Do Women Lag Behind Men? A Matched-Sample Analysis of the Dynamics of Gender Gaps*

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Abstract

Previous studies found mixed answers whether women-owned firms are less successful than men-owned firms. Women entrepreneurs may lag behind men because they tend to have less human capital, they may have different personal preferences toward their businesses, and they tend to choose highly competitive services and retail sectors. This comprehensive study builds upon previous researches to examine gender gaps in survival, business outcomes, growth rates and financial capital injections. We used a matched sample of 430 pairs of a woman-owned and a man-owned firms with the same human capital (measured by age, education, experience, and race), the same preferences (measured by weekly hours worked and whether they have home-based business or not) and in the same industrial clusters (high-tech, medium-tech, and non-tech). We used a confidential version of Kauffman Firm Survey, eight years of panel data of new firms that started in 2004. We found that a woman–owned firms have the same survival rate as a man-owned firms. Women start their firms with smaller assets and fewer employees and generate lower sales but earn same profit as men. Despite this fact, their growth rates of total assets, sales, profits and employment are same as their male-owned counterparts. We found no gender gaps in debt capital injection ratios. However, we found women use more equity capital and less trade finance as a percentage of total financing than men. Our findings suggest that women do not lag behind men but they manage a smaller firms. Our analysis of the size gap indicates that about half of the size gap is explained by differences in industry and the remaining half is unexplained, which needs to be explored more in detail in the future.

Key words: matched sample method, gender gaps, business performance, growth, survival rates, and financing

JEL codes: J16, L25**,** L26

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1. Introduction

The latest data from the U.S. Census indicate that while women-owned firms, especially women of color increased dramatically between 2007 and 2012. However, they are still underrepresented among the U.S. population of small business owners. They tend to be non-employer firms and their sales/revenues are 20-50 times smaller than the employer firms owned by a woman.

In the past few decades, a number of studies that explored women entrepreneurs and gender gaps in business performance increased rapidly and will continue to grow as women's role in the economy has been changing. Studies found that women-owned firms are typically smaller than men-owned firms, and likely to be organized as proprietorship or partnership (Coleman and Robb 2012). Women tend to choose highly competitive services and retail industries (Loscocco and Robinson 1991) and they are more risk averse than men (Kepler and Shane 2007). These differences stem from the underlying gendered social construct in which women and men have different motivations, preferences and expectations when running their businesses. However, does it mean that women lag behind men in terms of business performance? Researchers have mixed answers to this question.

According to social feminist theories, women and men are expected to act and behave differently. They take different roles within household, workplace, society and the economy. They are also perceived by others differently. Through gendered lens, Loscocco and Bird (2012)'s study investigates direct and indirect relationship between gender of the owner and success of the business. They argue that women typically start home-based business in order to balance their work-family obligations, to control their efforts and hours put into their business

and to stay closer to home. As a result, this gendered path explains why women-owned firms underperform compared to men in terms of sales.

However, Robb and Watson (2012)'s study found that women do not lag behind men in terms of three measures of business performance even after controlling risk related factors, key demographic differences and the firm size. Success of business largely depends on both human capital and financial capital (Cooper et al. 1994), especially for family businesses (Fairlie and Robb 2007). For retail and services sector, where women-owned firms are heavily concentrated, human capital plays more important role on success of women-owned firms whereas financial capital is more important for men-owned firms (Coleman 2007). Studies also found that women entrepreneurs not only start their business with smaller start-up capital but they also raise smaller financial capital in subsequent years (Coleman and Robb 2009).

The purpose of this study is to investigate the role of human and financial capital on gender gaps in business outcomes and financing sources using the matched sample estimates drawn from Kauffman Firm Survey (KFS). The matched sample method allows us to compare business performance of two identical firms (owned by a woman vs. a man) with same human capital and with same preferences (measured by a number of hours worked) within same industry and similar set-up (home-based or non-home-based). It also allows us to explore the impact of financial capital on business performance of two otherwise identical firms except gender of the owner. The study answers the question "do women lag behind men in business performance?" and examines whether a woman-owned firms underperform in terms of survival, business performance and financing compared with a man-owned firms with same characteristics.

The main contribution of our study is that we are the first to use the matched sample method in a panel data to examine the dynamics of women-owned firms using the KFS full sample. In

addition, it builds upon previous studies (Robb and Watson 2012; Coleman et al. 2013) that investigate the survival rate and business performance but it uses a novel approach – matched sample method. Thus, in addition to the methodological contributions the paper contributes to the existing body of literature on women entrepreneurs and understanding success of women-owned firms.

Our results show that a) woman-owned firms have the same survival rate as man-owned firms across the industry (except the retail sector), b) there appears to be a constant gender gap in assets, sales, profits, and employment because woman-owned firms start smaller and stay smaller but they grow at the same rate as man-owned firms c) Blinder-Oaxaca decomposition results indicate only a half of the asset gaps is explained by differences in industry and the remaining half is unexplained, and d) although a woman-owned firms start with a smaller capital and make smaller capital injections in subsequent years, there are no significant differences in debt and equity capital injections in relative terms (percentage of total financing).

2. Literature Review

A number of studies that explored gender gaps and women entrepreneurs has grown exponentially in the past few decades. Studies tried to answer whether women lag behind men, but found mixed results. There are three interrelated streams of literature that are closely tied to our research question, whether women lag behind men in terms of business performance: 1) studies on human capital investment as a key determinant that explains business performance, 2) studies on financial capital that predicts future growth of business and success of business, and 3) literature that use other factors which explain success of business and gender gaps.

2.1. Literature on Human Capital as a Success of Business

Human capital investment is one of the most important factor that determines the productivity growth, especially for high-tech industry and high-growth firms. For example, one year of schooling increases the productivity by 8.5-12.7 percent (Black and Lynch 1996). Formal education and prior work experience are the most cited factors that affect entrepreneurial success. Business owner's additional year of schooling not only directly increases firm's earnings (Van der Sluis et al. 2008), but it also indirectly affects business performance by reducing financial capital that the owner could obtain. Parker and van Praag (2006) estimated a direct impact of an additional year of schooling (13.7%) on the entrepreneurs' performance but it also indirectly reduces capital constraints of the firm (1.18%) which in turn affect the firm performance (by 3.9%). According to the Bureau of Labor Statistics estimates, only 2 percent of all firms in the U.S. in 2009 were high-employment-growth[3] firms, yet they generated 35 percent of job gains in 2009-2012 (Clayton et al. 2013).

Studies also found that education and experience of the entrepreneurs are the fundamental resources not only for the businesses performance but also for the firm survival. For example, Coleman, Cotei and Farhat (2013) examined survival rates and exit routes (through closure or through mergers and acquisitions) of new ventures and found that entrepreneurs' human capital (education, work experience, and life experience) impact not only the survival of the firm but it also determines a successful exist through mergers and acquisitions (M&A). Delmar and Shane (2006) argue that founding team's prior start-up experience and industry experience greatly enhance new firm's survival rate and sales. Gimeno et al. (1997) claim that some low performing firms continue to survive while others do not because of the entrepreneur's human capital characteristics (measured by formal education and managerial/supervisory skills) among other

[3] High-employment-growth firms are defined as a firm with 10 or more employees that experienced with 20 percent or more average annualized employment growth over a three year period.

factors, which increase economic performances of the organization. Contrary to this argument, Unger et al. (2011) found a stronger relationship between knowledge and skills related to firms' success than past education and experience because they treat human capital as a dynamic process as well as firms' growth.

Moreover, task-related knowledge and skills are also found to be important factors on success of a firm (Unger et al. 2011) but relative lack these essential skills (especially business and technical skills) could affect women-owners' performance (Heilbrunn 2004). Women business owners also lag behind men especially in terms of management skills as well as financial skills (Fairlie and Robb 2009; Loscocco and Robinson 1991). In addition, women entrepreneurs may have different skill sets than men (more in professional, or educational, or medical services sectors but less in technology, or construction or management). As a result, we would expect that women-owned firms have a lower survival rate or a higher exit rates than men and would underperform compared to men-owned firms.

2.2. Literature on Financial Capital as a Predictor of Business Success

Financial capital is another important factor that determines the growth of startups. The relationship between success of business and access to credit is more explicit for start-ups and their survival in subsequent years (Bates, et al. 2013; Fracassi, et al. 2013). However, startups and small businesses have disadvantages compared to large and established businesses (Berger & Udell, 1998). More specifically, startups have a fewer options for access to capital and small business' success heavily depends on their access to credit, especially on traditional bank loans (Williams & Ou, 2008). The U.S. Small Business Administration report that examined financing patterns of small businesses found that over 80% of the firms had outstanding debt, and 55% had traditional bank loans (Ou & Williams, 2003). Using the Kauffman Firm Survey - more recent

data of startup firms, Robb and Robinson (2010) found that 40% of initial startup capital is funded by bank loans.

