

Crossing the Employer Threshold: Determinants of Firms Hiring Their First Employee

by

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Executive Summary

Job creation is paramount to getting back to a full economic recovery, and small businesses have been called upon to create these jobs. One of the major thresholds that small businesses encounter when growing is whether to hire employees. Two datasets, the Kauffman Firm Survey (KFS) and the Growing America through Entrepreneurship (GATE) Project, are used in this study.

From the analysis of longitudinal data from the KFS several interesting patterns emerge regarding the dynamics of non-employer startups hiring their first employee. Many non-employer startups hire their first employee in the first three years of existence. After that period of time and through seven years, only a few additional firms make the switch from non-employer to employer.

The analysis turns to examining the characteristics of owners that predict whether a non-employer business hires an employee within the first seven years of operating. Non-employer startups owned by African-Americans have similar rates of hiring their first employee by each year as do white, non-Hispanic startups. Asian-owned startups have higher rates of hiring their first employee by each of the follow-up years. Hiring rates by each follow-up year are also higher among non-employer startups owned by Hispanics. Related to these racial and ethnic patterns, immigrants have higher rates of hiring their first employee by the first two follow-up years than the native-born, but the rates of hiring employees are similar by the seventh follow-up year. Female-owned startups are roughly 10 percentage points less likely to hire their first employee by the first, second and seventh years after startup.

Using the longitudinal data from the KFS, another important question examined is whether there are milestones that non-employer startups often reach before hiring their first employee. Surprisingly, the evidence does not clearly indicate a strong relationship between the revenues of non-employer firms and the decision to hire their first employee. The estimates for business assets, however, indicate a positive relationship with the annual employment probability. It may be more important for non-employer firms to build up assets to use or borrow against to hire their first employee than to rely on large revenues in the current year. Having intellectual property also has a positive association with making the non-employer to employer transition during the sample period.

Using data from the largest random experiment providing entrepreneurship training in the United States ever conducted, the question of whether entrepreneurship training increases the likelihood that non-employers hire an employee within the next several years is examined. The results are somewhat mixed and inconclusive. On the one hand, the points estimates on the

effects of entrepreneurship training on hiring the first employee by 6, 18 and 60 months are consistently positive, but on the other hand none of these estimates are statistically significant. Furthermore, the estimates do not provide evidence that the probability of hiring an employee or the number of employees increases with entrepreneurship training.

Introduction

Although the official end of the Great Recession was in 2009, the national unemployment rate was 7.4 percent in mid-2013, 3 percentage points higher than pre-recession levels. Job creation is essential for a full economic recovery, and small businesses have been called upon to create these jobs. President Obama has repeatedly mentioned the importance of startups and small businesses in creating jobs for Americans, and has signed laws such as the Small Business Jobs Act of 2010 and the Jumpstart Our Business Startups (JOBS) Act of 2012, which aim to create jobs through promoting small businesses.¹ Empirical evidence supports the arguments indicating that small businesses create a disproportionate share of new jobs in the economy and represent an important source of innovation, increasing national productivity and alleviating poverty (see Reynolds 2005; OECD 2006; U.S. Small Business Administration 2011 for example).² Often overlooked is that self-employed business owners also create jobs for themselves, representing more than 10 percent of total employment in the United States.

One of the major thresholds that small businesses encounter when they grow is whether to hire employees. The step from non-employer to employer entails additional registration and legal requirements; workers compensation and unemployment insurance issues, and the ongoing burden of making payroll. Navigating through filing for an employer identification number, federal wage and tax statement (Form W-2), employee eligibility verification (Form I-9), state new hire reporting program, workers' compensation insurance program, unemployment insurance tax registration program, and disability insurance in some states may be especially daunting to small business owners considering hiring their first employee. But perhaps the most important consideration for the owner is whether current and future revenues are large enough to cover the extra expenses of having employees.

This report examines several questions related to the decision by small business owners to hire their first employee that have not been previously examined in the literature. First, the study will examine the question of what owner characteristics are associated with businesses making the decision to hire their first employee in the first several years of operation. Are female, minority and immigrant owners less likely to cross the employer threshold? Second, business conditions associated with hiring the first employee will be examined. Is there a sales

¹ President Obama signed into law the Small Business Jobs Act in September 2010, which extends SBA-enhanced loan provisions, and provides lending support, tax cuts, and other opportunities for entrepreneurs and small business owners. President Obama also signed the Jumpstart Our Business Startups (JOBS) Act in April 2012 to help small businesses raise money more easily by allowing small companies to register confidentially with the SEC, market their securities online, and attract non-accredited and accredited investors to buy their securities.

² Haltiwanger, Jarmin and Miranda (2010) refine the argument that small businesses create a disproportionate number of jobs by showing that business startups and young businesses are the ones contributing substantially to both gross and net job creation.

milestone that firms often reach before hiring their first employee? Do businesses accrue enough assets before becoming employers? A third question is whether the non-employer firm has intellectual property, such as patents, copyrights and trademarks, associated with hiring the first employee. Finally, can entrepreneurship training help overcome some of the barriers to hiring employees? Entrepreneurship training often specifically teaches self-employed business owners strategies for hiring and managing employees, and provides training on registering for EINs, tax and insurance compliance, and legal issues, but does it increase the likelihood of hiring the first employee?

Several previous studies have examined the impact of small businesses on employment in the United States. Starting with the seminal study by Birch (1979) showing that small businesses were the principal driver of job creation in the U.S. economy and recent refinements of this argument to focus on young and high-impact firms, there has been considerable interest in what types of firms generate jobs. Recent evidence indicates that young and high-impact businesses (defined as having high rates of growth in sales and employment) account for essentially all net jobs in the economy (Haltiwanger, Jarmin and Miranda 2010 and Tracy 2011).

A few recent studies have also examined the relationship between and growth patterns from non-employer and employer businesses. Acs, Headd and Agwara (2009), for example, find that non-employers have a startup rate of 35 percent, which is nearly three times the startup rate of employer firms. Using matched data from the Census Bureau, Davis et al. (2006) find that a significant number of new employer firms start as non-employer firms. The link between non-employer and employer status and how it is related to reaching business milestones and owner characteristics has not been examined in detail.

