that our approach will form a springboard for future research that will uncover under what circumstances the finding that female-owned businesses out-survive male-owned businesses is accompanied by gender equality and value creation in dimensions such as work-family balance, enjoyment and broader societal contributions.

¹ The term “gender” refers here to biological sex differences rather than identification with male versus female roles

To empirically test the hypotheses, we employ a straightforward but novel research design that-unlike the vast majority of existing studies-moves beyond the estimation of a single binary female-owned business coefficient across settings that are often heterogeneous in nature. Using flexible survival duration regressions, we estimate separate gender coefficients for each of the many finely grained industries (four-digit SIC codes) and geographic areas (five-digit zip codes) in our dataset. We analyze a dataset of one million proprietorships, all from the U.S. State of Texas. Our million-firm dataset has far more businesses than even the largest datasets used in recent published studies: the 40,000 firm Characteristics of Business Owners data (Fairlie and Robb, 2009), the 5000 firm Kauffman Firm Survey (Coleman and Robb, 2009; 2012; Robb and Watson, 2012), and the GEM data (Estrin and Mickiewicz, 2011) with a half-million individuals, 2.8% of whom (14,000) are engaged in some form of entrepreneurship.

Our empirical approach is consistent with previous research concluding that the nature, incidence and outcomes of women's entrepreneurship vary at a macro level by broad industrial sector (e.g., manufacturing versus retail and services: Bates, 1995; Fairlie and Robb, 2009; Hundley, 2001; Klapper and Parker, 2011) and geographic region (e.g., country by country: Bardasi et al., 2011; Brush et al., 2006; Estrin and Mickiewicz, 2011; Hughes and Jennings, 2012; and within a country by urban and rural area: Bird and Sapp, 2004; Merrett and Gruidl, 2000). However, we believe that the expectations, opportunities and constraints for female business owners vary greatly within such broad classifications, and thus a micro-approach is necessary to accurately uncover and document industries and areas where female-owned businesses out-survive male-owned businesses.

The paper is organized as follows. We first articulate our hypotheses. We then describe our data and research design. Following this, we present results from (1) three regressions that follow the existing literature and estimate a single binary female-owned business coefficient across heterogeneous industries and geographic areas, (2) two regressions that allow gender-effect variation only between broad sectors such as retail and services or urban and rural, (3) and two regressions that estimate separate female-owned business coefficients for 402 industries and for 1664 geographic areas, respectively. We then test our hypotheses and present tables that list industries and geographic areas where female-owned businesses statistically significantly out-survive male-owned businesses. We conclude with implications and caveats.

3. Theoretical motivation

Our theoretical development regarding the relative survival duration of female-owned businesses and male-owned businesses is based on social constructionism (Berger and Luckmann, 1966) and feminist theory (Ahl, 2004; Calás et al., 2009; Ely and Padavic, 2007). Social constructionism posits that knowledge is not the direct result of sensory data, but rather is shaped and filtered by the language and beliefs of communities (Berger and Luckmann, 1966). At the most general level, feminist theories are concerned with the subordination of women to men (Ahl, 2004; Alvesson and Billing, 1997; Calás et al., 2009; Ely and Padavic, 2007)². From a social constructionist perspective, we agree with theorists who contend that the social construction of men and women as different is imbued with power and values that privilege the traits, behaviors and occupations that are constructed as appropriate for men over those that are constructed as appropriate for women (Ahl, 2006; Ahl and Nelson, 2010).

We contend that the social construction of gender expectations for men and women may differ, with respect to resource acquisition, work-life balance and other relevant factors, across industries and geographic regions (Ahl, 2004; Alvesson and Billing, 1997; Loscocco and Bird, 2012). These differing expectations for men and women afford opportunities and impose constraints on their professional activities (Beaman et al., 2009; Ely and Padavic, 2007; Ridgeway and Correll, 2004) and the ways in which they describe those activities (Cliff et al., 2005). A social constructionist perspective does not focus on the existence of socialized differences between men and women. Rather, it focuses on how the expectations embedded in the gender systems of different contexts-different geographic regions and industrial sectors for example-shape people's perceptions (Duehr and Bono, 2006), sway their conduct (Ahl, 2004), influence their felt need to accommodate or resist gender role prescriptions (Alvesson and Billing, 1997) and reinforce or provide opportunities to disrupt sex role traditionalism (Ely and Padavic, 2007).

² We take a general feminist approach, i.e., one that takes women and gender into account (Harding, 1987) and, therefore, we do not compare different models and perspectives in feminist theory (for reviews, see Ahl (2004; 2006), Calás et al (2009); Ely and Padavic (2007); Fischer et al. (1993)).

Our argument that industries and geographic areas should exist where female-owned businesses out-survive male-owned businesses is based not only on the social construction of gender norms and policies, but also on factors that are unique to the autonomy associated with business ownership. In contrast to employees within an organization, female-owned businesses may out-survive male-owned businesses because the ability to leverage advantages or resist constraints associated with assumptions about gender may depend upon having the authority and autonomy to do so. Within organizations this is most often not the case. Relative to women, men not only experience advantages in pay and promotion in fields such as military combat where masculine traits are deemed beneficial, but also experience smaller yet still significant advantages in pay and promotion in fields such as nursing where feminine traits are valued (Barnett et al., 2000; Budig, 2002; Jones and Gates, 2004).

However, in terms of business ownership, we argue that there are two factors that change this balance: (1) business owners have more autonomy than do employees (Calás et al., 2009; McAdam and Marlow, 2012) and (2) female business owners have already overcome some hurdles to attaining status and power by gaining access to the prototypically male role of business owner (Committee on Small Business, House of Representatives, 1988). Because of these two factors, female business owners may have sufficient authority, autonomy and power to uncover and exploit opportunities when socially constructed assumptions about women combine with industrial or regional norms and practices for business owners in ways that are potentially conducive to the survival of businesses owned by women. We do not argue that following an entrepreneurial path will necessarily lead to a high level of autonomy; we recognize that many structural barriers remain for women in self-employment (see, e.g., McAdam, 2013; chapter 2). Our argument requires only a non-trivial increase in autonomy relative to that experienced by women as salaried employees.

The expectations embedded in the gender system of particular industries may include variations in formal policies and procedures, typical contract terms, management styles, and cultural images of gender (e.g., Acker, 1990; Cliff et al., 2005; Fletcher, 1998; Pierce, 1999). These variations may create opportunities or constraints for men and women with respect to access to professional networks, resource acquisition and other factors relevant for the economic sustainability of business ventures. For example, gendered expectations and images for action, rationality, and emotional expression differ across industries such as engineering, healthcare, and law (Fletcher, 1998; Kellogg, 2011; Pierce, 1999, respectively). Thus, we propose that longer survival periods for female-owned businesses than for those owned by men should be evident within sectors of the economy that provide a context in which opportunities are associated with socially constructed assumptions about women and/or their traits, skills and preferences.

Hypothesis 1. Industries will exist where female-owned businesses systematically out-survive male-owned businesses; the number of such industries will be greater than the number predicted by random chance.

Similarly, nations and sub-national geographic regions vary in the gender expectations embedded in their gender system (e.g., Beaman et al., 2009; Bird et al., 2001; Gupta and York, 2008; Martin and Collinson, 2002) and reflected in cultural norms for working women and business ownership (Bird and Sapp, 2004; Hughes and Jennings, 2012; McLaughlin and Perman, 1991; Merrett and Gruidl, 2000; Tigges and Green, 1994). These variations in informal work practices, forms of knowing, and rhetoric may create opportunities or constraints for men and women with respect to factors relevant for work-life balance and economic sustainability of business ventures more generally. For example, the norms and rhetoric related to the legitimacy of women working outside of the home differs by region (Carter and Borch, 2005; Holloway, 1998). Rhetoric encouraging women to stay home to care for their young children versus rhetoric arguing that men should play a greater role in childcare may create different opportunities and constraints for women business owners who have children or plan to have children. Thus, we propose that longer survival periods for female-owned businesses than for those owned by men should be evident within geographic areas that provide a context in which opportunities are associated with socially constructed assumptions about women and/or their traits, skills and preferences.