Dependence on traditional bank loans is especially important source for women-owned businesses (Fairlie & Robb, 2009; Gatewood, Brush, Carter, Greene, & Hart, 2009) since they are more disadvantaged (Loscocco & Robinson, 1991). Bates, Robb, and Parker (2013) have found that female-owned small startups have lower growth rates than their male-owned counterparts. As a result, they may face difficulty securing the loan required for growth and expansion (Coleman and Robb 2009). Their growth may be restricted because female-owned firms are clustered in a few, highly competitive service industries and retail sectors (Wang 2013).

2.3. Literature on Other Factors that Explain Business Performance

While both human capital and financial capital are key determinants of growth, it is possible that firms (especially female-owned businesses) either don't want to grow or there are other barriers for growth of their firm (Ahl 2006; Manolova et al. 2012; Robb and Coleman 2010). Regardless of their intention to grow or stay smaller, not all firms want to maximize their profits (Wiklund et al. 2003). Entrepreneurship is a dynamic process which constantly evolves based on their current assessment of market demand, internal and external conditions and outside environments (Bianchi and Winch 2008).

However, studies found that female-owned firms are fundamentally different than male-owned firms. As a result, their performances and successes are different. For example, women business owners have different motivations and expectations than men when starting their businesses (Loscocco and Bird 2012; Manolova et al. 2012). Men are motivated, for example, by financial gains and self-realization, whereas for women, status is more important motivating factor (Manolova et al. 2008). Women owners also want to be independent, so they do not seek

outside equity and/or debt (Orser et al. 2006; Robb and Coleman 2010). They have different priorities when running their business (making it as hobby as opposed to a primary income). They may also have different preferences (keeping their businesses small and manageable). Balancing work–family obligations is another factor that explains the comparative underperformance and/or small size of female-owned firms (Ferguson and Durup 1998). Furthermore, women typically cultivate more personal networks (Staber 1993) than professional networks (Weiler and Bernasek 2001) which could be another reason why women-owned firms are typically small.

Based on the arguments discussed in these three streams of literature, we test the following set of hypotheses:

H1a: A woman-owned and a man-owned firms with same human capital (measured by age, education and experience) and same preferences (home-based vs. non-home-based, weekly hours worked) have the same survival rate.

H1b: A woman-owned and a man-owned firms with the same human capital (measured by age, education and experience) and the same preferences (home-based vs. non-home-based, weekly hours worked) have the same growth rate.

H1c: A woman-owned and a man-owned firms with the same human capital (measured by age, education and experience) and the same preferences (home-based vs. non-home-based, weekly hours worked) use the same capital structure.

Multivariate regression models, such as logistic regression or conditional logistic model, are most commonly used method for researchers to examine gender gap in performance. For example, to name a few recent studies, Robb and Watson (2012) explored gender differences in

business performance using the KFS, Yang and Aldrich (2014) investigated gender inequalities in leadership, Coleman and Robb (2009) analyzed gender gaps in access to capital and Mijid (2015) and Mijid and Bernasek (2013) investigated whether credit rationing is a form of gender discrimination. However, one of the main limitations of multivariate modeling is that it does not account for group differences in distributions (Starks and Garrido 2004). Our study differs from previous researches that use multivariate models to examine gender differences because we use multivariate modeling in a more controlled environment: subset of a sample matched by key characteristics. In other words, if woman-owned firms are inherently different than man-owned firms, multivariate modeling does not capture the heterogeneity of these firms. By matching firms by age, education, experience, and race of the owner, weekly hours worked, and location of the firms, we are able to create two comparable groups (Marlow 1997) except the gender of the owner.

3. Data and Sampling Method

3.1. About the Kauffman Firm Survey

This study uses the Kauffman Firm Survey (KFS) - largest and longest longitudinal data of 4,928 firms that started their operation in 2004. Although the KFS is public data, we used the confidential version of data that contain information about firm's location, four digit industry codes, and imputed values of missing variables. In response to the Kauffman Foundation's interest in understanding the dynamics of high-technology, medium-technology, and woman-owned businesses, the KFS is a stratified sample based on the industrial technology level and gender, which oversamples businesses in high- and medium-tech industries. Because the KFS is a stratified sample based on industrial technology level (high-tech, medium-tech, and non-tech) and gender, the sample of high-tech, medium-tech, or non-tech businesses standalone is

equivalent to a stratified simple random sample (e.g., the high-tech sample is a stratified simple random sample based on gender). In the KFS sampling process, businesses within each technology and woman-owned indicator sampling stratum were sorted by two control variables (implicit stratification): (1) D&B employee count categories, and (2) three-digit zip code; then, sampling selection was done using Chromy's sequential random sampling method (J. B. Farhat and Robb 2014) thus, we can think of the KFS as being consist of six random sub-samples. Since we have matched women entrepreneurs with men entrepreneurs at the lowest level of the sampling path, we should not be concerned about the oversampling and weights in our study. We use imputed data to conduct our research. Details of the data imputation procedures as well as data descriptions are available in (J. Farhat and Robb 2013).

3.2. Matched Sample Estimation

To our knowledge, we are the first to use the matched sample method in studying the dynamics of gender gaps in a panel data of start-up firms in the US. Riding and Swift (1990) used the matched sample method to investigate differences in loan terms, such as loan approval rates, interest rates, collateral and cosigner requirements, between woman- and man-owned firms. They argue that because women-owned firms are smaller and younger than men-owned firms on average and because women are typically concentrated on a certain retail and services industries, the loan terms are usually associated with these characteristics (firm size, age of a firm, and industry) but not necessarily gender of the owner. In order to properly measure the gender gap in lending terms between woman and man-owned firms, they match a woman-owned firm with a man-owned firm using five criteria: age, size, industry, growth rate and organizational structure.

The key differences between Riding and Swift (1990) and our approach is that 1) they investigated loan terms and whether banks discriminate women entrepreneurs but our approach is to investigate whether women lag behind men and if so, why? 2) they used firm size, age, industry, organizational structure and sales growth rate as a matching criteria to investigate gender discrimination but our approach is to use other objective criteria such as age, education, experience, and race of the owner, number of hours worked, as well as whether or not a firms is a home-based.

The matched sample method is also used by Marlow (1997) to examine motivations of women and men entrepreneurs. Her study is based on 28 matched samples and mainly focused on qualitative analysis. She suggests that further study should be focusing on a larger dataset.

In our study, a matched sample of women entrepreneurs by men entrepreneurs based on industry, age, education, work experience, race and location allow us to examine the performance gaps (earnings, growth, profitability and survival) and financing gaps in a more controlled environment. Human capital, financial capital and owner's characteristics are the most cited reasons for gender gaps. Researchers find evidence that human capital and financial capital may be substituted to each other (Parker 2009). Thus, on one hand controlling for human capital will allow us to study if the financial capital is the only driver of performance gaps. On the other hand, controlling for human capital will allow us to study the determinants of start-up capital gap as well as the determinants of financing sources gaps (internal vs external).

There are two main characteristics for determining the measure of closeness to use in matching women entrepreneurs with men entrepreneurs. The first involves which factors (X's) to include in matching women entrepreneurs with men entrepreneurs. For the purpose of this study, we matched a woman-owned firm with a man-owned firm based on industry, age, education,

work experience, race, weekly hours worked and location. The second characteristic involves combining those factors into one distance measure. In this study, the matched firm selected for a particular woman-owned firm (case) (*i*) will be the man-owned firm (*j*) closest to the woman-owned firm in terms of D*ij*, where D*ij* is defined as the Euclidean distance between the case and control matching factors.

Using the baseline year and within each industry we match a woman-owned firm with a man-owned firm based on the following characteristics:

1. Age of the owner
2. Education of the owner
3. Work experience of the owner
4. Race of the owner
5. Weekly hours worked
6. Location of the firm (Home-Based vs. Other)

We impose a one-to-one exact matching protocol. Thus, if two or more man-owned firms have the same distance from a woman-owned firm, one of these man-owned firms is randomly selected. Meanwhile, if two or more woman-owned firms have the same distance from one man-owned firm, one of these woman-owned firms is randomly selected. Figure 1 illustrate the matching path and Table 1 shows the 430 matched firms' characteristics. As shown in Figure 1, out of 3140 firms that are still in operation as of end of 2011, we find 25 high-tech firms, 133 medium-tech firms, and 272 non-tech firms that are matched by the above six criteria.

3.3. Descriptive Statistics

Panel A of Table 1 shows summary statistics of matched firms as of 2004 by our six selected criteria. While continuous variables such as age, experience and weekly hours worked by owners indicate almost one to one match, categorical variables such as education, or binary variables such as race demonstrate the exact match. Panel B of Table 1 shows additional characteristics of

a woman-owned and man-owned firms, such as total assets, sales, profits, numbers of employees and industrial sectors.