Another strand of research indicates variation in employment rates and average number of employees by demographic characteristics of the owner. Substantial disparities exist between minority vs. non-minority owned firms and female vs. male owned firms, for example: 13.3 percent of minority-owned firms hire employees compared with 21.6 percent of non-minority owned firms, and 11.7 percent of female-owned business hire employees compared with 23.2 percent of male-owned businesses (U.S. Census Bureau 2013). These findings, however, are for all existing businesses and do not capture the relationship between owner characteristic and the employment decision when that decision is made. The proposed research will contribute to all three of these literatures by providing the first detailed longitudinal study of the owner, business, and training determinants of non-employers hiring their first employee.

The lack of research on this main question is primarily due to data limitations. Very few datasets meet all of the conditions needed to study the determinants of businesses hiring their first employee. Information is needed on the time at which a business hires its first employee, owner and business characteristics, and longitudinal information on business conditions or milestones. All of the information for startups needs to be collected from the inception of the business through the first several years of operations. Focusing on existing firms does not provide information on when the first employee was hired, only includes

surviving firms, and does not include a complete history of employment by startups. Data for examining the question of whether entrepreneurship training can help startups hire their first employee are especially lacking. No previous datasets have information allowing for a credible method of identifying whether entrepreneurship training helps business owners hire their first employee.

Data

Two datasets, the Kauffman Firm Survey (KFS) and the Growing America through Entrepreneurship (GATE) Project, are used in this study. Both of the datasets provide difficult-to-find information on when a non-employer business hires its first employee. These datasets also provide detailed information on the characteristics of the owner and business prior to when the business hires its first employee (instead of less reliable retrospective information). Finally, both datasets provide longitudinal data that follows businesses over several years. The only national representative dataset that provides all of these pieces of information is the KFS. The GATE dataset is the only dataset providing information meeting all of these criteria and providing an experiment in which entrepreneurship training is randomly allocated.

Commonly used household surveys such as the American Community Survey (ACS), the Current Population Survey (CPS), and the Survey of Income and Program Participation (SIPP) do not provide information on the hiring of employees among self-employed business owners. Commonly used business surveys such as the Survey of Business Owners (SBO) and the Survey of Small Business Finances (SSBF) have information on employment, but are cross-sectional datasets making it impossible to identify the time at which a business hires its first employee.³ Administrative data from the Census Bureau such as linked business record data are confidential, require many years to gain access to, and often have very limited or no information on characteristics of the owner. Dun & Bradstreet data have very little information on the owner and have been criticized for not being accurate or up to date (Haggerty et al. 1999). No previous datasets have information allowing for a credible method of identifying whether entrepreneurship training helps business owners hire their first employee.

The Kauffman Firm Survey

The KFS, conducted by the Kauffman Foundation, is a panel study of 4,928 businesses founded in 2004. See Robb et al. (2010) for a detailed description of the KFS. The business startups were surveyed in 2004 (baseline) and annually after that date. The most recent year of available data is the seventh follow-up survey conducted in 2011. These data were released in spring 2013 and are the final wave planned for the KFS. The sampling frame for the KFS is the Dun & Bradstreet database started in 2004. The definition of a startup used in the KFS is whether at least one of several business indicators were present for the first time in 2004. The indicators include payment of unemployment insurance taxes, payment of FICA taxes, presence

³ See Fairlie and Robb (2008) for a comparison of household- vs. business-level surveys.

of a legal status for the business, presence of an employer identification number (EIN), and use of schedule C to report business income. Thus, the KFS definition of a business start is somewhat unique and may include a disproportionate number of more “advanced” startups.

The panel dataset provided in the KFS provides an unprecedented source of data on business startups in their early years of operation.⁴ Detailed information on each firm includes employment, industry, physical location, sales, profits, and business assets at start-up and over time.⁵ The KFS also includes detailed information on intellectual property, such as patents, copyrights, and trademarks. The detailed information on employment and other business activity provided annually in the KFS allows for an examination of the dynamic relationship between these factors and employment among new businesses. Most importantly, it allows for an analysis of business and owner characteristics at the time young businesses hire their first employee.

The KFS also provides detailed information on owner characteristics such as age, gender, race, ethnicity, education, and prior work experience.⁶ This information is useful for identifying the characteristics of owners that hire employees within the first several years of operation. Panel data allow for measurement of these characteristics year by year, and thus immediately prior to when non-employer startups make the decision to hire their first employee.

Robb et al. (2010) provide a detailed comparison of the KFS to several commonly used business-level datasets. These comparisons, however, include the full sample of businesses in the KFS. To examine the representativeness of the KFS sample of non-employer startups used in this study, estimates are compared to estimates from the 2007 Survey of Business Owners microdata for a roughly similar population (defined as all non-employer businesses started in the previous year). Appendix Table 1 reports estimates of the industry distribution from both datasets. For most industries, the KFS and SBO are roughly similar in representation. The main exceptions are that the KFS non-employer startup sample is overrepresented in manufacturing and wholesale trade, and underrepresented in health and educational services compared with the new non-employer sample in the SBO.

⁴ For more information about the KFS survey design and methodology, please see Ballou et al (2008).

⁵ The KFS also includes detailed financing information. These variables, however, are not included in the analysis because of endogeneity concerns. For example, if a firm needs to hire employees prior to production then the only method of doing this is to obtain financing. In this case, however, the financing did not cause the business to hire the employee, but instead the need to hire employees caused the business to find financing. Similar concerns have been noted in the literature examining liquidity constraints for business creation. See Parker (2009), Kerr and Nanda (2011), and Fairlie and Krashinsky (2012) for recent discussions of the literature.

⁶ Owner characteristics are identified for the primary owner of the business. The primary owner of multi-owner businesses is identified by the largest equity share in 2004 with ties being allocated by comparing hours worked and other variables (see Robb et al. 2010). Thanks to Alicia Robb and Joseph Farhat for providing the codes for primary owners.