Hypothesis 2. Geographic areas will exist where female-owned businesses systematically out-survive male-owned businesses; the number of such areas will be greater than the number predicted by random chance.

4. Research design

4.1. Data

4.1.1. *The populations of small businesses and the Texas sales tax data*

Our data set includes every business establishment that collected sales taxes in the U.S. State of Texas and thus includes all retail and personal services businesses that sold goods or services to final consumers—at any point in time from January 1990 through October 2006. These businesses represent a substantial proportion of the U.S. economy. For example, Kosova and Lafontaine (2010) report Bureau of Labor Statistics estimates from 2008 that 13 million U.S. employees worked in manufacturing, while a larger number, 15 million, were involved in retailing and another 13.3 million in the leisure and hospitality sector. With the exception of hotels, which are assessed room taxes rather than a sales tax, all businesses in the retail, personal services, leisure and hospitality sectors should appear in our data. We lack complete data for business-to-business service firms, banks, wholesalers, and manufacturers. Firms from these sectors are included in the data only if they have some presence in retail or personal services, i.e., if they pay some sales tax. These data are described further in Kalnins and Lafontaine (2013).

We assembled these data by combining downloads of the Texas Sales and Use Tax Permit Holder File (www.window.state.tx.us/taxinfo/taxfiles.html) from 1995, 1998, 2001, 2004, and 2006. Each download gave us information not only about all existing businesses at the time of the download but also about all establishments that went out of business up to five years before the download. Once combined, the database contained a population of 2,202,935 separate sales-tax collecting establishments open at some point in time between 1990 and 2006. Among these, there were 1,447,952 proprietorship establishments.

As per www.entrepreneur.com/encyclopedia, a proprietorship is defined as a business that legally has no separate existence from its owner. Income and losses are taxed on the individual's personal income tax return. Proprietorships may hire employees as needed, but the employees cannot receive equity in the business. We analyzed proprietorships because (1) we are able to use the owner's name to identify gender, (2) by virtue of their small size, owner gender is likely to be visible to stakeholders, and (3) they make up a substantial portion of the U.S. economy. In 1990, U.S. proprietorships generated \$141 billion in (27% of all) taxable net income and in 2003, \$230 billion in (23% of all) taxable net income (U.S. Census Bureau, 2011: 491).

We know the business names and addresses of all proprietorships. We know the founding date associated with each owner and when an establishment exits and if and when its ownership is transferred. We also know each establishment's four-digit 1987 SIC code. In 2004 SIC codes were replaced by six-digit NAICS codes. Therefore, we do not include establishments founded after 2003 in any of our analyses, including 40,165 (3.3% of the 1,447,952) that list an SIC code. However, we still rely on information through October 2006 to assess survival duration.

Ownership transfers affected 7% of our population. For these, we included a separate observation in all regressions for each owner's tenure at a proprietorship. If a female owner exits and a man takes over the business, there is one observation for the woman, with her survival duration used to calculate the dependent variable, and one observation for the man, with his survival duration as the dependent variable. We conducted robustness tests where we kept only the first owner's observation for these 7%. We used only the gender and survival duration of the first owner. Only one of twenty industry-level results changed in Table 3; the p-value for SIC 5921: Liquor Stores changed to 0.064. No zip code-level results changed in Table 4.

4.1.2. *Men's and women's business ownership and social security baby names*

We were able to determine owner gender for 1,208,190 (83.4%) of the 1,447,952 proprietorships using the U.S. Social Security Database (www.ssa.gov/OACT/babynames) of the most common 1000 names given to boys and girls in every decade since the 1880s. This database and technique has been used in many recent artificial intelligence studies (e.g., Gallagher and Chen, 2008). If a first name appeared for only one gender in the SSA database, then we assigned that gender to any business owner with the name. We excluded 174,260 (12.0%) proprietorships because the owner's first name never appeared in the database. When names appeared for both genders, we chose this cutoff: if one gender was twenty times more common than the other gender for a name, we assigned business owners with that name the more common gender. We excluded 65,496 (4.6%) because the ratio was less than 20:1, as it is for names such as Dana, Leslie, and Chris. A robustness test using a 5:1 ratio changed only one result in Table 3: the p-value of SIC 5741: Drapery, Curtain & Upholstery Stores changed to 0.07. No zip code-level results changed in Table 4.

In addition to Anglo names, the SSA database contains 88 of the top 100 Hispanic first names listed at www.babycenter.com for 2011 -born boys and 80 of the top 100 for girls. Further, the database contains eight of the nine common "African American sounding names" for men and 9 of 9 for women, used by Bertrand and Mullainathan (2004) in their study of job market discrimination. Further, Fryer and Levitt (2004) find that most African American parents use common Anglo names indistinguishable from those of white Americans. Thus, we are confident we are including a vast majority of proprietorships operated by members of the nation's three largest ethnic groups. Most of the names missing from SSA appear to be Asian first names.

Of the 1,208,190 gender-identified proprietorships in the data, 1,004,636 were founded in or after 1990; for these there is no survivor bias and thus we use them for our analyses below.

4.2. *Method and dependent variable*

We estimate Weibull proportional hazard regressions using the 1,004,636 gender-assigned proprietorship establishments. The formal dependent variable is the hazard rate, defined as the rate of instantaneous transition from origin state (active establishment) to destination state (owner's exit). For observation i the hazard rate is:

$$h_i(t) = p \cdot t^{p-1} \exp(X_i\beta),$$

where t is any point in time through October 2006 in which i is an active establishment. X_i is a vector of independent variables. We estimate the shape parameter p and coefficient vector (3).

The hazard rate is calculated by using the actual survival duration of all proprietorships that have ceased to do business by October 2006 and by using the time in business through October 2006 for all proprietorships still in business at the time. The method distinguishes between these two groups such that October 2006 is never considered to be the exit date for the latter group.

We chose the Weibull model relative to other proportional hazards models because, through the shape parameter p , it has the flexibility to allow exit rate to vary based on the age of a business. This is a key feature of a model given that young firms have higher instantaneous exit rates than do more experienced firms (e.g., Dunne et al., 1989; Evans, 1987; Everett and Watson, 1998). We note that all our conclusions regarding survival duration of female-owned businesses remain the same when we estimated exponential proportional hazard models that do not allow for exit rates to differ based on age.

4.3. *Key independent variables: proprietorship owner gender and interaction terms*

The main variable of theoretical interest is the binary female-owned businesses variable. In our first three regressions, the female-owned business coefficient is a single value constrained to be identical across all industries and geographic areas, in other words, it captures a gender effect assumed to be economy-wide. These regressions are meant to replicate the substantial amount of existing work that includes only a binary female-owned business variable (e.g., Fairlie and Robb, 2009; Kalleberg and Leicht, 1991; Robb and Watson, 2012; Watson, 2003, 2012).

We then allow the female-owned business effect to vary by broad sector category by interacting it with binary variables for retail (SIC codes 5200-5999), services (SIC codes 7000-7999), and "other" (all other SIC codes in our data; mostly manufacturing and wholesale) as industry sectors, and rural (196 non-metropolitan counties in Texas) and urban (58 metro counties) as geographic sectors. We intend these regressions to build directly on previous work that has found female owners and employees to be clustered within the retail and services sectors (e.g., Anna et al., 2000; Bates, 1995; Fairlie and Robb, 2009; Hundley, 2001; Tigges and Green, 1994). No one appears to have tested the possibility that the relative survival duration of female-owned businesses and male-owned businesses might also then vary across these broad sectors. However, in the case of geography, Merrett and Gruidl (2000) and Bird and Sapp (2004) have examined variation in relative performance by gender based on the rural/urban dichotomy.