A woman-owned firms are a half the size of a man-owned firms in terms of total assets ($31K vs. $61K), sales ($45K vs. $84K), and number of employees (0.28 vs. 0.66) on average. However, a woman-owned firms in our sample earned a higher profit in 2004 (although it was insignificant) than a man-owned firms ($3.7K vs. $2.5K) even though a woman-owned firms operated with significantly smaller assets and employees. A significantly higher percentage of women organized their firms as a sole proprietorship than men (69% vs. 53%). A percentage of a woman-owned firms with at least one person engaged in R&D activity were similar to that of a man-owned firms (0.18 vs. 0.16). Retail trade sector and arts, entertainment and recreational services represent a higher percentage of women than men, whereas construction, professional, scientific, and technical services as well as administrative and support services have a higher representation of men than women. It is important to point out that although a woman-owned firms are smaller (in terms of traditional size measures) and concentrate in a certain industrial sectors that are different than a man-owned firms, they earn same profit and engage in similar R&D activities as a man-owned firms in 2004.

4. Empirical Methodologies and Findings

4.1. The Gender Gaps

Following Fairlie and Robb (2009), we use closure, profits, employment and sales to measure performance gaps. Because we are interested in the business outcomes, our independent variables include human capital, financial capital, owner characteristics and industry characteristics as well as other control variables. The following subsections describe the

methodologies we used analyzing gender gaps in survival, business outcomes and financing and our results.

4.1.1. Gender Gaps in Survival

First, among the nonparametric duration models we choose the life-table method to establish survival rates. The life-table method enables the calculation of nonparametric estimates of the survival and hazard functions without assuming an underlying distribution or how independent variables change survival experiences. Thus, it avoids the potentially large errors brought about by making incorrect assumptions about the distribution. The results of our analysis indicate (in Table 2) that a woman-owned firms have a slightly lower survival rates in each year than a man-owned firms. Using Log-rank test for equality of survivor functions, we find no differences in the survival rates between a woman and man-owned firms during 2004-2011. As shown in Table 2, fewer and fewer women stayed in business each year but the same is true for male entrepreneurs in our sample. At the end of 2011, less than half of both female and male owned firms were still in operation (207 vs. 211 firms accordingly).

In Table 3, we show the results for the survival rates across industries since Table 2 shows the survival rate in an aggregate number. We find that no differences between women and men across different industries, except the retail sector. In fact, a woman-owned firms had a better survival rates in most industries but the differences were insignificant. Retail industry is the only sector that shows a significantly lower survival rate for women yet it is one of the sectors where women entrepreneurs choose to cluster.

Next, as in Coleman, Cotei and Farhat (2013), we use the Cox regression (proportional hazards) model to examine the factors that impact closure among a woman-owned and a man-owned firms. Table 4 shows the regression results by estimating the Cox model for the hazard

function of 860 firms in our sample, we considered four different specifications as shown in Table 4. Models 1-4 include either start-up capital or start-up total assets or capital injection during year *t* or total assets during year *t* since these variables are highly correlated to each other. In addition, we control for industry effects as well as key demographic variables, such as owner's gender, education, and experience, a number of hours worked, R&D activities and organizational type.

Prior research reveals that human capital is a significant factor in business survival (Cressy, 1996). Our regression analysis confirms the theoretical predictions that higher levels of human capital reduce the hazard rate. Weekly hours worked, owner's education and experience are negatively related with the likelihood of closure. Being Sole Proprietorship or having R&D activities significantly reduce the rate of hazard. More interesting after controlling for human capital, financial capital doesn't seem to be a major predictor of the likelihood of closure. Inconsistent with prior studies, the firm size (as measured by total assets or capital at startup) or gender don't have an impact on the hazard rate. Our results indicate that firm's survival is purely driven by human capital.

4.1.2. Gender Gaps in Business Outcomes

For performance measures, we use standard regression models to estimate the factors that impact these outcomes among woman-owned and man-owned firms. The Blinder-Oaxaca decomposition technique is used to explore the gender differences in business (if they do exist). In addition, we use the random coefficients model to examine the growth paths of Profits, Employment, Assets and Sales over time.

First, simple comparisons of the growth paths of total assets, sales, profits, and number of employees are shown in Table 5. These variables follow the same growth path among woman-

owned and man-owned firms, but with a constant gap. In Figure 2, for example, we show the growth path of total assets between a woman and man–owned firms which illustrates a woman-owned firms start smaller and stay smaller.

In Figure 3 we see a similar growth pattern for sales since a woman-owned firms operated with significantly smaller assets than a man-owned firms. However, as Figure 4 shows, a number of employees for a man-owned firms grew at a much higher rate between 2004 and 2007 than a woman-owned firms, fell sharply in 2008 due to recession and stayed flat thereafter with about 1.1 employee. A woman-owned firms' employment leveled off with 0.6 employees.

Profit is a highly volatile measure especially for the first few years of firm's inception. In Figure 5, we show that profits are severely affected by recession but a man-owned firms are hit by recession earlier than a woman-owned firms due to the fact that they are segregated in certain industrial sectors as such as construction. As a result, the gender gap in profits closed in 2007, 2008 and 2010 but oscillated in 2006, 2009 and 2011, displays a cyclical movement.

In order to explore these growth paths more in detail, we use a latent growth model. Latent growth modeling is a statistical technique that use Structural Equation Model (SEM) framework to estimate growth trajectories. A main advantage of using latent growth models is to investigate systematic change, inter-individual variability in this change and the correlation of the growth parameters (endowments "initial status" and growth rate) with time varying and non-time varying covariates.

The latent growth curve model is represented by the following set of formulas:

Level-1 equation (measurement model):

$$y_{it} = \pi_{0i} + \pi_{1i} Time_t + \epsilon_{it} \quad \text{, for } i = 1,2,..n \text{ and } t = 1,2,..T \text{ .} \qquad (1)$$

where y_{it} is the response variable for firm i at time t . π_{0i} is a latent variable that represents

the level-1 intercept (endowments "initial status"), π_{1i} is a latent variable that represents the growth trajectory (growth rate).

More traditionally, the structural model would be represented by:

$$\boldsymbol{\Upsilon} = \boldsymbol{\tau}_y + \boldsymbol{\Lambda}_y \boldsymbol{\eta} + \boldsymbol{\varepsilon} \quad (2)$$

$$\begin{bmatrix} y_{i1} \\ \vdots \\ y_{iT} \end{bmatrix} = \begin{bmatrix} 0 \\ \vdots \\ 0 \end{bmatrix} + \begin{bmatrix} 1 & t_1 \\ \vdots & \vdots \\ 1 & t_T \end{bmatrix} \begin{bmatrix} \pi_{0i} \\ \pi_{1i} \end{bmatrix} + \begin{bmatrix} \epsilon_{i1} \\ \vdots \\ \epsilon_{iT} \end{bmatrix} \quad (2.a)$$

Level-2 equations (structural model):

$$\pi_{0i} = \gamma_{00} + \gamma_{01} x_i + \zeta_{0i} \quad (3.a)$$

$$\pi_{1i} = \gamma_{10} + \gamma_{11} x_i + \zeta_{1i} \quad (3.b)$$

x_i is a time varying (or non-time varying) predictor(s) of the intercept and (or) slope variables. In the level-2 equations, γ_{00} and γ_{10} are the intercepts or average value of π_{0i} and π_{1i} respectively, and ζ_{0i} and ζ_{1i} are error terms.

$$y_{it} = \pi_{0i} + \pi_{1i} Time_t + \epsilon_{it} \text{ , for } i = 1,2,..n \text{ and } t = 1,2,..T \text{ .} \quad (4.a)$$

$$\pi_{0i} = \gamma_{00} + \gamma_{01} Female + \zeta_{0i} \quad (4.b.)$$

$$\pi_{1i} = \gamma_{10} + \gamma_{11} Female + \zeta_{1i} \quad (4.c.)$$

Our results from the latent growth model is shown in Table 6 which confirms the above results in Table 5. First column of Table 6 shows the results of the total assets for a man-owned and a woman-owned firms. The intercept that represents the initial endowments of assets for a man-owned firms is $79,708, but for a woman-owned firms, it is significantly lower which is by $45,179 lower than that of a man-owned firms. The slope indicates that a man-owned firms grow $3,733 a year, whereas a woman-owned firms grow by $320 less than a man-owned firms which was not significant. The same results are found for employment (the second column) and sales (third column). As a result, our findings suggest that female owned startups have a lower initial

assets, sales and employment but the same growth rate as male owned startups.