GATE Experiment

Growing America through Entrepreneurship (Project GATE) is an evaluation designed and implemented by the U.S. Department of Labor and U.S. Small Business Administration. The GATE experiment is the largest-ever randomized evaluation of entrepreneurship training and assistance involving more than 4,000 participants. It differs from earlier large-scale evaluations in the United States because its training was marketed to any individual interested in starting or growing a business, and was not limited to individuals receiving unemployment or welfare benefits. It also involved both individuals who wanted to start a business and individuals who already owned a business, but wanted to grow that business.

GATE was administered between September 2003 and July 2005 in cities of varying sizes: Philadelphia and Pittsburgh, Pa.; Minneapolis/St. Paul, Duluth, and Virginia, Minn.; Portland, Lewiston, and Bangor, Maine (see Bellotti et al. 2006 for more details). Both urban and rural populations were served by the sites. Fourteen different organizations provided the GATE training, including SBA-funded Small Business Development Centers and non-profit community-based organizations. All of the providers and their programs had been operating prior to the experiment, and thus collectively represent the existing market for entrepreneurship training in the United States.

Individuals interested in applying to receive entrepreneurship training through the program had to first attend an orientation meeting at a One-Stop Career Center. Applicants were informed that “GATE does not have space for everyone” and that a “lottery or random drawing will decide whether you will be able to enter the program.” Applicants were then randomly assigned to the treatment or control group with equal probability. The treatment group was offered an array of free services. Program administrators informed the control group that the GATE program did not have the capacity to offer them services, and administrators offered no referrals to other (free) services either.

The array of GATE services offered to the treatment group began with a one-on-one assessment meeting to determine an individual’s specific training needs. Then training was provided by experienced business consultants in classroom and/or one-on-one settings. Classroom offerings targeted a variety of general and specialized topics at different experience levels. Introductory courses cover subjects such as legal structure, business plans, and marketing. Intermediate and advanced courses cover subjects including managing growth, legal risks, and personnel issues. These classes would be especially important for entrepreneurs deciding whether to hire their first employee. The total cost of providing training to GATE recipients was estimated to be \$1,321 per person.

Extensive data were collected on treatment and control group members on the application survey and from three follow-up surveys. Data are available at baseline (prior to entrepreneurship training) and at follow-up waves of 6 months, 18 months and 60 months after baseline. Detailed information on employment, sales, profits and other firm characteristics are available for each time period. Detailed information on owner characteristics such as age, education, gender, race, immigrant status, marital status, children, family income, health,

family business experience, credit history, unemployment insurance receipt, health insurance, and personality traits are also available from the baseline survey. The resulting dataset provides unprecedented longitudinal information on the employment of businesses after the owners of those businesses received training. The impact of entrepreneurship training on when and whether businesses hire their first employee has not been previously examined.

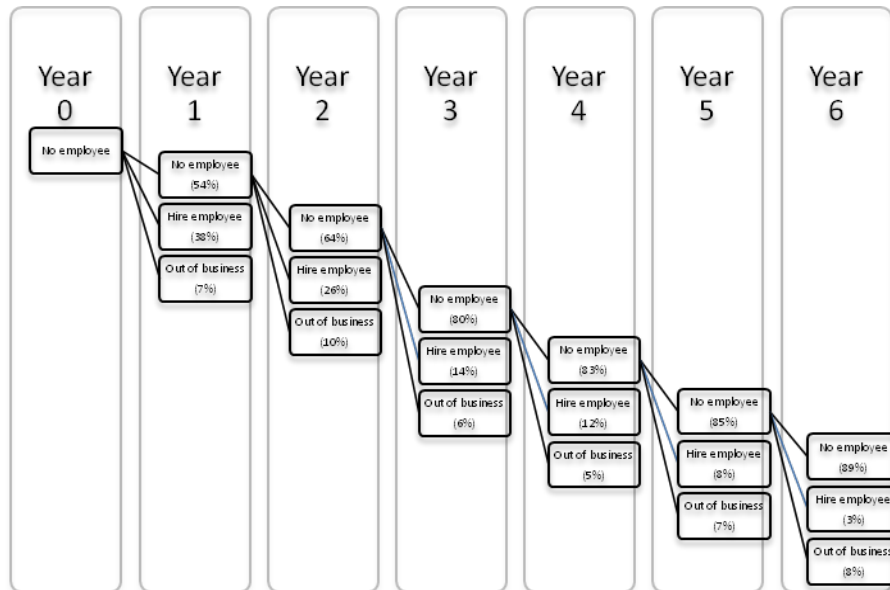
Owner Characteristics and Hiring the First Employee?

This section examines the characteristics of non-employer businesses that lead to hiring their first employee. The focus is on owner characteristics that predict hiring an employee one to seven years after startup, which represents the full sample period of the KFS. As noted above, the KFS is the only large, nationally representative dataset with detailed demographic information on the owners of startups allowing for this type of analysis. The panel of non-employer startups included in the KFS is also important because all firms can be tracked even if they are not successful in the few years after startup. Cross-sectional data based on existing non-employer and employer firms include only surviving firms up to that point in time and all non-surviving firms when they hired their first employee. Also retrospective information on when the first employee was hired instead of contemporaneous information is more subject to the possibility of recall bias.

Figure 1 displays the full sequence of hiring decisions over the first seven years. The KFS includes information through seven years following startup.⁷ Starting with the first year, there were 2,460 non-employer startups in the KFS with complete information on employment decisions that year. Of those non-employer businesses, 38.0 percent hired their first employee and 7.4 percent went out of business that year. Of the 1,197 businesses remaining as non-employers in the KFS in the second year, 26.0 percent hired their first employee and 9.5 percent went out of business in that year. In the following years, the probability of hiring the first employee drops as the remaining sample of non-employer businesses becomes smaller. The percentage of non-employer businesses going out of business each year, however, does not decline. In the sixth year, 2.8 percent of non-employers hire their first employee and 8.3 percent go out of business.

⁷ The reported estimates are only for non-employer startups. Startups with employees represent 40.9 percent of all startups captured in the KFS.

**Figure 1: Rates of Hiring First Employee and Going Out of Business for Non-Employer Startups
Kauffman Firm Survey, 2004-2011**



The full decision tree displayed in Figure 1 indicates the richness of the KFS panel data in terms of analyzing employment outcomes. To examine the factors leading to non-employers hiring their first employee the study focuses on two measures of when businesses hire their first employee.