Finally, we interact the female-owned business variable with finely grained industries and geographical areas in the form of 402 SIC codes and 1644 zip codes. Because we also include the industry and geographic primary terms (see our description in the control variables section immediately below), the exponentiated form of the interaction term

coefficients can be interpreted as a hazard ratio, i.e., the ratio of the estimated instantaneous hazard rate of female-owned business exit to that for male-owned business, within an industry and area. Values of the hazard ratio below one indicate that female-owned businesses are out-surviving male-owned businesses in the industry or area while values above one represent the opposite.

4.4. *Control variables*

Our first set of control variables are the 402 SIC and 1644 zip code binary primary term variables, which control for industry and geographic area, respectively. We include all SIC and zip codes that meet the following criterion: at least 10 female-owned businesses and 10 male-owned businesses must have been founded between 1990 and 2003 that list the code. The 10/10 rule represents our best attempt at facilitating convergence of our maximum likelihood-based Weibull models (some with over 4000 coefficients) while discarding a minimum of information. We also include a binary variable for each year of founding between 1990 and 2003.

We then include two control variables for experience measured at each establishment's time of founding. These are (1) the number of other establishments previously opened by the owner and (2) the congenital experience, that is, the cumulative business experience of the owner before the founding of the establishment under observation. We measure congenital experience based on the common "square root decay" formulation (please see Baum and Ingram, 1998, for a detailed description of this formulation). Specifically, the value of congenital experience is assumed to decay with time, based on the square root of the difference between the each year in which experience was accumulated and the year the establishment under observation is founded.

5. Results

5.1. *Single coefficient/broad sector coefficient results for female-owned businesses*

In the first three columns of Table 1, we present results of regressions with only a single binary female-owned business variable. The value of the exponentiated coefficient (the hazard ratio) of 1.051 from the first column implies that a female-owned business is 1.051 times as likely to exit at any point in time as is a male-owned business. However, we cannot make valid inferences from cross-industry comparisons of survival duration without explicitly controlling for industry. We do so in the second column. This substantially decreases the hazard ratio, to 1.011, consistent with observations by Bates (1995), Anna et al. (2000) and others that female-owned businesses may be more common in low-performing industries. Finally, the hazard ratio increases somewhat in the third column when we control for geography as well as industry.

In the last two columns of Table 1, we present results that include separate coefficients for the broad sectors: retail, services, and "other" in the fourth column, and rural and urban in the fifth column. Like the results in columns 1-3, both of these regressions imply that male-owned businesses out-survive female-owned businesses throughout the economy, albeit with variations in magnitude from sector to sector. The hazard ratios are statistically significant throughout but appear to be smallest in retail and urban areas (1.007 and 1.009, respectively), moderate in services (1.043), and the greatest in the "other" industries and in rural areas (1.094 and 1.098, respectively). We note that the urban and rural results are very similar to those obtained by Merrett and Gruidl (2000) who analyzed businesses in the U.S. State of Illinois.

Our control variable results are also worthy of note. First, our two owner experience variables both have hazard ratios below one that are statistically significant. Establishments of owners that have (1) opened locations previously and (2) accumulated congenital experience are less likely to exit at any given point in time than are the establishments of novice owners, consistent with the results of Baum and Ingram (1998) and Kalnins and Mayer (2004). Further, the fact that the value of the shape parameter p is significantly less than one indicates that younger firms are more likely to exit at any given point in time than are older firms, consistent with many previous studies (e.g., Dunne et al., 1989; Evans, 1987; Everett and Watson, 1998).

Table 1

Weibull regressions. Single independent variable/broad sector variables for female-owned business. Dependent variable is the hazard rate, i.e., the rate of instantaneous exit. N = 1,004,636 proprietorship establishments.

	(1)	(2)	(3)	(4)	(5)
Year (Y) fixed effects	14	14	14	14	14
Industry (SIC) fixed effects	0	402	402	402	402
Geography (ZIP) fixed effects	0	0	1664	1664	1664
Female-owned business	1.051**	1.011**	1.022**		
	(0.0023)	(0.0025)	(0.0025)		
Female-owned businesses in Retail				1.007*	
				(0.0033)	
Female-owned businesses in Services				1.043**	
				(0.0058)	
Female-owned businesses in Other Industries (manufacturing and wholesale)				1.094**	
				(0.0078)	
Female-owned businesses in Rural Areas (Census "non-metropolitan" counties)					1.098**
					(0.0058)
Female-owned businesses in Urban Areas (Census "metropolitan" counties)					1.009**
					(0.0026)
Number of Establishments of Same Owner	0.770**	0.784**	0.782**	0.782**	0.781**
	(0.0031)	(0.0032)	(0.0033)	(0.0033)	(0.0033)
Owner Experience	0.996**	0.996**	0.996**	0.996**	0.996**
	(0.0009)	(0.0009)	(0.0010)	(0.0010)	(0.0010)
Shape Parameter ρ (age)	0.839**	0.847**	0.852**	0.852**	0.852**
Log-likelihood	-1,702,354	-1,691,283	-1,684,294	-1,684,229	-1,684,214
Likelihood Ratio Test ($H_0 = \text{constant only}$)	9161.2	31,305.9	45,283.3	45,449.9	45,440.4

Standard errors in parentheses; **p < 0.01; *p < 0.05. All coefficients exponentiated as hazard ratios.

Table 2

Numbers of SIC codes and zip codes with survival duration comparisons by gender.

Which gender survives longer? (statistically significant at p < 0.05)	402 SIC codes			1664 zip codes		
	Total codes	Businesses represented	Wgt. avg. haz. ratio	Total codes	Businesses represented	Wgt. avg. haz. ratio
Male-owned businesses survive statistically significantly longer	95	405,038 (40.3%) [†]	1.16	177	127,462 (12.7%) [†]	1.22
Statistically insignificant survival duration differences by gender	283	320,436 (31.9%) [†]	1.02	1411	783,493 (78.0%) [†]	1.02
Female-owned businesses survive statistically significantly longer	24	271,967 (27.1%) [†]	0.93	76	86,946 (8.7%) [†]	0.84

[†] Percentage is of all 1,004,636 businesses. The three categories do not sum to 100% because of the 10/10 rule described in Section 4.4.

5.2 Disaggregated industrial and geographic female-owned business effects

We now present results from regressions with 402 industry-specific and 1664 geography-specific intercepts interacted with the female-owned business variable. Given the large number of coefficients, we cannot present complete regression results as we did in Table 1. Table 2 presents summary statistics that allow us to test our two hypotheses: the number of industries (left-hand side of Table 2) and geographic areas (right-hand side) where (1) male-owned businesses statistically significantly out-survive female-owned businesses, (2) neither gender out-survives the other, and (3) female-owned businesses statistically significantly survive longer.

As shown in the left-hand side of Table 2, in the first row, male-owned businesses out-survived female-owned businesses in 95 SIC codes representing 405,038 businesses (40.3% of 1,004,636). These all had hazard ratios greater than one and statistical significance at p < 0.05. But, in the third row, female-owned businesses out-survived male-owned businesses in 24 SIC codes representing 271,967 businesses (27.1%). If the latter effect was merely the result of random chance, we would observe, with 95% confidence, a number between 5 and 15 industries where female-owned

businesses appear to out-survive male-owned businesses.³ If in reality male-owned businesses systematically out-survived female-owned businesses throughout the economy, this interval would lie even closer to zero. Our result of 24 industries is greater than the upper bound of the 95% confidence interval. Thus we consider Hypothesis 1 to be supported: Industries exist where female-owned businesses systematically out-survive male-owned businesses; the number of such industries is greater than the number predicted by random chance.

Similarly, in the right-hand side of Table 2, in the first row, male-owned businesses out-survived female-owned businesses in 177 zip codes, representing 127,462 businesses (12.7% of all 1,004, 636). But in the third row, female-owned businesses out-survived male-owned businesses in 76 zip codes, representing 86,946 businesses (8.7%). We note that there are more zip codes than SIC codes and thus fewer observations within each zip code, on average, leading to a lower likelihood of statistical significance in the zip code analysis.