In terms of profits (last column of Table 6), we have a slightly different results. A man-owned firms earn about $9,992 profit in their initial year of operation as indicated by the coefficient of the intercept, but a woman-owned firms earn $1368 less profit, which is statistically insignificant. Furthermore, the slopes indicate that a man-owned and a woman-owned firms earn about the same profit each year thereafter. This suggests that female owned startups also have the same initial profits and the same growth rate as male-owned firms.

Previous empirical studies (Fairlie and Robb 2009; Loscocco et al. 1991; Jennings and Brush 2013) repeatedly reported that female-owned firms have smaller assets than male-owned firms. Many reasons are brought forward to explain the smallness of female-owned startups. First, female entrepreneurs most of the time start their business with different motivation. In order to be more present and engaged with their families many female entrepreneurs view themselves as self-employed than being a business owner. While the KFS data doesn't provide us with the reasons for why the entrepreneurs started the business in the baseline data, it did ask the question in the final survey of 2011. Thus, we examined the reasons for starting the business for the surviving firm's only.

As shown in Table 7, female entrepreneurs in our sample have different motivations for starting their businesses. About 22% of a woman-owned firms reported that reasons for starting their business is to have a primary source of income whereas this number is 32% for a man-owned firms, and the gap is statistically significant at the 5% level. Conversely, a significantly higher percentage of female owners started their business to have more freedom to meet family responsibilities than male owners (15% vs. 8%). This result was not surprising given that previous studies pointed out that men are motivated by financial gains and self-realization,

whereas for women, status is more important motivating factor (Manolova et al. 2008). Nevertheless, our findings in Table 7 suggests that if the KFS data had these variables or other variables that measure motivations of entrepreneurs across all years of the panel study, these variables might have explained some of the unexplained gender gaps in assets.

Second, due to the lack of savings (net worth) female entrepreneurs has a smaller amount of equity capital available to them. Starting from the 2008 survey the KFS collected data about the net worth of the primary owner. As shown in Table 8, a percentage of a woman-owned firms with a negative or zero net worth is significantly lower compared to a man-owned firms in 2008-2011, which is contrary to what we expected. On the other hand, a percentage of woman entrepreneurs with less than $50,000 (positive net worth) or with $50,000-$100,000 net worth is higher than their male counterparts but it was insignificant. A percentage a women-owned firms with more than $100,000 net worth is same as the percentage of a man-owned firms. This indicates that net worth is not an issue in our sample.

Third, female entrepreneurs start their business in a low capital requirement industries, which means they are more likely to be risk averse than men, thus they start a smaller size businesses. Since that our sample was matched based on industry (high-tech, medium-tech, and low-tech), examining this claim using our sample is not possible. Yet, using our sample and the full KFS data, we can examine the relative size of female and male entrepreneurs.

In table 9 we calculate the average start-up size in each industry based on all businesses started in 2004 (column 2). We also calculate the average business size (column 1) and relative size (column 3) by gender in our sample. Table 9 shows that female entrepreneur's startup size in our sample is on average below the industry average within each industry. Although the same can be said for the male entrepreneurs in our sample (except the construction industry which

exhibits 108% relative size), female-owned firms are much smaller than male-owned within each industry. For example, a woman-owned firms in construction sector have an average of $80K assets but a man-owned firms have $126.7K (with a relative size of 69% and 108% accordingly). The only sector that shows the same relative asset size is the wholesale trade industry where they have about $45K assets. Besides construction and wholesale trade, female-owned firms' sizes range between $12K and $39K whereas male-owned business sizes range from $22K to $123K. These results support the hypothesis that female entrepreneurs are more risk averse than men.

To explain the gap in the start-up size (means of assets) between the man-owned and woman-owned businesses we utilized the widely used Blinder–Oaxaca decomposition method (Blinder 1973; R. Oaxaca 1973). The decomposition is based on the linear model:

$$Y_\mu = \alpha_\mu + X'_\mu \beta_\mu + \epsilon_\mu \qquad (5.a)$$

$$[\![E(\epsilon]\!]_\mu) = 0\ , \mu \in (F, M) \qquad (5.b)$$

where Y_μ the outcome variable (asset size, in our case), X'_μ is a vector of predictors, β_μ contains the slope parameters, α_μ is the intercept, ϵ_μ is the error term and M represents men and F is women.

In order to investigate the sources of gender differentials in detail, using the coefficients estimated from the male and female equations in the above, the observed gender gap in Y can be decomposed into several effects:

$$[\![E(Y]\!]_M) - E(Y_F) = \left[E\left(X'_M\right)[\![-E\left(X'_F\right)\right]\beta]\!]_M + [\![[\alpha]\!]_M - \alpha_F] + E\left(X'_F\right)(\beta_M - \beta_F) \qquad (6.a)$$

$$E = E(X_{\downarrow}M^{\uparrow},)\ [\![- E(X_{\downarrow}F^{\uparrow},)\ ]\beta]\!]_{\downarrow}M \qquad (6.b)$$

$$[\![U = [\alpha]\!]_M - \alpha_F] + E\left(X'_F\right)(\beta_M - \beta_F) \qquad (6.c)$$

The first term (E) of the right hand side of the equation amounts to the part of the differential that is due to group differences in the predictors. The first term is occasionally called "explained" or "observed gender gap in characteristics" or "endowments effect"). The second term (U) measures the unexplained outcome gap due to differences in coefficients or returns. The literature cited two major problems with the Blinder-Oaxaca decomposition. First, the index number problem where the results will vary along with the choice of the reference group. This problem has been addressed by studies such as those by Oaxaca and Ransom (1994), Neumark (1988), and Cotton (1988). Second, in the case of having categorical variables, the decomposition results for categorical predictors depend on the choice of the omitted base category. Gardeazabal and Ugidos (2004) and Yun (2005) proposed the solution to this issue by restricting the coefficients for the single categories to sum to zero. In our analysis we use the modified Blinder-Oaxaca decomposition to overcome the problems with the traditional Blinder-Oaxaca decomposition.

The top panel of Table 10 shows the estimated values of total assets for a woman-owned and a man-owned firms in 2004, which indicate that a woman-owned firms are a half the size of a man-owned firms ($30,755 vs. $61,114). In 2004, the gender gap in assets was $30,359. The gap increased to $48,507 between 2004 and 2011, as a woman-owned grew ($48,214) as well as a man-owned firms ($96,721). To analyze this gap using Blinder-Oaxaca decomposition method, we first used the six criteria as predictors. Given that our sample was matched based on age, work experience, weekly hours worked, education, race, high-tech, medium-tech, non-tech industry and home-based, using only these variables as predictors should have a zero endowment effect and most of the gap in the start-up size between the man-owned and woman-owned businesses must be unexplained due to omitted variables. As expected the predictors that were

used to match the sample almost can explain nothing of the gap (see Panel B, the Base Model) in 2004 and only 3% of the gap in 2004-2011 panel regression.

Next, we included the industry controls (at 3-digits level NAICS) to the predictors since that industry classification is the only variable available across all years of the survey. Panel C of Table 10 shows the results of the Blinder-Oaxaca decomposition of start-up size with industry variables as predictors. By adding the industry controls, we are able to explain about 43.6% of the gap. The remaining 56% of the gap is explained by omitted variables.

4.1.3. Gender Gaps in the Financing Sources

It is well documented that woman-owned start-ups use similar sources of finance, but they tend to use smaller amounts of external finance than man-owned start-ups do (Jennings and Brush 2013); however, on average woman-owned start-ups have smaller businesses. Controlling for human capital, we examine what factors are driving the start-up capital gap. In addition, we examine the determinants of financing choice and the size (amount) of internal and external financing among woman-owned and man-owned firms as well as within each group.

We classify debt and equity into insider and outsider capital based on the fact that insiders have more access to information about the business more than outsiders. Insider's personal debt consists of personal debt from family and others. Outsider's personal debt consists of personal credit cards and personal bank loans. Insider's business debt consists of business debt from family, employees, and other individuals. Outsider's business debt consists of business credit cards, bank loans, government loans, loans from other businesses. Owner's equity consist of equity provided by the owner. In Table 11, we report the mean differences in capital balances and capital injections between woman-owned and man-owned firms. Women and men in our sample start their businesses (2004) with similar debt structure except the outsider personal debt

and equity. We find no significant differences in insider personal debt, business debt, (both insider and outsider). However, we do find that women use significantly less outsider personal debt ($7.5K vs. $11.5K for men) and equity capital ($10K vs. $16.5K) than men. This could be due to differences in personal preferences of women and men toward equity and debt capital (perhaps their desires to be independent make them not to give up so much equity or perhaps they have difficulty raising debt and equity capital under their business name). Our results also indicate that women raise significantly less outsider personal debt and equity capital in 2004. We find similar results for 2011, woman-owned firms have significantly lower total personal debt ($2K vs. $5.6K) and equity capital ($34K vs. $54K) even though there are no significant differences found in the components of debt. We also found that women use significantly less (4-5 times less the amount of men) trade finance ($7K vs. 34K). Compared to the end-of-year snapshots, however, 2004-2011 averages show completely different results. On average, woman-owned firms use and raise significantly lower debt and equity capital compared to their man-owned counterparts in almost all classifications except personal and business insider debt capital balances and capital injections.