Table 1 reports the percentage of non-employer startups in the KFS hiring their first employee in each of the follow-up years. This provides detail on when non-employer startups hire their first employee, summarizing the information displayed in Figure 1. For example, it answers the question of what percentage of businesses hire their first employee in the first year after startup vs. the second year. Firms that are known to go out of business before hiring an employee by the reported year are included in the sample, implying that the estimates are not conditional on survival to that year.⁸ Among non-employer startups, 36.6 percent hire their first employee in the first year after startup. 12.6 percent of startups hire their first employee in the second follow-up year, 4.0 percent hire in the third follow-up year, and 3.1 percent hire in the fourth follow-up year. Only a small percentage of non-employer startups hire their first employee in the fifth, sixth or seventh years following startup. A large percentage of non-employer startups (13.3 percent), however, are still in business, but do not hire their first employee by the end of the study period. Finally, 27.9 percent of non-employer startups went out of business over the sample period before ever hiring their first employee.

⁸ Some observations are lost from the original sample of 2,460 non-employer startups displayed in Figure 1 because of incomplete employment information in later years. Those observations cannot be used to identify when a non-employer startup hired its first employee.

Table 1: Hiring Rates of First Employee among Non-Employer Startups
Kauffman Firm Survey (2004-2011)

	Percent	N
Hire first employee at:		
1 year after startup	36.6%	1590
2 years after startup	12.6%	1590
3 years after startup	4.0%	1590
4 years after startup	3.1%	1590
5 years after startup	1.4%	1590
6 years after startup	0.8%	1590
7 years after startup	0.4%	1590
Has not hired employee by end of study period	13.3%	1590
Out of business before hiring employee by end of study period	27.9%	1590

Notes: (1) The sample consists of businesses with no employees at startup in 2004. (2) The sample conditions on non-missing observations for all sample years.

Another method of measuring when non-employer startups make the switch to being an employer firm is to examine the likelihood of hiring the first employee *by* each of the follow-up years. Table 2 reports estimates. Again, firms that are known to go out of business before hiring an employee are included in the sample so the estimates are not conditional on survival. One year after startup, 38.0 percent of non-employers have hired their first employee. By two years after startup the majority of non-employer firms have hired their first employee.⁹ By seven years after startup, 58.8 percent of initial non-employer businesses have hired their first employee. The increase in the likelihood of hiring a first employee rises quickly and then slows down as more businesses have already hired their first employee.

These summary measures of hiring employees in the first several years following startup reveal interesting patterns. Many non-employer startups hire their first employee in the first three years of existence. After that period of time and through seven years, only a few additional firms make the switch from non-employer to employer. Many of these firms may not have the long-term goal of hiring employees.

⁹ The sample size drops for 2 years after startup and each subsequent year because some businesses have missing information on employment in those years. Estimates of hire rates by follow-up year conditioning on only businesses with non-missing observations for all survey years are similar.

Table 2: Hiring Rates of First Employee among Non-Employer Startups
Kauffman Firm Survey (2004-2011)

	Percent	N
Hire first employee by:		
1 year after startup	38.0%	2460
2 years after startup	51.0%	2214
3 years after startup	54.0%	1960
4 years after startup	57.2%	1810
5 years after startup	58.4%	1712
6 years after startup	58.5%	1626
7 years after startup	58.8%	1590

Note: The sample consists of businesses with no employees at startup in 2004.

The analysis turns to examining the characteristics of owners that predict whether a non-employer business hires an employee within the first seven years of operating. Table 3 reports estimates of the percentage of non-employer startups hiring employees by 1, 2 and 7 years after startup for several owner characteristics. One year after startup is chosen because the estimates reported in Table 2 indicate that nearly 40 percent of non-employer startups hire within this time period. The majority of startups hire within the first two years, and seven years represents the full sample period. Non-employer startups owned by African Americans have similar rates of hiring their first employee by each year as do white, non-Hispanic startups. Asian-owned startups have higher rates of hiring their first employee by each of the follow-up years.¹⁰ Hiring rates by each follow-up year are also higher among non-employer startups owned by Hispanics. Related to these racial and ethnic patterns, immigrants have higher rates of hiring their first employee by the first two follow-up years than the native-born, but the rates of hiring employees are similar by the seventh follow-up year.

Non-employer startups owned by men and women differ substantially in their rate of hiring first employees by each of the reported follow-up years. Female-owned startups are roughly 10 percentage points less likely to hire their first employee by the first, second and seventh years after startup.

Owner's education is correlated with the likelihood of hiring employees in the first several years of the business. Higher levels of education are associated with a higher percentage of non-employer startups hiring their first employee by the first, second and seventh follow-up

¹⁰ Races in this survey are white, African American, Asian, and "other race," a residual category. Hispanic is an ethnic category that includes all races.

Table 3: Owner Characteristics and Hiring Rates of First Employee among Non-Employer Startups
Kauffman Firm Survey (2004-2011)

Owner Characteristic	Hire First Employee by 1 Year after Startup		Hire First Employee by 2 Years after Startup		Hire First Employee by 7 Years after Startup	
	Percent	N	Percent	N	Percent	N
Total	38.0%	2460	51.0%	2214	58.8%	1590
White, non-Hispanic	36.3%	2010	48.9%	1823	57.9%	1326
African-American	38.8%	197	49.9%	169	58.5%	110
Asian-American	53.7%	81	68.9%	70	70.2%	51
Other race	51.3%	131	65.6%	114	67.0%	77
Hispanic	48.1%	118	64.5%	104	67.0%	68
Native born	37.4%	2220	50.3%	2005	58.8%	1452
Immigrant	44.8%	235	58.3%	204	58.6%	136
Male	41.0%	1762	54.5%	1592	62.2%	1140
Female	31.9%	696	43.9%	620	51.8%	449
High school or less	35.7%	309	48.9%	271	58.5%	182
Some college	36.7%	898	49.9%	796	55.1%	553
College graduate	40.0%	1243	52.7%	1137	62.2%	848
Industry work experience < 10 years	35.2%	1283	47.2%	1133	54.5%	813
Industry work experience \geq 10 years	41.7%	1171	56.2%	1075	64.6%	773

Note: The sample consists of businesses with no employees at startup in 2004.

years. Prior industry work experience is also associated with a higher likelihood of hiring the first employee by each of the follow-up years.