If the female-owned business effect was merely the result of random chance, we would observe, with 95% confidence, a number between 30 and 52 zip codes where female-owned businesses would appear to out-survive male-owned businesses. If in reality male-owned businesses systematically out-survived female-owned businesses throughout the economy, this interval would lie even closer to zero. Our actual result of 76 is greater than the upper bound of the 95% confidence interval. Thus we consider Hypothesis 2 to be supported: geographic areas exist where female-owned businesses systematically out-survive male-owned businesses; the number of such areas is greater than the number predicted by random chance.

5.3. Industries where female-owned businesses out-survive male-owned businesses

In the tables below we explore the most populous industries where female-owned businesses out-survive male-owned businesses and where the survival difference is statistically significant. Because we cannot display all 402 coefficients, in Table 3 we present only those from the twenty largest industries, based on total number of proprietorships founded between 1990 and 2003. In addition to the hazard ratio, we present the proportion of male-owned businesses and female-owned businesses within each industry whose businesses survive longer than three years. This measure does not require the estimation of any regressions.

Table 3 demonstrates that female-owned businesses out-survive male-owned businesses in a variety of industries and with some concentrations in particular industrial sectors. The most substantial difference in relative survival duration exists in SICs

Table 3
Twenty largest industries where female-owned businesses out-survive male-owned businesses. All are statistically significant at $p < 0.05$.

SIC code	Total bus.	SIC Size Ranking	Description of SIC code	Hazard ratio	3 yr. survivors	
					Men	Women
8299	530	166	Schools & Educational Services	0.80	0.37	0.45
7911	326	193	Dance Studios	0.80	0.32	0.49
5072	321	196	Wholesale Hardware	0.84	0.44	0.51
7389	30,098	5	Business Services, N. E. C.	0.87	0.41	0.49
7311	2374	75	Advertising Agencies	0.87	0.35	0.39
5814	1856	87	Drinking Places Serving Liquor	0.87	0.31	0.37
5714	1792	88	Drapery, Curtain & Upholstery Stores	0.88	0.43	0.46
7336	7435	34	Commercial Art & Graphic Design	0.89	0.40	0.47
5651	12,907	18	Family Clothing Stores	0.90	0.25	0.30
5719	6737	36	Miscellaneous Home Furnishings Stores	0.90	0.33	0.39
5921	2007	83	Liquor Stores	0.90	0.41	0.43
5963	12,474	19	Direct Selling Establishments	0.91	0.30	0.36
8999	7824	29	Services, N. E. C.	0.91	0.42	0.46
5632	15,188	15	Women's Accessory & Specialty Stores	0.93	0.31	0.35
5992	10,751	22	Florists	0.93	0.34	0.38
5944	17,534	10	Jewelry Stores	0.94	0.37	0.41
5699	15,459	14	Misc. Apparel & Accessory Stores	0.94	0.30	0.34
5621	9378	23	Women's Clothing Stores	0.94	0.26	0.30
5947	88,785	2	Gift, Novelty & Souvenir Shops	0.97	0.34	0.37
5945	27,544	6	Hobby, Toy & Game Shops	0.97	0.34	0.38

³ Because the estimated coefficients that underlie the hazard ratios are distributed normally, we can generate accurate confidence intervals for the case of random chance by stimulating 10,000 samples of 402 (industry) and 1664 (area) standard-normally distributed coefficient observations. Note that these confidence intervals cannot be derived analytically.

8299: Schools and Educational Services and 7911: Dance Studios, where the hazard ratio is 0.80. In other words, at any point in time, a female-owned business is only 80% as likely to exit as is a male-owned business.

Four of the twenty largest industries where female-owned businesses out-survive male-owned businesses relate to clothing. These are 5699: Misc. Apparel & Accessory Stores; 5632: Women's Accessory & Specialty Stores; 5651: Family Clothing Stores; and 5621: Women's Clothing Stores. Another four relate to gift giving. These are 5992: Florists, 5944: Jewelry Stores, 5947: Gift, Novelty and Souvenir Shops, and 5945: Hobby, Toy & Game Shops. And two industries relate to alcohol sales and service. These are 5921: Liquor Stores and 5814: Drinking Places Serving Liquor.

Finally, we note that female-owned businesses out-survive male-owned businesses in two very populous industries: in 5947: Gift, Novelty and Souvenir Shops with 88,785 proprietorships and in 7389: Business Services with 30,098 proprietorships. A substantial number of the proprietorships in the latter category are business-focused interior design businesses.

Table 4
Twenty largest zip codes where female-owned businesses out-survive male-owned businesses. All are statistically significant at $p < 0.05$.

Zip code	Total bus.	Zip size ranking	Main city associated with zip code	Location type	Hazard ratio	3 yr. survivors	
						Men	Women
77024	1717	142	Houston	Large city	0.71	0.38	0.53
75205	1575	173	Dallas	Large city	0.75	0.35	0.48
75248	2387	35	Dallas	Large city	0.79	0.37	0.48
78209	2426	29	San Antonio	Large city	0.80	0.36	0.43
77057	2704	18	Houston	Large city	0.82	0.32	0.38
77042	1778	127	Houston	Large city	0.82	0.27	0.35
75080	2343	42	Richardson	In MSA of large city	0.83	0.39	0.46
75231	1832	112	Dallas	Large city	0.83	0.26	0.35
76011	1642	159	Arlington	In MSA of large city	0.84	0.27	0.32
75093	1615	165	Plano	In MSA of large city	0.84	0.41	0.49
75229	2228	56	Dallas	Large city	0.85	0.41	0.46
77077	2081	68	Houston	Large city	0.85	0.31	0.39
77063	1960	87	Houston	Large city	0.86	0.30	0.37
75243	3004	9	Dallas	Large city	0.88	0.30	0.35
79762	2325	44	Odessa	Medium city	0.88	0.30	0.33
78759	2371	37	Austin	Large city	0.90	0.34	0.39
77379	2346	40	Spring	In MSA of large city	0.90	0.44	0.46
75006	2861	13	Carrollton	In MSA of large city	0.91	0.34	0.37
76116	2258	54	Fort Worth	Large city	0.91	0.35	0.39
75287	1913	95	Dallas	Large city	0.92	0.28	0.33

Large city: population > 500,000;

Medium city: 100,000 < population < 500,000.

In Appendix A, we present a corresponding table of twenty largest industries where male-owned businesses out-survive female-owned businesses. There too we find concentrations in particular industrial sectors. Three of the twenty revolve around automobiles: 7538: General Automotive Repair Shops, 5531: Auto & Home Supply Stores, and 5521: Motor Vehicle Dealers (Used Only). Four involve repair. These are 7699: Repair Shops & Related Services, 7538: General Automotive Repair Shops, 7378: Computer Maintenance & Repair, and 7623: Refrigeration & Air-Conditioning Service. Finally, two are contracting businesses: 1799: Special Trade Contractors and 1521: General Contractors; Single-Family Houses.

5.4. Geographic areas where female-owned businesses out-survive male-owned businesses

We now turn to a detailed analysis of geographic areas. In Table 4, we present the largest twenty zip codes, in terms of total number of proprietorships, where female-owned businesses statistically significantly out-survive male-owned businesses.

Fifteen of the twenty are a part of Texas' largest cities, defined as those with populations of 500,000 or more. Six cities satisfy this criterion: Dallas, Houston, San Antonio, Fort Worth, Austin and El Paso. Another three zip codes, those in Carrollton, Richardson and Plano, are in medium-size cities that are de facto suburbs of the Dallas/Fort Worth MSA, while Spring is a suburb within the Houston MSA. Only the zip code in Odessa is in a medium-sized city that is not a part of a major metropolitan area.

In Appendix A, we present a corresponding table of the twenty largest zip codes where male-owned businesses out-survive female-owned businesses. In this table, only two zip codes are a part of the large Texan cities. And only four are contained within the MSAs of large cities. The remaining fourteen are in medium-sized or small Texan cities and towns.