In Table 12, we show the same variables in percentage terms (as a percent of total financing). The gender gaps disappear except in equity and trade finance between 2004 and 2011. In other words, women owners have the same capital structure as men in percentage terms even though the dollar values are much smaller. We find that woman-owned firms raised 50% equity capital as a percent of their total financing, which is significantly higher than men (45.1%). This could be due to the smallness of woman-owned firms compared to man-owned firms (the scale issue).

Next, we use Tobit Model to estimate the determinants of debt and equity financing, following Coleman, Cotei and Farhat (2014) and Cotei and Farhat (2011). The key difference

between these studies and ours is that we use a sample of a woman-owned and a man-owned firms matched by six criteria. Appendix A describes variables that are used in the model and Table 13 show the results of determinants of capital injections ratios. We found that the coefficients for "female" is negative but insignificant[4] (except for equity injection ratio), which means that being a woman does not affect the debt capital injections ratios (whether it is personal or business and insider or outsider). A gender of an owner also does not affect trade finance as a percent of total financing either. However, the coefficient for the equity capital ratio is positive and significant at the 5% level. A woman-owned firms raised more equity in percentage term than a man-owned firms which confirms the results shown in Table 12.

5. Conclusions

This paper investigates whether women entrepreneurs lag behind men in terms survival, business outcomes, and financial capital injections. Previous studies find mixed answers when comparing successes of women-owned businesses with their men-owned counterparts. This may be due to the limitations in the data that resulted measurement issues (incorrect and improper measurements), which led researcher came up with conflicting findings and conclusions. Our study differ from previous researches because we used the matched sample method to select a woman-owned firms with their exact match owned by a man using six key criteria that are considered as human capital and as their preferences (age, education, experience, race, weekly hours worked and home-based vs. non-home-based, and industrial cluster).

We found that a woman-owned firms do not lag behind a man-owned firms in the survival, growth and profitability, and debt/equity capital injections. The only issue we found

[4] Since our study is to explore the gender gaps, we explain here coefficients for "female" only for the interest of brevity.

was that a woman-owned firms start smaller and stay smaller, as shown in our latent growth analysis, but they perform as well as men. The result is consistent with previous studies that argues an absolute size of the firm does not matter (Manolova et al. 2008). In addition, we have identified women entrepreneurs' motivations and risk-awareness are indeed different than male entrepreneurs. However, due to data limitations, we cannot include the motivations and relative risk averseness in our regressions analysis. This implies that further studies on this topic should address why they want to stay smaller.

Our findings also suggest that we need to collect more detailed information about demographics (marital status, number and age of their children), motivations, preferences, risk awareness and intentions of business owners as well as some behavioral questions.

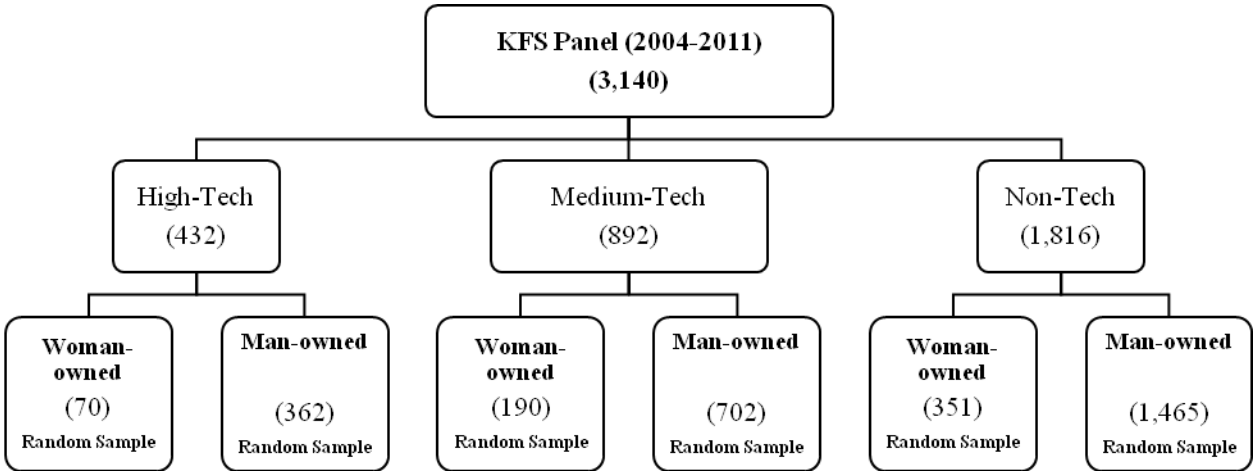

Figure 1 Matching Path of Surviving Firms

Sample Firms	Matching Firms	Sample Firms	Matching Firms	Sample Firms	Matching Firms
25	25	133	133	272	272

Table 1
Descriptive Statistics of Matched Firms

Panel A	Woman-owned	Man-owned	Difference
Variables (in 2004)	Mean	Mean	Mean
Age	45.46	45.07	0.39
Work Experience	10.35	10.43	-0.08
Weekly Hours Worked	36.53	36.18	0.35
High School or less	8.60	8.60	0.00
College Degree	64.65	64.65	0.00
Graduate Degree	26.74	26.74	0.00
Race: White	88.37	88.37	0.00
Race: Other	11.63	11.63	0.00
High Tech Industry	5.81	5.81	0.00
Medium Tech Industry	30.93	30.93	0.00
Non-Tech Industry	63.26	63.26	0.00
Home Based	67.21	67.21	0.00
Panel B			
Variables (in 2004)			
Total Assets	30754.91	61113.64	-30358.72***
Sales	45326.27	84208.86	-38882.58**
Profit	3767.45	2466.87	1300.58
Employees	0.28	0.66	-0.38**
Sole Proprietorship	0.69	0.53	0.16***
R&D activity	0.18	0.16	0.01
Construction	2.33	8.14	-5.81***
Manufacturing	8.14	5.35	2.79
Wholesale Trade	4.88	3.49	1.39
Retail Trade	15.58	11.63	3.95*
Information	3.95	3.02	0.93
Real Estate and Rental and Leasing	2.79	3.26	-0.47
Professional, Scientific, and Technical Services	27.21	32.56	-5.35*
Administrative and Support Services	6.05	9.77	-3.72**
Arts, Entertainment, and Recreation	5.12	1.40	3.72***
Other Services	23.95	21.40	2.55

Notes: two-sample t-test . ***, **, * indicate that the Man-owned mean is statistically different from Woman-owned mean at 0.01, 0.05 and 0.10 levels, respectively.

Table 2 Survival Rate

Panel A	Woman-owned			Man-owned		
Year	Beg. Total	Closure	Survivor	Beg. Total	Closure	Survivor
2004	430			430		
2005	382	48	0.888	392	38	0.912
2006	342	40	0.795	358	34	0.833
2007	316	26	0.735	322	36	0.749
2008	280	36	0.651	288	34	0.670
2009	255	25	0.593	256	32	0.595
2010	230	25	0.535	235	21	0.547
2011	207	23	0.488	211	24	0.491
Test for equality of survival curves: P-Value					0.786	

Notes: Log-rank test for equality of survivor functions. ***, **, * indicate that the Man-owned survivor rate is statistically different from Woman-owned survivor rate at 0.01, 0.05 and 0.10 levels, respectively.

Table 3 Survival Rates by Industry

Survival Rates 2004-2011 by Industry	Woman-owned Survivor	Man-owned Survivor	Test for equality P-Value
Construction	0.600	0.600	0.941
Manufacturing	0.457	0.478	0.926
Wholesale Trade	0.476	0.400	0.698
Retail Trade	0.313	0.480	0.046**
Information	0.529	0.462	0.600
Real Estate and Rental and Leasing	0.667	0.643	0.984
Professional, Scientific, and Technical Services	0.530	0.500	0.679
Administrative and Support Services	0.577	0.452	0.419
Arts, Entertainment, and Recreation	0.636	0.500	0.639
Other Services	0.476	0.457	0.961

Notes: Log-rank test for equality of survivor functions. ***, **, * indicate that the Man-owned survivor rate is statistically different from Woman-owned survivor rate at 0.01, 0.05 and 0.10 levels, respectively.