Many of these owner characteristics are correlated with other characteristics, limiting the ability to identify whether the relationship between the owner characteristic and hiring the first employee is due to the characteristic or another one that is correlated with it. Important characteristics of the business, such as industry, may also be correlated with owner characteristics.

A multivariate regression is used to estimate the separate and independent contributions from each owner and business characteristic to the probability that non-employer startups hire their first employee by the first, second and seventh follow-up years. Table 4 reports estimates, note that the non-Hispanic white is the left out category. Non-employer businesses owned by Asians, other race, and Hispanics have higher probabilities of hiring first employees than both non-Hispanic, white-owned businesses and African-American-owned businesses, all else equal. Female-owned non-employer firms have lower annual probabilities of hiring their first employee than male-owned firms.

Table 4: Regressions for Probability of Hiring First Employee
Non-employer Startups - Kauffman Firm Survey (2004-2011)

Explanatory Variables	By 1 Year after Startup (1)		By 2 Years after Startup (2)		By 7 Years after Startup (3)	
African-American	0.00838 (0.04258)		-0.00565 (0.04910)		0.05406 (0.06387)	
Asian-American	0.17478 (0.06897)	**	0.23409 (0.07674)	***	0.17472 (0.07932)	**
Other race	0.12570 (0.05140)	**	0.13483 (0.05403)	**	0.15197 (0.06377)	**
Hispanic	0.07071 (0.05468)		0.13196 (0.06050)	**	0.12730 (0.07875)	
Immigrant	-0.01565 (0.04415)		-0.02637 (0.05123)		-0.06087 (0.06658)	
Female	-0.08755 (0.02474)	***	-0.09266 (0.02898)	***	-0.03513 (0.03788)	
Some college	0.01975 (0.03478)		0.01476 (0.04234)		-0.09452 (0.05039)	*
College graduate	0.04388 (0.03527)		0.02914 (0.04271)		-0.08744 (0.04743)	*
Industry work exp. > 10 years	0.03302 (0.02298)		0.05531 (0.02609)	**	0.02439 (0.03433)	
Other industry	-0.01589 (0.09890)		-0.08660 (0.10919)		-0.24204 (0.16904)	
Construction	0.07575 (0.04964)		0.04544 (0.05699)		0.09997 (0.07534)	
Manufacturing	0.14575 (0.05570)	***	0.12237 (0.06538)	*	0.09981 (0.08850)	
Wholesale trade	0.25716 (0.06048)	***	0.17615 (0.06953)	**	0.21710 (0.08295)	***
Retail trade	0.08518 (0.04684)	*	0.05171 (0.05404)		0.07725 (0.07745)	
Transportation and warehousing	0.12147 (0.07555)		0.19142 (0.08966)	**	0.21907 (0.09122)	**
Information	-0.03328 (0.06582)		-0.01662 (0.07588)		-0.06866 (0.10955)	
Finance, insurance and real estate	-0.05926 (0.04934)		-0.08031 (0.05928)		-0.04966 (0.08550)	
Professional services	0.12143 (0.04231)	***	0.06974 (0.04889)		0.12723 (0.06607)	*
Management	0.07932 (0.04891)		0.12508 (0.05734)	**	0.14899 (0.07638)	*
Health and educational services	0.08719 (0.07186)		0.05560 (0.08357)		0.15946 (0.11404)	
Entertainment, accommodation and food services	0.01381 (0.06352)		0.01163 (0.08011)		-0.04673 (0.11191)	
Sample size	2419		1982		931	

Notes: (1) The sample consists of businesses with no employees at startup in 2004. (2) Regional controls are included in all specifications. (3) *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

The positive relationship between owner's education and the likelihood of hiring the first employee at each follow-up year noted above does not survive after controlling for other owner characteristics and the industry of the firm. Among non-employer startups it does not appear that the owner's education has a strong predictive power on whether the first employee is hired in the first several years of operation. Having more industry work experience before startup also has a weaker relationship with hiring an employee in the first several years of operation. Although human capital, such as owner's education and prior industry work experience, has been identified as an important determinant of business success in previous research, it appears to be less important in determining which non-employer startups hire their first employee in the first several years of operation.

Industry differences are important in determining which non-employer startups are likely to hire employees.¹¹ Non-employer startups in wholesale trade have the highest rate of hiring employees, followed by the transportation, manufacturing and professional industries. In these industries, hiring employees may be important for capturing returns-to-scale for growth of businesses.

Legal Form of Organization

The KFS also includes information on the legal form of organization of the business. Does the legal form of organization affect the probability of hiring an employee among non-employer startups? This question is examined by estimating the same set of regressions including dummy variables for the legal form of organization. Dummy variables are included for incorporated businesses (58.6 percent) and partnerships (5.5 percent). Estimates are reported in Table 5. Non-employer startups that are incorporated are more likely to hire their first employee by each of the reported follow-up years relative to non-employer startups that are sole proprietorships. The evidence is less clear for partnerships. The interpretation of these results is difficult because decisions about employment might cause businesses to choose their legal status. For example, a non-employer startup that plans on hiring employees in the first few years might choose to become incorporated because of the employment decision. Additionally, a relatively small percentage of firms change legal form status, suggesting that becoming incorporated is not a potentially important milestone such as revenues or assets (Cole 2011).

¹¹ Hiring rates by industry are reported in Appendix Table 2.