A formal statistical analysis supports our descriptive findings that female-owned businesses out-survive male-owned businesses in large cities. Cumulatively, the large Texan cities contain 46 zip codes where female-owned businesses statistically significantly out-survive male-owned businesses, but only 18 zip codes where the reverse is true. A binomial test of large cities, with 46 "successes" out of 64 (46 + 18) trials, rejects at $p < 0.01$ the possibility that female-owned businesses and male-owned businesses will experience, on average, equal survival duration in large cities. In contrast, outside the large cities, male-owned businesses out-survive female-owned businesses in 159 zip codes while female-owned businesses out-survive male-owned businesses in only 30. A binomial test thus also rejects at $p < 0.01$ the possibility of equal survival duration outside the large cities.

6. Summary, implications and caveats

6.1. Summary

Motivated by social constructionism and feminist theory, we argued that different geographic and industrial contexts might provide differing opportunities and constraints for women business owners. We contributed two hypotheses: (1) Industries and (2) geographic areas will exist where female-owned businesses systematically out-survive male-owned businesses. Further, the number of such industries and areas will be greater than the number predicted by random chance.

We tested these hypotheses empirically using one million proprietorships in Texas. Our findings support both hypotheses and contradict the common conclusions of previous work that either (1) male-owned businesses out-survive female-owned businesses throughout the economy, or that (2) female-owned businesses and male-owned businesses experience, on average, equal survival duration. We found that female-owned businesses out-survived male-owned businesses in a wide variety of industries. The greatest difference in survival ratio was in SICs 8299: Schools and Educational Services and 7911: Dance Studios. In these industries, at any point in time, a female-owned business is only 80% as likely to exit as is a male-owned business. Further, we found that four of the twenty largest industries where female-owned businesses out-survive male-owned businesses were related to clothing, four were related to gift-giving, and two were related to alcohol sales and service. In terms of geographic area, female-owned businesses consistently out-survived male-owned businesses in the largest cities.

While there is little prior research to compare with our industry results, our geographic findings are consistent with previously articulated theory that urban areas are less bound by gender role traditionalism than rural areas (Merrett and Gruidl, 2000). Our results are inconsistent with Bird and Sapp's (2004) hypothesis that male business owners will have better opportunities in more lucrative urban areas and thus will leave the less lucrative rural areas to female owners. In contrast to the empirical designs of both of those studies, however, we found that urban/rural was not the most fruitful dichotomy. Isolating the largest cities was necessary to find areas where female-owned businesses consistently out-survived male-owned businesses. To the extent that the expectations and constraints associated with gender role traditionalism are influencing survival duration, we conclude that the phenomenon may be as strong in the urban areas of medium-sized and small cities as it is in rural areas.

6.2. Implications of longer survival duration

Given the results of our study, we can now ask in what settings does longer survival duration provide an opportunity to challenge sex role traditionalism and when does it merely serve to uphold it. For example, when women

owners out-survive men in industries related to gift-giving, the implications for gender relations may be quite different than in more gender-neutral industrial sectors such as restaurants and pubs (a/k/a "Eating Places" and "Drinking Places") that serve alcohol. It may be the latter that provide the greatest opportunities for investigating how the social construction of gender can challenge sex role traditionalism.

We recognize that longer survival duration in some particular industries and regions may suggest a low social and economic status of these sectors. Yet, future insights might be gained by trying to hold social and economic value relatively constant by comparing the social construction of gender in very similar industries that yielded opposite empirical results for men and women. For example, in the industries of men's (SIC 5611) and women's (SIC 5621) clothing, the product as well as the social and economic value of participating in these industries is likely to be similar, but our analysis yielded statistically significant but opposite survival duration results. The women's result is presented in Table 3; men's clothing exhibited a statistically significant hazard ratio of 1.14 but had too few proprietorships (1461) to be included in Appendix Table 1.

Another interesting comparison comes from pubs and restaurants. Female-owned businesses out-survive male-owned businesses, with hazard ratios of 0.90 and 0.91, when operating pubs and alcohol-serving restaurants, respectively, while male-owned businesses out-survive female-owned businesses, with a hazard ratio of 1.07, when operating restaurants that do not serve alcohol. The result for pubs is presented in Table 3; that for non-alcohol-serving restaurants in Appendix Table 1. Yet, it is unlikely that alcohol-serving establishments would be considered to be of lower status or lower social or economic significance than "dry" establishments. The examples of clothing and restaurants support the interpretation that—at least in some sectors—longer survival duration may imply greater economic sustainability of female-owned businesses rather than a burden of being forced to cling to subsistence businesses. We discuss possibilities for future research based on pubs and restaurants in Section 6.4.

6.3. *Implications for future quantitative studies*

In their recent special issue introduction, Ahl and Nelson (2010: 6) stated "We urge entrepreneurship researchers and publication outlets to consider the usefulness of another study contrasting empirical findings on entrepreneurship with men/women as a binary independent variable. What can we learn moving forward from more of such inquiries? How meaningful are new findings based on this model?" While Ahl and Nelson's primary aim is to encourage awareness of the substantial heterogeneity among women entrepreneurs and the institutions that may generate this heterogeneity, our findings suggest a complementary conclusion: that micro-level heterogeneity of settings such as industry and geography needs to be taken into account.

Almost all studies that have analyzed the effect of female ownership on survival duration have used only a single binary female-owned business variable, but results have been inconsistent (see Jennings and Brush, 2013, for an extensive review). Our empirical findings suggest that it is inaccurate to interpret a negative and statistically significant coefficient of a single binary female-owned business variable as an indication that male-owned businesses out-survive female-owned businesses throughout the economy. It is similarly inappropriate to interpret a lack of statistical significance of this binary female-owned business coefficient as a sign of gender equality in terms of survival duration.

Further, we demonstrated empirically that estimating separate female-owned business coefficients for broad sectors (e.g., urban versus rural, retail versus services) still obscures the settings where female-owned businesses systematically out-survive male-owned businesses. Consistent with the results of previous studies (Bird and Sapp, 2004; Merrett and Gruidl, 2000) all broad sectors in our data showed that, on average, male-owned businesses out-survive female-owned businesses. Only when we use finely grained industries and geographical areas do we begin to observe domains where female-owned businesses survive longer. To more accurately capture the effects of business owner gender in future studies—even for those with non-performance outcome variables such as incidences of discrimination, human capital variation, or preferences—we believe that scholars will benefit from adopting flexible research designs that allow gender-based effects to vary by industrial and geographic categories, as finely grained as possible, and other dimensions as well.

6.4. *Implications for future qualitative studies*

Our findings identify industrial and geographic "places of interest" that may be fruitful for qualitative researchers who are interested in uncovering industries and regions associated with multiplex advantages for women-owned businesses. By examining the industries we have highlighted we can possibly begin to uncover which of these help to overturn sex-role traditionalism, and may offer greater profitability, work-life balance and/or social contributions to surrounding communities.

For example, alcohol-serving establishments may represent one such "place of interest" because they often play vital roles within their communities as a "third place" for social engagement (Oldenburg, 2001). Recently, an interview study of 51 independently owned pubs found that, due to the social nature of this business and the public visibility of owners, many of these establishments "sponsored community groups (such as sports clubs and special-interest groups), both through in-kind support (such as providing facilities for meetings) and through direct financial sponsorship" (Balan and Lindsay, 2009: 30). Because women entrepreneurs are more likely than men to blend a social mission into their enterprise (Gupta and York, 2008; Hechavarria et al., 2012) and because women are less prone to alcohol use and alcoholism than are men (Substance Abuse and Mental Health Services Administration, 1999), we conjecture that alcohol-serving establishments may provide multiplex advantages that include survival duration, profitability, and community social value that are associated with female business ownership. We would strongly urge future work at the level of the individual establishment or within a community to investigate female-owned businesses activity in this industry for these reasons.