Table 4. Cox-proportional hazard model

Variables	Model 1	Model 2	Model 3	Model 4
	Hazard Ratio	Hazard Ratio	Hazard Ratio	Hazard Ratio
Start-up Capital	1.03			
Start-up Total assets		0.98		
Capital Injection t			1.02	
Total Assets t				0.97**
Sole Proprietorship	0.83*	0.81**	0.82*	0.80**
Female owner	0.97	0.99	0.97	0.99
Weekly Hours Worked	0.99***	0.99***	0.99***	0.99***
Owner's education	0.95**	0.95**	0.95*	0.95*
Owner's work experience	0.99**	0.99**	0.99**	0.99**
R&D activity	0.73*	0.73*	0.71**	0.73*
Industry fixed effects	Yes	Yes	Yes	Yes

Notes: ***, ** and * indicate the coefficient is statistically different from zero at 0.001, 0.01 and 0.05 levels, respectively. Description of the independent variables is provided in Appendix A. Hazard ratio is the ratio of incidence rates.

Table 5: Growth of Mean Values of Business Performance

Woman-owned				
Year	Total Assets	Sales	Profit	Employees
2004	30755	45326	3767	0.28
2005	41756	72338	12199	0.59
2006	45452	94517	16690	0.72
2007	49755	172384	18749	0.65
2008	56866	182260	15466	0.59
2009	50231	202486	11843	0.59
2010	59187	157278	17516	0.73
2011	70164	161492	24500	0.60
2004-2011	48039	125385	14071	0.57
Man-owned				
2004	61114	84209	2467	0.66
2005	91792	180654	15220	1.22
2006	106592	205907	24233	1.48
2007	104118	216982	17821	1.51
2008	111509	261844	17433	1.11
2009	94070	295218	21783	1.06
2010	107634	221387	18438	1.06
2011	125155	259041	31006	1.08
2004-2011	97049	203964	17220	1.14

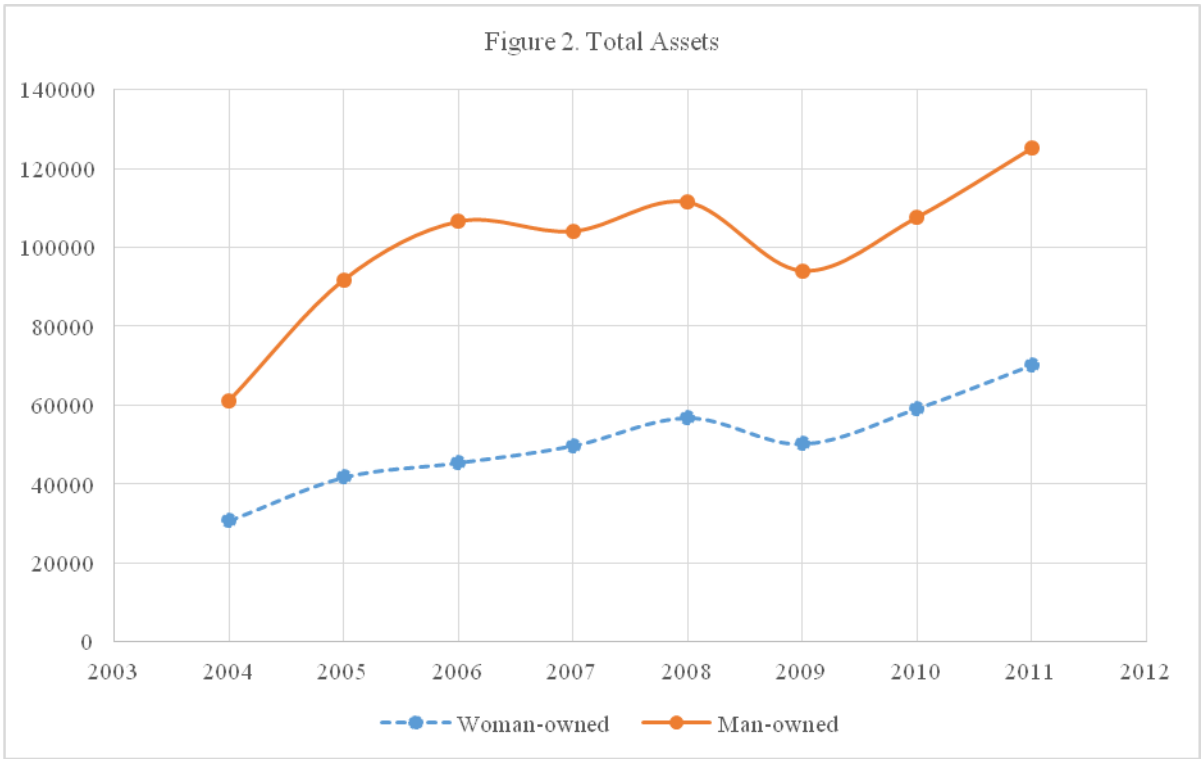
Figure 2. Total Assets
140000
120000
100000
80000
60000
40000
20000
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Woman-owned
Man-owned

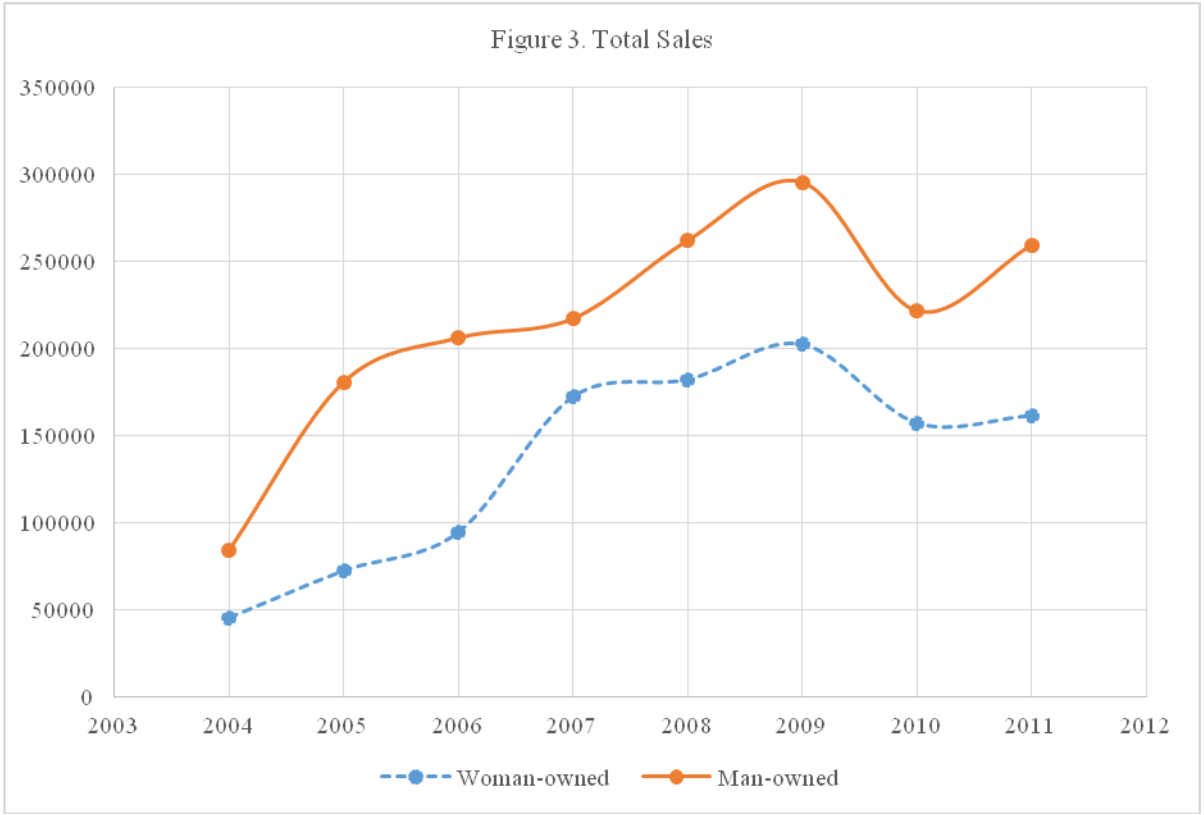
Figure 3. Total Sales
350000
300000
250000
200000
150000
100000
50000
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Woman-owned
Man-owned