Table 5: Regressions for Probability of Hiring First Employee including Legal Form of Organization

Non-employer Startups - Kauffman Firm Survey (2004-2011)

Explanatory Variables	By 1 Year after Startup (1)		By 2 Years after Startup (2)		By 7 Years after Startup (3)	
African-American	0.01034 (0.04274)		-0.00366 (0.04959)		0.06132 (0.06620)	
Asian-American	0.17392 (0.06891)	**	0.24039 (0.07826)	***	0.17309 (0.08546)	**
Other race	0.12539 (0.05111)	**	0.13259 (0.05337)	**	0.14550 (0.06643)	**
Hispanic	0.07476 (0.05448)		0.13187 (0.06014)	**	0.12716 (0.08069)	
Immigrant	-0.02032 (0.04395)		-0.02839 (0.05112)		-0.06111 (0.07029)	
Female	-0.08134 (0.02475)	***	-0.08636 (0.02905)	***	-0.02430 (0.03783)	
Some college	0.01558 (0.03457)		0.00931 (0.04232)		-0.10647 (0.05096)	**
College graduate	0.03296 (0.03528)		0.01626 (0.04299)		-0.11064 (0.04882)	**
Industry work exp. > 10 years	0.03072 (0.02293)		0.05432 (0.02607)	**	0.02239 (0.03439)	
Other industry	-0.03129 (0.09977)		-0.10504 (0.10849)		-0.26844 (0.16663)	
Construction	0.06745 (0.04986)		0.03233 (0.05691)		0.08164 (0.07519)	
Manufacturing	0.13623 (0.05522)	**	0.11074 (0.06557)	*	0.08227 (0.08912)	
Wholesale trade	0.24504 (0.06022)	***	0.15788 (0.06968)	**	0.18410 (0.08441)	**
Retail trade	0.07800 (0.04683)	*	0.03926 (0.05429)		0.06719 (0.07661)	
Transportation and warehousing	0.10656 (0.07640)		0.17467 (0.08910)	**	0.19072 (0.09246)	**
Information	-0.03497 (0.06661)		-0.02492 (0.07559)		-0.05656 (0.10771)	
Finance, insurance and real estate	-0.08099 (0.05049)		-0.09314 (0.05941)		-0.07188 (0.08645)	
Professional services	0.11198 (0.04241)	***	0.05687 (0.04913)		0.10927 (0.06635)	*
Management	0.07356 (0.04866)		0.11384 (0.05771)	**	0.13076 (0.07668)	*
Health and educational services	0.08124 (0.07128)		0.03695 (0.08375)		0.14838 (0.11582)	
Entertainment, accommodation and food services	0.00350 (0.06360)		0.00017 (0.08032)		-0.04575 (0.11238)	
Incorporated	0.06045 (0.02612)	**	0.04264 (0.02934)		0.08700 (0.03799)	**
Partnership	0.04194 (0.05408)		-0.08990 (0.06198)		-0.05928 (0.10680)	
Mean of Dep. Variable	0.37991		0.56187		0.73760	
Sample size	2419		1982		931	

Notes: (1) The sample consists of businesses with no employees at startup in 2004. (2) Regional controls are included in all specifications. (3) *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Business Milestones Associated with Taking the Leap from Owner to Employer

Another important question is whether there are milestones that non-employer startups often reach before hiring their first employee. For example, non-employer firms might often wait until they have large enough annual revenues to take on the extra expenses of hiring employees. Do startups also build up assets before hiring their first employee?

The examination of these questions requires longitudinal data on startups with measures of both employment and milestone variables year by year instead of a single point in time. By combining follow-up years to create longitudinal data it is possible to measure the annual probability that non-employer firms hire their first employee over the entire sample period. It is also possible to measure levels of revenues and business assets of non-employer firms prior to the timing of the employment decision. Table 6 reports an estimate of the annual probability of hiring the first employee among non-employer firms. Overall, the annual rate at which non-employer businesses hire an employee by the following year is 23.4 percent.

Estimates of annual hire rates are also reported by revenue class in Table 6. Perhaps surprisingly, the likelihood of hiring the first employee is not strongly related to total business revenues. The probability of hiring an employee actually decreases from 26.7 percent for non-employer firms with \$0 in annual revenues to 18.6 percent for non-employer firms with \$1-\$10,000 in annual revenues. The likelihood of becoming an employer firm remains steady as revenues increase until the \$100,001 or more level. For revenues of \$100,001 or more, the probability of hiring the first employee in the next year increases from 21.4 percent for non-employers with revenues of \$25,001-\$100,000 to 30.4 percent.¹² Even this change is not large considering the potential importance of higher revenues to offset the increased costs of hiring employees.

Table 6 also reports estimates by business asset levels. Assets include cash, accounts receivable, equipment, machinery, product inventory, and vehicles. Non-employer startups may wait until their business assets hit a certain level to offer financing or collateral for raising money to hire employees. Similar to revenue levels, however, there is no clear evidence that the probability of a non-employer firm hiring its first employee over the following year increases substantially with business asset levels. The probability that a non-employer business with \$0 in total business assets hires its first employee over the following year is 22.0 percent. For non-employers with \$100,001 or more in total business assets the probability is not much higher at 24.2 percent. Non-employers with \$25,001-\$100,000 in total business assets have a probability of 28.2 percent.

¹² Only categorical information on revenues is available in the KFS.

Table 6: Annual Rates of Hiring First Employee
 Non-Employer Panel Data - Kauffman Firm Survey (2004-2011)

Milestone	Hire First Employee	
	Percent	N
All Non-Employer Observations	23.4%	6092
Total Revenues (Annual)		
Zero	26.7%	1750
\$1-10,000	18.6%	1313
\$10,000-25,000	19.8%	710
\$25,000-100,000	21.4%	1369
\$100,000 or more	30.4%	777
Total Business Assets		
Zero	22.0%	667
\$1-10,000	19.7%	2130
\$10,000-25,000	24.6%	1013
\$25,000-100,000	28.2%	1342
\$100,000 or more	24.2%	920
Patents		
No	23.3%	5867
Yes	31.9%	168
Copyrights		
No	23.2%	5447
Yes	28.1%	535
Trademarks		
No	22.4%	5382
Yes	35.6%	586
Any intellectual property		
No	22.4%	4951
Yes	31.2%	940

Note: The sample consists of all non-employer observations over sample period, 2004 to 2011.