6.5. *Implications for policy*

Our findings may help legislators, policymakers and administrators better articulate their goals and more effectively develop strategies that align with their stated goals. Because we studied survival duration, our findings provide information particularly relevant to the policy perspective that "shifting concentration from initiatives designed to boost female participation in business ownership to those concerned with improving the sustainability of women-owned firms is likely to generate greater economic and social benefits whilst avoiding problematic displacement effects" (Marlow et al., 2008: 348).

From a feminist perspective, "there are difficulties and danger in talking about women as a single group but there are also dangers in not being able to talk about women as a single group" (Ahl, 2004:30). Talking about women as a single group has allowed the U.S. Congress to pass the Women's Business Ownership Acts of 1988 and 1999 and to provide funding for Women's Business Centers. These centers train prospective and existing women business owners in the areas of finance, management and marketing, but with no emphasis on any particular industrial sectors. However, this positioning of women as a single group could further reinforce a subordinate role of women as helpless and in need of assistance (Ahl, 2006; Marlow, 2002).

Our conclusions suggest that policymakers and legislators might consider commissioning studies to better understand when the longer survival duration of female-owned businesses increases gender equality and when it does not. In terms of legislation, there are two primary strategies for offering assistance to women: (1) targeting sectors where male-owned businesses clearly out-survive female-owned businesses and directly reducing the difference or (2) supporting female owners in sectors where female-owned businesses already out-survive male-owned businesses in order to indirectly compensate for the presence of the dominance of male-owned businesses elsewhere. However, selecting the optimal strategy for increasing equality is dependent upon the identification of industries and areas where the social construction of gender provides opportunities not only for business survival and economic profitability but also for challenges to sex role traditionalism.

6.6. *Caveats and additional recommendations for future work*

We conclude with five caveats. First, survival duration is the only outcome variable that is available in our data. While the Texas Comptroller keeps revenue and sales tax payment information for all of the individual businesses in our data set, they do not make that information public due to confidentiality. Yet, testing whether female-owned businesses might be more profitable or generate greater revenues than male-owned businesses in some industries or areas represents an important complementary exercise to this one because (1) lengthy survival for women in some industries

and areas may merely suggest low social and economic status of these sectors, and (2) the findings on gender and profitability—all of which use only a single binary female-owned business variable—are as inconclusive as those regarding survival duration. Bardasi et al. (2011), Du Rietz and Henrekson (2000), Johnsen and McMahon (2005), Marco (2012), Robb and Watson (2012), and Watson (2002,2012) find null results while Fairlie and Robb (2009), Fasci and Valdez (1998), Honig (1998), Loscocco et al. (1991), and Rosa et al. (1996) find that male-owned businesses are more profitable than female-owned businesses.

Second, our data do not provide information regarding three variables used in previous studies: establishment size, owner education and hours worked. Female-owned businesses are typically smaller than their male-owned counterparts (Bardasi et al., 2011; Bird and Sapp, 2004; Cliff, 1998; Fischer et al., 1993). Given that larger businesses typically survive longer than smaller firms (Bruderl et al., 1992), our regressions might be biased in favor of male-owned businesses for this reason—possibly understating the number of industries and areas where the female ownership itself has important effects on survival duration. Regarding education and hours worked, Robb and Watson (2012) find that these variables were insignificant in their survival regressions, suggesting that they may not be crucial as controls.

Third, as we noted in the data section we had to exclude 174,260 proprietorships because their owners' first names never appeared in the Social Security Baby Name database. Most of these appear to be Asian first names. A statistically significantly ($p < 0.01$) smaller proportion of these establishments survived for three years (34.7%) than did the proportion of those businesses (37.1%) that we analyzed. This difference suggests that the internal and external pressures and dynamics might be different for this group. Future work would be valuable to confirm the generalizability of our findings.

Fourth, in addition to our million proprietorships, our data lists 435,978 Texan incorporated businesses for which only a corporation name is provided, and thus gender is difficult to assign. Incorporated businesses are typically larger than proprietorships in terms of sales and employees. It is possible that the variation in relative survival duration among female-owned businesses and male-owned businesses will not be as pronounced as for proprietorships. An analysis of incorporated businesses would be a valuable extension of this work. However, we believe that, even if our results regarding female-owned businesses applied only to proprietorships—approximately 27% of taxable net income within the U.S. economy, as we cite in the Section 4.1 above—these results would still represent a valuable contribution.

Finally, even though we only analyzed one region within one nation (Texas) we suspect that substantial variation in the relative survival duration of female-owned businesses and male-owned businesses exists across the U.S. and in other nations. We believe that female-owned businesses will out-survive male-owned businesses in some industries and sub-regions within most regions and nations. Yet, given that cultural norms regarding woman as business owners differ across regions and nations, the particular industries and geographic areas where female-owned businesses will out-survive male-owned businesses may vary. Additional study in different national and cultural settings is warranted.

Acknowledgments

The authors thank Marya Besharov, Ileen Devault, Esther Duflo, Robin Ely, Francine Lafontaine, the Cornell Writing Group and three anonymous reviewers for their comments on earlier versions of this paper.

Appendix A

Appendix Table 1

Twenty largest industries where male-owned businesses out-survive female-owned businesses. All are statistically significant at $p < 0.05$.

SIC code	Total bus.	SIC size ranking	Description of SIC code	Hazard ratio	3 yr. survivors	
					Men	Women
7538	15,105	16	General Automotive Repair Shops	1.38	0.39	0.30
1711	4797	43	Plumbing, Heating & Air-Conditioning	1.38	0.51	0.42
7623	4339	46	Refrigeration & Air-Cond. Service	1.32	0.52	0.41
1521	4798	42	Gen. Contractors; Single-Family Houses	1.23	0.37	0.30
5941	17,660	8	Sporting Goods Stores & Bicycle Shops	1.21	0.41	0.32
1799	7808	30	Special Trade Contractors, N. E. C.	1.19	0.38	0.34
5521	7544	31	Motor Vehicle Dealers (Used Only)	1.19	0.46	0.39
7699	16,578	13	Repair Shops & Related Services	1.18	0.46	0.39
5531	13,045	17	Auto & Home Supply Stores	1.18	0.35	0.28
5731	8187	28	Radio, TV & Consumer Electronics	1.16	0.28	0.25
7378	5036	41	Computer Maintenance & Repair	1.11	0.35	0.31
7349	22,252	7	Building Cleaning & Maintenance	1.10	0.33	0.30
5734	16,719	12	Computer & Computer Software Stores	1.10	0.33	0.30
5261	4289	47	Retail Nurseries	1.10	0.46	0.41
5412	8533	26	Convenience Stores	1.09	0.36	0.32
5722	5146	40	Household Appliance Stores	1.08	0.30	0.28
782	17,578	9	Lawn & Garden Services	1.07	0.39	0.39
5812	55,665	4	Eating Places Serving No Alcohol	1.06	0.26	0.25
7221	9130	25	Photographic Studios, Portrait	1.06	0.48	0.48
5932	62,872	3	Used Merchandise Stores	1.05	0.37	0.36

Appendix Table 2

Twenty largest zip codes where male-owned businesses out-survive female-owned businesses. All are statistically significant at $p < 0.05$.