Figure 4. Number of Employees

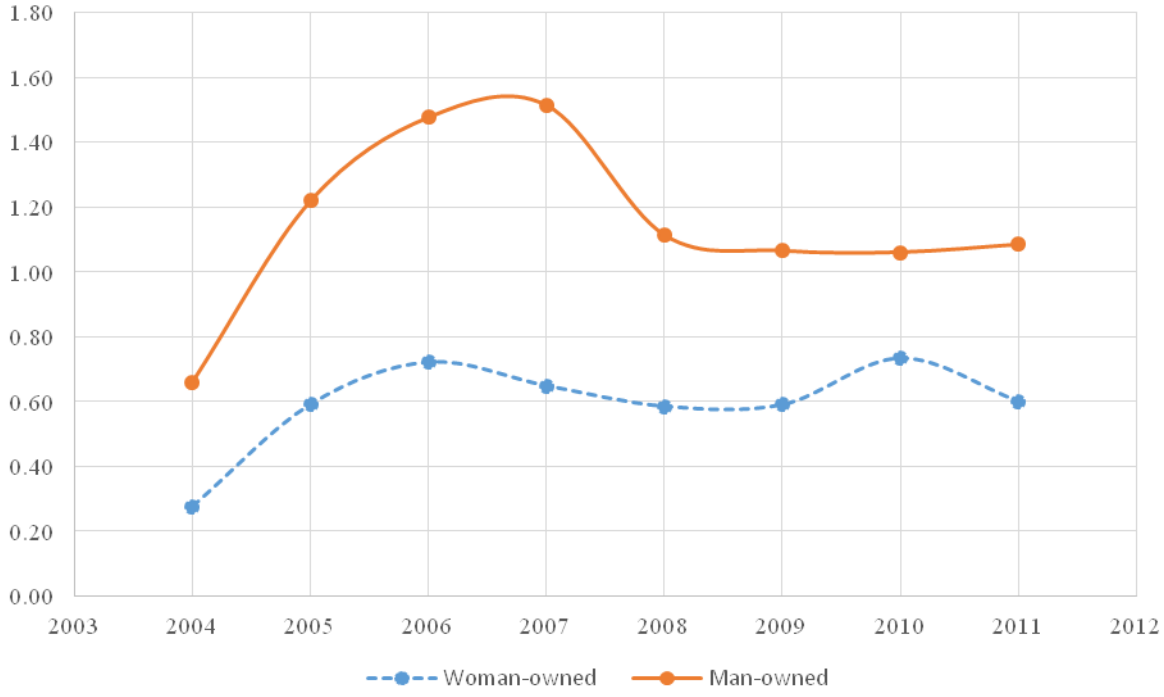

Figure 5. Profit

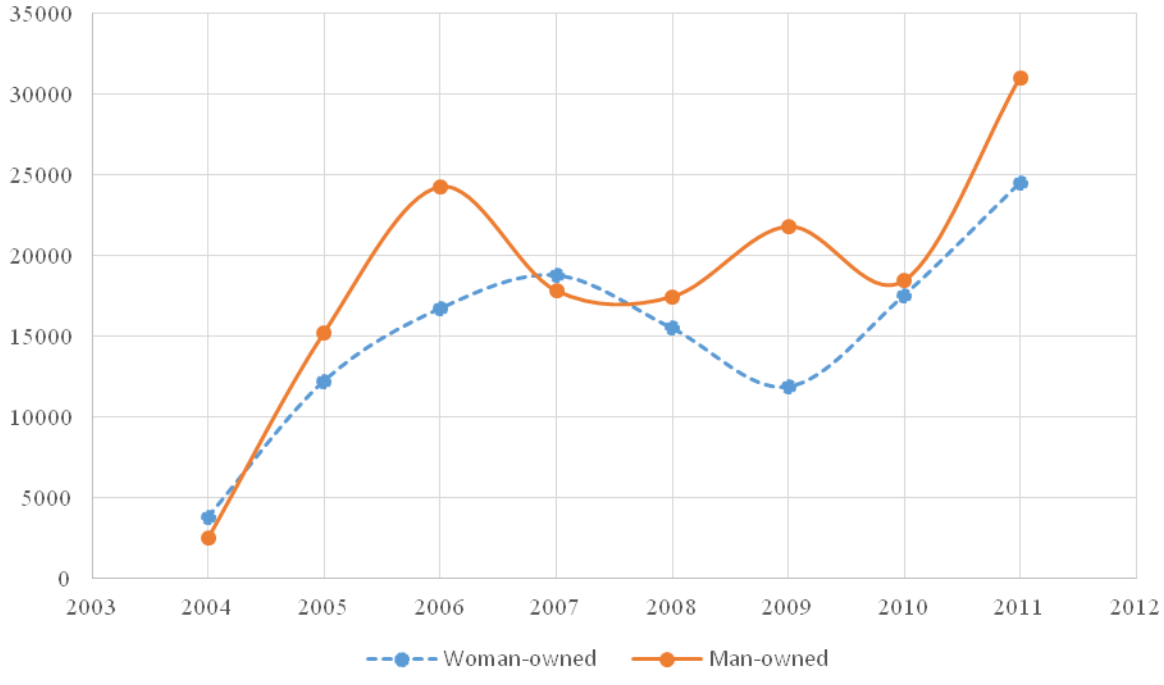

Table 6: Growth Modeling

	Assets	Total Employees	Sales	Profit
Intercept				
γ_{00}	79708.6 ***	1.43***	136781.7***	9991.62***
γ_{01}	-45179.24***	-0.55**	-71133.17**	-1368.41
Slope				
γ_{10}	3732.92**	0.06*	20083.47***	1778.63**
γ_{11}	-320.24	-0.01	-2386.98	-453.71

Notes: ***, ** and * indicate the coefficient is statistically different from zero at 0.001, 0.01 and 0.05 levels, respectively. Description of the independent variables is provided in Appendix A.

Table 7 Motivations of Start-ups

Reasons for Starting the Business (%)	Woman-owned	Man-owned
To have a primary source of income	22.06	31.90**
To have a secondary source of income	17.65	21.43
To be my own boss	27.45	28.57
To have more freedom to meet family responsibilities	15.20	8.10**
To create a job not available elsewhere in the job market	11.27	7.14
Other	6.37	2.86*
Number of Observations	207	211

***, **, * indicate that the Man-owned percentage is statistically different from Woman-owned percentage at 0.01, 0.05 and 0.10 levels, respectively.

Table 8 Net Worth of Primary Owners

Woman-owned				
Net Worth (%)	2008	2009	2010	2011
Negative or zero net worth	3.42	3.33	4.23	3.57
Between $1 and $50,000	18.63	19.58	18.31	17.86
$50,001 to $100,000	17.87	18.33	19.25	19.39
$100,001 to $250,000	20.15	20.83	20.66	20.92
More than $250,000	39.92	37.92	37.56	38.27
Number of Observations	280	255	230	207
Man-owned				
Net Worth (%)	2008	2009	2010	2011
Negative or zero net worth	10.14***	9.68***	8.77**	8.33**
Between $1 and $50,000	16.30	14.52	14.04	14.71
$50,001 to $100,000	14.49	14.52	15.35	15.20
$100,001 to $250,000	20.00	20.97	21.05	20.10
More than $250,000	39.06	40.32	40.79	41.67
Number of Observations	288	256	235	211

***, **, * indicate that the Man-owned percentage is statistically different from Woman-owned percentage at 0.01, 0.05 and 0.10 levels, respectively

Table 9 Firm Size Measured by Total Assets

Woman-owned	Woman-owned Business Size	Industry Average Size[1]	Relative Size[2] %
Construction	$80,440.00	$116,360.00	69.13
Manufacturing	$13,270.00	$112,660.00	11.79
Wholesale Trade	$45,396.00	$142,129.00	31.94
Retail Trade	$38,816.00	$87,920.00	44.19
Information	$15,672.00	$119,873.00	13.10
Real Estate and Rental and Leasing	$29,660.00	$217,235.00	13.66
Professional, Scientific, and Technical Services	$16,975.00	$59,147.00	28.73
Administrative and Support Services	$24,756.00	$66,483.00	37.29
Arts, Entertainment, and Recreation	$12,992.00	$37,856.00	34.30
Other Services	$36,753.00	$118,488.00	31.02
Man-owned	Man-owned Business Size	Industry Average Size[1]	Relative Size[3] %
Construction	$126,691.00	$116,360.00	108.33
Manufacturing	$98,563.00	$112,660.00	87.51
Wholesale Trade	$44,876.00	$142,129.00	31.58
Retail Trade	$53,186.00	$87,920.00	60.52
Information	$65,462.00	$119,873.00	54.71
Real Estate and Rental and Leasing	$123,683.00	$217,235.00	56.96
Professional, Scientific, and Technical Services	$30,924.00	$59,147.00	52.32
Administrative and Support Services	$44,076.00	$66,483.00	66.29
Arts, Entertainment, and Recreation	$22,312.00	$37,856.00	58.97
Other Services	$76,570.00	$118,488.00	64.65

[1] Based on all firms established in 2004, using the KFS data population

[2] Relative Size= Woman-own Business Size / Industry Average Size, based on 2004 data.

[3] Relative Size= Man-owned Business Size / Industry Average Size, based on 2004 data.