Both business revenues and assets measure the current resources of the firm, but future potential resources of the firm may be the most important in making the decision to become an employer firm. In particular, a milestone for many non-employer startups might be when they obtain intellectual property, such as a patent, trademark or copyright. Patents, trademarks and copyrights might be useful for non-employer firms considering hiring employees because they provide a potential source of future revenues even if the firm is experiencing low current revenues. For non-employer firms with patents, the probability of hiring the first employee

increases from 23.3 percent to 31.9 percent (see Table 6). Obtaining copyrights and trademarks is also associated with an increase in the likelihood of becoming an employer firm: for copyrights the increase is roughly 5 percentage points; for trademarks, 13 percentage points. Combining all types of measurable intellectual property, the estimates indicate that having at least one type is associated with roughly a 9 percentage point higher rate of hiring the first employee.

To identify the independent associations between these milestones and the decision to hire the first employee, the analysis turns to estimating a multivariate regression. Table 7 reports estimates. The observational unit in the regressions is the business year, and only startups that have not previously hired an employee are included in the sample. Specification 1 focuses on the independent effects of owner characteristics and industries on the annual probability of hiring the first employee. The estimates reveal similar patterns as those for the regressions predicting hiring the first employee by 1, 2 and 7 years following startup. Asians, other race and Latino non-employers have higher rates of making the transition to an employer firm than do non-Hispanic, white and black non-employers. Female-owned businesses have a lower annual probability of hiring the first employee over the sample period than male-owned businesses. Finally, owners with more prior work experience have a higher annual probability of hiring the first employee.

Specification 2 adds the milestone variables reported in Table 7 to the regression specification. In addition to these milestone variables, the regression includes all of the previous owner characteristics, industry, and regional controls. After controlling for other factors, there does not appear to be a strong, clear relationship between revenues and the probability of hiring the first employee. Most of the coefficients on revenue levels are negative, indicating that non-employer businesses with zero revenues have relatively high probabilities of hiring their first employee in the sample period (the left out or comparison category is zero revenues). There is some evidence, however, that the largest revenue class has a higher probability of hiring the first employee than the previous revenue classes, indicating a somewhat U-shaped relationship.

The estimates for business assets, however, indicate a positive relationship with the annual employment probability. An increase in the probability of hiring the first employee occurs when firms have business assets of \$10,001 to \$25,000. After that level there is no further increase, but firms with at least \$10,001 in business assets have a 6-9 percentage point higher probability of hiring the first employee over the sample period, all else equal.

Having intellectual property also has a positive association with making the non-employer to employer transition during the sample period. Intellectual property, which includes patents, copyrights and trademarks, is associated with a 7 percentage point increase in the annual probability of hiring the first employee.

Table 7: Regressions for Annual Probability of Hiring First Employee
Non-Employer Panel Data - Kauffman Firm Survey (2004-2011)

Explanatory Variables	In Following Year (1)		In Following Year (2)		In Following Year (3)		In Following Year (4)	
African-American	0.01613 (0.03221)		0.00594 (0.03209)		-0.00150 (0.03203)		0.02098 (0.03240)	
Asian-American	0.15645 (0.06803)	**	0.18576 (0.06900)	***	0.18753 (0.06930)	***	0.18813 (0.06850)	***
Other race	0.13127 (0.04513)	***	0.11198 (0.04809)	**	0.11485 (0.04732)	**	0.11975 (0.04635)	***
Hispanic	0.11114 (0.05336)	**	0.11271 (0.05503)	**	0.11263 (0.05445)	**	0.11206 (0.05411)	**
Immigrant	0.01809 (0.03663)		0.01743 (0.03877)		0.01828 (0.03855)		0.01720 (0.03756)	
Female	-0.05342 (0.01666)	***	-0.04123 (0.01704)	**	-0.04524 (0.01705)	***	-0.04228 (0.01688)	**
Some college	-0.01868 (0.02579)		-0.01937 (0.02582)		-0.02212 (0.02595)		-0.02015 (0.02579)	
College graduate	0.00106 (0.02580)		-0.00504 (0.02597)		-0.00745 (0.02617)		-0.00045 (0.02596)	
Industry work exp. > 10 years	0.03943 (0.01634)	**	0.03625 (0.01665)	**	0.03511 (0.01668)	**	0.03836 (0.01652)	**
Revenues: \$1-\$10,000			-0.06380 (0.02028)	***	-0.06557 (0.02002)	***		
Revenues: \$10,001-\$25,000			-0.07024 (0.02321)	***	-0.06052 (0.02308)	***		
Revenues: \$25,001-\$100,000			-0.06149 (0.01969)	***	-0.04157 (0.01929)	**		
Revenues: \$100,000 or more			-0.00204 (0.02860)		0.02897 (0.02765)			
Business assets: \$1-\$10,000			0.02041 (0.02323)				-0.00814 (0.02279)	
Business assets: \$10,001-\$25,000			0.06255 (0.02760)	**			0.03479 (0.02700)	
Business assets: \$25,001-\$100,000			0.08812 (0.02681)	***			0.06469 (0.02603)	**
Business assets: \$100,000 or more			0.07367 (0.02903)	**			0.05923 (0.02818)	**
Intellectual property			0.07379 (0.02321)	***	0.07598 (0.02321)	***	0.07995 (0.02333)	***
Mean of Dep. Variable	0.23364		0.23531		0.23526		0.23538	
Sample size	5793		5452		5455		5593	

Notes: (1) The sample consists of all non-employer observations over sample period, 2004 to 2011. The unit observation is a business-year. (2) Industry and regional controls are included in all specifications. (3) *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Although not reported, regression specifications are estimated that include all three types separately. Including all three types of intellectual property separately in the regression, estimates indicate that the strongest relationship is between trademarks and the annual probability of hiring the first employee.

Revenues and business assets are positively correlated, which might weaken their estimated relationships with the employment probability. Specifications 3 and 4 include revenues and assets alone with the other controls, respectively. The estimates confirm the conclusion from the previous regressions – business assets have a positive association with the probability of hiring the first employee, but revenues do not have a clear relationship. It may be more important for non-employer firms to build up assets to use or borrow against to hire their first employee than to rely on large revenues in the current year.