Zip code	Total bus.	Zip size ranking	Main city associated with zip code	Location type	Hazard ratio	3 Yr. Survivors	
						Men	Women
77093	1584	171	Houston	Large city	1.40	0.35	0.29
77630	1575	172	Orange	Small city	1.38	0.36	0.31
78624	1711	144	Fredericksburg	Small city	1.28	0.51	0.40
79701	2276	51	Midland	Medium city	1.22	0.36	0.28
75901	2145	65	Lufkin	Small city	1.20	0.38	0.32
78415	2205	59	Corpus Christi	Medium city	1.19	0.33	0.25
78577	2106	66	Pharr	Small city	1.19	0.32	0.26
78852	1700	148	Eagle Pass	Small city	1.16	0.38	0.32
78501	4574	1	McAllen	Medium city	1.15	0.33	0.28
78572	4233	2	Palmhurst	Small town	1.15	0.33	0.29
77581	2019	80	Pearland	In MSA of large city	1.14	0.45	0.38
77511	1913	95	Alvin	In MSA of large city	1.14	0.39	0.35
76031	1706	146	Cleburne	In MSA of large city	1.13	0.43	0.36
78155	1722	141	Seguin	Small city	1.12	0.46	0.41
78521	3122	7	Brownsville	Medium city	1.11	0.34	0.30
75150	3015	8	Mesquite	In MSA of large city	1.10	0.36	0.31
78520	4119	3	Brownsville	Medium city	1.09	0.30	0.28
79936	3245	5	El Paso	large city	1.09	0.37	0.33
78040	2704	17	Laredo	Medium city	1.09	0.34	0.31
78041	2573	22	Laredo	Medium city	1.09	0.31	0.29

Large city: population > 500,000.

Medium city: 100,000 < population < 500,000.

Small city: 10,000 < population < 100,000.

Small town population < 10,000.

References

- Acker, J., 1990. Hierarchies, jobs and bodies: a theory of gendered organizations. *Gend. Soc.* 4 (2), 139-158.
- Ahl, H., 2004. *The Scientific Reproduction of Gender Inequality: A Discourse Analysis of Research Texts on Women's Entrepreneurship*. Copenhagen Business School Press, Copenhagen.
- Ahl, H., 2006. Why research on women entrepreneurs needs new directions. *Enterp. Theory Pract.* 30 (5), 595-621.

- Ahl, H., Nelson, T., 2010. Moving forward: institutional perspectives on gender and entrepreneurship. *Int. J. Gen. Entrep.* 2 (1), 5-9.
- Alvesson, M., Billing, Y., 1997. *Understanding Gender and Organizations*. Sage, London.
- Anna, A.L., Chandler, G.N., Jansen, E., Mero, N.P., 2000. Women business owners in traditional and non-traditional industries. *J. Bus. Ventur.* 15 (3), 279-303. Balan, P., Lindsay, N., 2009. *Innovation Capability and Entrepreneurial Orientation Dimensions for Australian Hotels*. CRC for Sustainable Tourism Pty. Ltd., Gold Coast, Australia.
- Bardasi, E., Sabarwal, S., Terrell, K., 2011. How do female entrepreneurs perform? Evidence from three developing regions. *Small Bus. Econ.* 37 (4), 417-441.
- Barnett, W.P., Baron, J.N., Stuart, T.E., 2000. Avenues of attainment: occupational demography and organizational careers in the California civil service. *Am. J. Sociol.* 106(1), 88-144.
- Bates, T., 1995. Self-employment entry across industry groups. *J. Bus. Ventur.* 10 (2), 143-156.
- Baum, J.A.C., Ingram, P., 1998. Survival-enhancing learning in the Manhattan hotel industry, 1898-1980. *Manag. Sci.* 44 (7), 996-1016.
- Beaman, L., Chattopadhyay, R., Duflo, E., Pande, R., Topalova, P., 2009. Powerful women: Does exposure reduce bias? *Q. J. Econ.* 124 (4), 1497-1540.
- Berger, P.L., Luckmann, T., 1966. *Social Construction of Reality: A Treatise in the Sociology of Knowledge*. Anchor Books, Garden City, NY.
- Bertrand, M., Mullainathan, S., 2004. Are Emily and Greg more employable than Lakisha and Jamal? *Am. Econ. Rev.* 94 (4), 991 -1013.
- Bird, B., Brush, C.G., 2002. A gendered perspective on organizational creation. *Enterp. Theory Pract.* 26 (3), 41 -65.
- Bird, S.R., Sapp, S.G., 2004. Understanding the gender gap in small business success: urban and rural comparisons. *Gend. Soc.* 18 (1), 5-28.
- Bird, S.R., Sapp, S.G., Motoko, L., 2001. Small business success in rural communities: explaining the sex gap. *Rural. Sociol.* 66 (4), 507-531.
- Bruderl, J., Preisendorfer, P., Ziegler, R., 1992. Survival chances of newly founded business organizations. *Am. Sociol. Rev.* 57 (2), 227-242.
- Brush, C., Carter, N.M., Gatewood, E.J., Greene, P.G., Hart, M.M., Brush, C., Carter, N., Gatewood, E., Greene, P., Hart, M., 2006. Introduction: the Diana project international. *Growth Oriented Women Entrepreneurs and Their Businesses. A Global Research Perspective*. Edward Elgar, Cheltenham, U.K., pp. 3-22.
- Budig, M.J., 2002. Male advantage and the gender composition of jobs: who rides the glass escalator? *Soc. Probl.* 49 (2), 258-277.
- Calás, M.B., Smircich, L., Bourne, K.A., 2009. Extending the boundaries: reframing "entrepreneurship as social change" through feminist perspectives. *Acad. Manag. Rev.* 34 (3), 552-569.
- Carter, J.S., Borch, C.A., 2005. Assessing the effects of urbanism and regionalism on gender-role attitudes, 1974-1998. *Sociol. Inq.* 75 (4), 548-563.
- Carter, N.M., Williams, M., 2003. Comparing social feminism and liberal feminism: the case of new firm growth. In: Butler, J. (Ed.), *New Perspectives on Women Entrepreneurs*. New Information Publishing, pp. 25-50.
- U.S. Census Bureau, 2011. *Statistical Abstract of the United States, 131st ed.* U.S. Government Printing Office, Washington, DC.
- Cliff, J.E., 1998. Does one size fit all? Exploring the relationship between attitudes towards growth, gender, and business size. *J. Bus. Ventur.* 13 (6), 523-542.
- Cliff, J.E., Langton, N., Aldrich, H.E., 2005. Walking the talk? Gendered rhetoric vs. action in small firms. *Organ. Stud.* 26 (1), 63-91.