Table 10 Blinder-Oaxaca Decomposition of Assets

Year		2004		2004-2011	
Assets		Coef.	%	Coef.	%
Panel A	**Differential**				
$[E(Y]_M)$		61113.64	100.00	96721.51	100.00
$E(Y_F)$		30754.91	50.32	48213.96	49.85
Difference : $[E(Y]_M) - E(Y_F)$		30358.72	49.68	48507.55	50.15
Panel B	**Model 1: Base Model**				
Predictors : Age, Work Experience, Weekly Hours Worked, Education, Race, High, Medium, Non-Tech Industry and Home Based					
Decomposition					
Explained		-161.28	-0.53	1507.40	3.11
Unexplained		30520.00	100.53	47000.14	96.89
Panel C	**Model 2: Expanded Model**				
Predictors : Model 1's Predictors plus industry dummies at 3-digits level NAICS					
Decomposition					
Explained		13224.40	43.56	21162.23	43.63
Unexplained		17134.32	56.44	27345.31	56.37

Table 11 Mean Differences in Capital Balance and Capital Injections Between Woman-owned and Man-owned Firms

Year	2004		2011		2004-2011	
	Woman-owned	Man-owned	Woman-owned	Man-owned	Woman-owned	Man-owned
Capital Balance	$	$	$	$	$	$
Personal Debt: Insiders	1048	1065	229	501	780	854
Personal Debt: Outsiders	7537	11558*	1758	5132	4846	9848***
Personal Debt: Total	8585	12623*	1988	5633*	5626	10702***
Business Debt: Insiders	146	183	41	46	142	122
Business Debt: Outsiders	4123	5624	4484	7948	4939	7404*
Business Debt: Total	4269	5806	4525	7994	5081	7526*
Debt: Total	12854	18429*	6512	13627**	10707	18228***
Equity: Owner	10782	16477**	34429	54990*	19250	33452***
Liability	6224	9180	9219	17768	8081	13251*
Capital Injections						
Personal Debt: Insiders	1041	1066	245	358	820	948
Personal Debt: Outsiders	7081	11015**	1746	2922	4892	8995***
Personal Debt: Total	8122	12081**	1991	3280	5712	9943***
Business Debt: Insiders	167	207	48	55	168	163
Business Debt: Outsiders	4009	5544	5680	7870	5057	7390*
Business Debt: Total	4176	5751	5728	7925	5225	7552*
Debt: Total	12298	17832*	7719	11205	10936	17496***
Equity: Owner	10657	17758***	2574	3174	5786	8574**
Trade Finance	7602	15510	7221	33993**	11694	46240**
N	430	430	207	211	2442	2492

Notes: ***, **, * indicate that the Man-owned mean is statistically different from Woman-owned mean at 0.01, 0.05 and 0.10 levels, respectively

Table 12 Mean Differences in Capital Balance and Capital Injections in Percentage Terms

Year	2004		2011		2004-2011	
	Woman-owned	Man-owned	Woman-owned	Man-owned	Woman-owned	Man-owned
Capital Balance	%	%	%	%	%	%
Personal Debt: Insiders	3.1	3.4	0.5	0.5	1.8	1.5
Personal Debt: Outsiders	17.9	18.1	4.0	4.1	10.2	11.6
Personal Debt: Total	21.0	21.5	4.5	4.5	11.9	13.1
Business Debt: Insiders	0.6	0.9	0.1	0.0	0.6	0.4
Business Debt: Outsiders	6.7	7.7	7.2	8.1	8.2	9.0
Business Debt: Total	7.3	8.6	7.3	8.2	8.8	9.4
Debt: Total	28.3	30.1	11.8	12.7	20.7	22.4
Equity: Owner	57.8	56.2	69.6	69.8	63.5	61.7
Liability	13.9	13.8	18.6	17.5	15.8	15.9
Capital Injections						
Personal Debt: Insiders	3.7	4.0	3.5	2.7	4.0	3.3
Personal Debt: Outsiders	20.1	19.4	17.1	16.2	19.0	20.2
Personal Debt: Total	23.8	23.4	20.7	18.8	23.0	23.5
Business Debt: Insiders	0.9	1.1	0.0	0.8	1.1	1.0
Business Debt: Outsiders	7.1	8.0	31.2	27.9	16.2	18.3
Business Debt: Total	8.0	9.1	31.2	28.7	17.2	19.2
Debt: Total	31.7	32.4	51.9	47.6	40.2	42.7
Equity: Owner	63.2	60.3	30.3	31.5	50.4	45.1**
Trade Finance	5.1	7.3	17.8	21.0	9.4	12.2*
N	430	430	207	211	2442	2492

***, **, * indicate that the Man-owned percentage is statistically different from Woman-owned percentage at 0.01, 0.05 and 0.10 levels, respectively

Table 13 Determinants of Capital Injections ratios

	Personal Debt: Insiders	Personal Debt: Outsiders	Personal Debt: Total	Business Debt: Insiders	Business Debt: Outsiders	Business Debt: Total	Debt: Total	Trade Finance	Equity: Owner
	1	2	3	4	5	6	7	8	9
R&D activity	0.051	0.037	0.028	-0.018	-0.04	-0.04	-0.042	-0.078	0.102**
Intellectual property	0.052	-0.005	-0.012	0.059	0.029	0.027	-0.065	0.013	0.108**
Credit risk	0.002	-0.038*	-0.028	0.056	-0.161***	-0.147***	-0.147***	-0.046	0.211***
Tangible Assets	0.107*	0.081*	0.099**	0.071	-0.011	0.003	0.082	-0.091	-0.016
Sales (Ln)	-0.004	0.003	0.002	-0.013	0.024***	0.019***	0.016***	0.071***	-0.047***
Profitability	-0.250***	-0.145***	-0.18***	-0.085	0.171***	0.158***	0.040	0.207***	-0.224***
Home-based	-0.173***	0.037	-0.005	-0.021	-0.040	-0.042	0.003	-0.35***	0.164***
Age	-0.012***	-0.002	-0.004**	-0.001	0.003	0.003	-0.002	-0.004	0.004*
White	0.036	0.029	0.042	-0.019	-0.038	-0.035	0.047	-0.037	-0.037
Sole Proprietorship	0.058	0.115***	0.111***	-0.125	-0.308***	-0.301***	-0.103***	-0.032	0.127***
Female	-0.056	-0.041	-0.043	-0.052	-0.025	-0.028	-0.048	-0.041	0.094**
Commitment	0.005***	0.002*	0.002**	0.003*	0.004***	0.004***	0.003***	0.004***	-0.004***
Education	0.001	0.006	0.009	-0.022	0.001	-0.003	0.010	-0.103***	0.045***
Work experience	0.001	-0.005**	-0.004**	-0.004	-0.001	-0.001	-0.004*	0.005*	0.001
Medium Tech Industry	-0.084	0.027	0.026	0.221	0.043	0.064	0.128	-0.637***	0.140
Non-Tech Industry	-0.041	0.033	0.032	0.144	0.093	0.089	0.110	-0.097	-0.032
Intercept	-0.468**	-0.155	0.009	-1.58***	-0.218	-0.117	0.543***	-0.259	-0.388*
N	4934								

Notes: ***, **, * indicate at 0.01, 0.05 and 0.10 levels, respectively

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Appendix A

Variables Used in the Determinants of Capital Injections Ratios

Variable	***Description***
Dependent Variables	
Total Financing	Sum of Owner equity, Personal credit card balance, Personal bank loan, Personal other loan, Business credit card balance, Business credit line, and Business bank loan
Owner equity (%)	Total Owner equity to Total Financing
Total personal debt (%)	Total personal debt to Total Financing
Total business debt (%)	Total business debt to Total Financing
Total debt (%)	Total debt to Total Financing
Independent Variables	
R&D activity	Equals 1 if business has at least one employee responsible for R&D, =0 otherwise
Intellectual property	Equals 1 if business has patent or copyright or trademark, =0 otherwise
Credit risk	D&B Commercial Credit Score (1 very low risk,……., 5 very high risk)
Tangible Assets	Tangible assets to total assets
Sales(ln)	The logarithm of (total sales($)+1) at year t
Profitability	Equals 1 if the firm report profit, =0 otherwise
Home-based	Equals 1 if the firm is home based, =0 otherwise
Age (in years)	Age of the owner
White	Equals 1 if owner is White , =0 otherwise
Sole Proprietorship	Equals 1 if the firm is organized as a sole proprietorship, =0 otherwise
Female	Equals1 if owner is female, =0 otherwise
Commitment	The sum of number of hours worked weekly by the owner
Education (in years)	Owner Education level
Work experience (in years)	Work experience of the owner
High-tech	Equals 1 if business is in a high-tech industry, =0 otherwise
Medium-tech	Equals 1 if business is in a medium-tech industry, =0 otherwise
Non-tech	Equals 1 if business is in a non-tech industry, =0 otherwise