- Coleman, S., Robb, A., 2009. A comparison of new firm financing by gender: evidence from the Kauffman Firm Survey data. *Small Bus. Econ.* 33 (4), 397-411.
- Coleman, S., Robb, A., 2012. Gender-based firm performance differences in the United States: examining the roles of financial capital and motivations. In: Hughes, K., Jennings, J. (Eds.), *Global Women's Entrepreneurship Research: Diverse Settings, Questions, and Approaches*. Edward Elgar, Cheltenham, UK, pp. 75-94.
- Committee on Small Business, House of Representatives, 1988. *New economic realities: the role of women entrepreneurs*. Hearings Before the Committee on Small Business, House of Representatives, One Hundredth Congress, Second Session, Washington, DC, April 26 and 27; May 10,11,17, and 19,1988.
- Du Rietz, A., Henrekson, M., 2000. Testing the female underperformance hypothesis. *Small Bus. Econ.* 14 (1), 1 -10.
- Duehr, E.E., Bono, J.E., 2006. Men, women, and managers: are stereotypes finally changing? *Pers. Psychol.* 59 (4), 815-846.
- Dunne, T., Roberts, M., Samuelson, L., 1989. The growth and failure of U.S. manufacturing plants. *Q. J. Econ.* 104 (4), 672-698.
- Ely, R., Padavic, I., 2007. A feminist analysis of organizational research on sex differences. *Acad. Manag. Rev.* 32 (4), 1121-1143.
- Estrin, S., Mickiewicz, T., 2011. Institutions and female entrepreneurship. *Small Bus. Econ.* 37 (4), 397-415.
- Evans, D.S., 1987. The relationship between firm growth, size, and age: estimates for 100 manufacturing industries. *J. Ind. Econ.* 35 (4), 567-581.
- Everett, J., Watson, J., 1998. Small business failure and external risk factors. *Small Bus. Econ.* 11 (4), 371 -390.
- Fairlie, R., Robb, A., 2009. Gender differences in business performance: evidence from the characteristics of Business Owners Survey. *Small Bus. Econ.* 33 (4), 375-395.
- Fasci, M., Valdez, J., 1998. A performance contrast of male- and female-owned small accounting practices. *J. Small Bus. Manag.* 36 (3), 1-7.
- Fischer, E.M., Reuber, R.A., Dyke, L.S., 1993. A theoretical overview and extension of research on sex, gender, and entrepreneurship. *J. Bus. Ventur.* 8 (2), 151-168.
- Fletcher, J.K., 1998. Relational practice a feminist reconstruction of work. *J. Manag. Inq.* 7 (2), 163-186.
- Fryer Jr., Roland G., Levitt, S.D., 2004. The causes and consequences of distinctively black names. *Q. J. Econ.* 119 (3), 767-805.
- Gallagher, A.C., Chen, T., 2008. Estimating age, gender, and identity using first name priors. *Proc. IEEE Conf. Comput. Vis. Pattern Recognit.* 1 -8.
- Gupta, V.K., York, A.S., 2008. The effects of geography and age on women's attitudes towards entrepreneurship: evidence from the state of Nebraska. *Int. J. Entrep. Innov.* 9 (4), 251-262.
- Harding, S., 1987. *Feminism and Methodology*. University Press, Bloomington, Indiana.
- Hechavarria, D.M., Ingram, A., Justo, R., Terjesen, S., 2012. Are women more likely to pursue social and environmental entrepreneurship. In: Hughes, K., Jennings, J. (Eds.), *Global Women's Entrepreneurship Research: Diverse Settings, Questions, and Approaches*. Edward Elgar, Cheltenham, UK, pp. 135-151.
- Holloway, S., 1998. Local childcare cultures: moral geographies of mothering and the social organisation of pre-school education. *Gend. Place Cult.* 5 (1), 29-53.
- Honig, B., 1998. What determines success? Examining the human, financial, and social capital of Jamaican microentrepreneurs. *J. Bus. Ventur.* 13 (5), 371-394.
- Hughes, K.D., Jennings, J.E., 2012. Introduction: showcasing the diversity of women's entrepreneurship research. In: Hughes, K., Jennings, J. (Eds.), *Global Women's Entrepreneurship Research: Diverse Settings, Questions, and Approaches*. Edward Elgar, Cheltenham, UK, pp. 1 -14.

- Hundley, G., 2001. Why women earn less than men in self-employment. *J. Lab. Res.* 22 (4), 817-829.
- James, A., 2012. Conceptualizing 'woman' as an entrepreneurial advantage: a reflexive approach. In: Hughes, K., Jennings, J. (Eds.), *Global Women's Entrepreneurship Research: Diverse Settings, Questions, and Approaches*. Edward Elgar, Cheltenham, UK, pp. 226-240.
- Jennings, J.E., Brush, C.G., 2013. Research on women entrepreneurs: challenges to (and from) the broader entrepreneurship literature? *Acad. Manag. Ann.* 7 (1), 663-715.
- Johnsen, G.J., McMahon, R.G., 2005. Owner-manager gender, financial performance and business growth amongst SMEs from Australia's Business Longitudinal Survey. *Int. Small Bus. J.* 23 (2), 115-142.
- Jones, C.B., Gates, M., 2004. Gender-based wage differentials in a predominantly female profession: observations from nursing. *Econ. Educ. Rev.* 23 (6), 615-631.
- Kalleberg, A., Leicht, K., 1991. Gender and organizational performance: determinants of small business survival and success. *Acad. Manag. J.* 34 (1), 136-161.
- Kalnins, A., Lafontaine, F., 2013. Too far away? The effect of distance to headquarters on business establishment performance. *Am. Econ. J. Microecon.* 5 (3), 157-179.
- Kalnins, A., Mayer, K.J., 2004. Franchising, ownership, and experience: a study of pizza restaurant survival. *Manag. Sci.* 50 (12), 1716-1728.
- Kellogg, K.C., 2011. *Challenging Operations: Medical Reform and Resistance in Surgery*. University of Chicago Press.
- Klapper, L.F., Parker, S.C., 2011. Gender and the business environment for new firm creation. *World Bank Res. Obs.* 26 (2), 237-257.
- Kosova, R., Lafontaine, F., 2010. Survival and growth in retail and service industries: evidence from franchised chains. *J. Ind. Econ.* 58 (3), 542-578.
- Loscocco, K.A., Bird, S.R., 2012. Gendered paths why women lag behind men in small business success. *Work. Occup.* 39 (2), 183-219.
- Loscocco, K.A., Robinson, J., Hall, R.H., Allen, J.K., 1991. Gender and small business success: an inquiry into women's relative disadvantage. *Soc. Forces* 70 (1), 65-85.
- Marco, R., 2012. Gender and economic performance: evidence from the Spanish hotel industry. *Int. J. Hosp. Manag.* 31 (3), 981-989.
- Marlow, S., 2002. Women and self-employment: a part of or apart from theoretical construct? *Int. J. Entrep. Innov.* 3 (2), 83-91.
- Marlow, S., McAdam, M., 2013. Gender and entrepreneurship: advancing debate and challenging myths; exploring the mystery of the under-performing female entrepreneur. *Int. J. Entrep. Behav. Res.* 19 (1), 114-124.
- Marlow, S., Carter, S., Shaw, E., 2008. Constructing female entrepreneurship policy in the UK: is the US a relevant benchmark? *Environ. Plan. C Gov. Policy* 26 (2), 335-351.
- Martin, P., Collinson, D., 2002. Over the pond and across the water: developing the field of "gendered organizations". *Gend. Work. Organ.* 9 (3), 244-265.
- McAdam, M., 2013. *Female Entrepreneurship*. Routledge, London, UK.
- McAdam, M., Marlow, S., 2012. Sectoral segregation or gendered practices? A case study of roles and identities in a copreneurial venture. In: Hughes, K., Jennings, J. (Eds.), *Global Women's Entrepreneurship Research: Diverse Settings, Questions, and Approaches*. Edward Elgar, Cheltenham, UK, pp. 189-203.
- McLaughlin, D.K., Perman, L., 1991. Returns vs. endowments in the earnings attainment process for metropolitan and nonmetropolitan men and women. *Rural. Sociol.* 56 (3), 339-365.
- Merrett, C.D., Gruidl, J.J., 2000. Small business ownership in Illinois: the effect of gender and location on entrepreneurial success. *Prof. Geogr.* 52 (3), 425-436.

- Oldenburg, R., 2001. *Celebrating the Third Place*. Marlowe & Co., New York.
- Pierce, J.L., 1999. Emotional labor among paralegals. *Ann. Am. Acad. Polit. Soc. Sci.* 561 (1), 127-142.
- Ridgeway, C.L., Correll, S.J., 2004. Unpacking the gender system: a theoretical perspective on gender beliefs and social relations. *Gend. Soc.* 18 (4), 510-531.
- Robb, A.M., Watson, J., 2012. Gender differences in firm performance: evidence from new ventures in the United States. *J. Bus. Ventur.* 27 (5), 544-558.
- Rosa, P., Carter, S., Hamilton, D., 1996. Gender as a determinant of small business performance: insights from a British study. *Small Bus. Econ.* 8 (6), 463-478.
- Substance Abuse and Mental Health Services Administration, 1999. Summary of findings from the 1998 National Household Survey on Drug Abuse (DHHS Publication No. (SMA) 99-3328). U.S. Department of Health and Human Services, Rockville, MD.
- Tigges, L.M., Green, G.P., 1994. Small business success among men-and women-owned firms in rural areas. *Rural. Sociol.* 59 (2), 289-310.
- Watson, J., 2002. Comparing the performance of male- and female-controlled businesses: relating outputs to inputs. *Enterp. Theory Pract.* 26 (3), 91-100.
- Watson, J., 2003. Failure rates for female-controlled businesses: are they any different? *J. Small Bus. Manag.* 41 (3), 262-277.
- Watson, J., 2012. Networking: gender differences and the association with firm performance. *Int. Small Bus. J.* 30 (5), 536-558.