Although all of these milestones are measured when the business has no current employees, there remains the concern that the estimated effects are not causal. This is an important concern with the regression results. The positive relationship between business assets and hiring the first employee might simply represent the unobserved growth plan of the business and not that higher assets *cause* non-employer firms to take the leap to being an employer firm. The same concern arises for intellectual property. Although it is measured for the business prior to hiring their first employee, estimates of the relationship might capture other unobserved factors. The finding that revenues do not have a clear positive relationship with the annual employment probability is less a concern, however, because the likely bias is towards finding a positive relationship. Although these results might not provide definitive estimates on the causal effects of reaching milestones on hiring the first employee, they provide suggestive evidence. Theoretically, one might expect there to be causal effects and these effects are likely partly responsible for the positive estimates found here.

Businesses with Positive Revenues

There is often concern that the behavior of businesses that have no revenues might differ substantially from businesses with positive revenues. To examine this potential concern, Table 8 reports estimates of the same set of regressions excluding all business observations with zero revenues. Including only positive revenue non-employer startup observations reduces the sample size by roughly one-third. The estimates for the owner characteristics, such as Asian, Hispanic, female and industry work experience are similar. The estimates for intellectual property are also generally similar.

Table 8: Regressions for Annual Probability of Hiring First Employee including only Businesses with Revenues
Non-Employer Panel Data - Kauffman Firm Survey (2004-2011)

Explanatory Variables	In Following Year (1)	In Following Year (2)	In Following Year (3)	In Following Year (4)
African-American	-0.01531 (0.04044)	-0.00914 (0.04102)	-0.01404 (0.04053)	-0.01261 (0.04100)
Asian-American	0.11369 (0.08564)	0.15396 (0.08592)	* 0.15597 (0.08580)	* 0.14705 (0.08621)
Other race	0.18526 (0.06469)	*** 0.16512 (0.06775)	** 0.17400 (0.06640)	*** 0.16612 (0.06668)
Hispanic	0.10238 (0.07062)	0.11102 (0.07244)	0.10927 (0.07141)	0.10679 (0.07167)
Immigrant	0.03152 (0.04573)	0.02764 (0.04796)	0.02850 (0.04809)	0.02991 (0.04655)
Female	-0.06438 (0.01902)	*** -0.05118 (0.01932)	*** -0.05417 (0.01944)	*** -0.05362 (0.01927)
Some college	0.01075 (0.02860)	0.01347 (0.02840)	0.00966 (0.02860)	0.01468 (0.02854)
College graduate	0.01511 (0.02892)	0.01293 (0.02879)	0.00918 (0.02913)	0.01567 (0.02894)
Industry work exp. > 10 years	0.04201 (0.01849)	** 0.03649 (0.01879)	* 0.03503 (0.01882)	* 0.03934 (0.01868)
Revenues: \$1-\$10,000				
Revenues: \$10,001-\$25,000		-0.01267 (0.02307)	0.00080 (0.02291)	
Revenues: \$25,001-\$100,000		-0.00588 (0.02222)	0.01882 (0.02102)	
Revenues: \$100,000 or more		0.05509 (0.03084)	* 0.09175 (0.02883)	***
Business assets: \$1-\$10,000		0.07753 (0.02664)	***	0.07404 (0.02680)
Business assets: \$10,001-\$25,000		0.11764 (0.03108)	***	0.11617 (0.03095)
Business assets: \$25,001-\$100,000		0.14693 (0.03040)	***	0.15522 (0.03020)
Business assets: \$100,000 or more		0.13240 (0.03440)	***	0.14923 (0.03370)
Intellectual property		0.05170 (0.02577)	** 0.05662 (0.02590)	** 0.05426 (0.02573)
Mean of Dep. Variable	0.21876	0.22045	0.22042	0.22045
Sample size	3975	3841	3842	3841

Notes: (1) The sample consists of all non-employer observations with non-zero revenues over sample period, 2004 to 2011. The unit observation is a business-year. (2) Industry and regional controls are included in all specifications. (3) *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

The estimates for revenues and business assets reveal some interesting patterns. First, there is some evidence of a positive relationship for the largest revenue class relative to the \$1-10,000 revenue class. This finding is similar to previous findings, but highlighted somewhat by the change in the reference from the \$0 revenue class in Table 7 to the \$1-10,000 revenue class in Table 8.¹³ There is no evidence of a positive relationship across the other revenue classes. Second, the estimates indicate a stronger positive relationship between business assets and hiring first employees. The removal of zero revenue observations has increased all of the coefficient estimates. Finally, similar to previous findings, estimates of the relationship between business assets and hiring probabilities are not sensitive to the inclusion or exclusion of the revenue variables. Overall, the results excluding zero-revenue observations do not change the general conclusions.

Services and Other Industries

The relationships between revenues and business assets might differ across industries. The KFS sample is not large enough to run separate analyses by detailed industry, but it is large enough to run separate regressions for broad industry groupings. Table 9 reports estimates for regressions including only non-employer startups in the services industry (where many startups are found). Table 10 reports estimates for regressions including only non-employer startups in the construction, manufacturing, trade, and other industries. In the services industries, the relationship between sales and hiring is not clear. The relationship between business assets and hiring is also not clear, although there are some positive coefficients relative to the lowest level. Only a few of the coefficient estimates are statistically significant, which is in part due to smaller sample sizes.

In the regressions that include the construction, manufacturing, trade and other industries, the positive relationship between business assets and hiring probabilities is clear. Hiring increases generally with each level of business assets. The relationship with revenues is less clear, with hiring first decreasing with higher sales and then increasing for these industries. The separate industry analyses, in general, do not reveal different patterns for the revenues and business asset results than for the main results.

Estimates for the other variables indicate that intellectual property has a similar association with hiring in the two broad industry groups. The industry groups also have similar demographic characteristics predicting which non-employer startups hire. Although it would be useful to conduct separate analyses with more detailed industries, the results for these broad groupings do not indicate substantially different results and the sample sizes are not large enough in the KFS to investigate the question further.

¹³ The change in left-out category from Table 7 to Table 8 essentially removes the left part of the U-shaped relationship.

Table 9: Regressions for Annual Probability of Hiring First Employee in Services Industries
Non-Employer Panel Data - Kauffman Firm Survey (2004-2011)

Explanatory Variables	In Following Year (1)	In Following Year (2)	In Following Year (3)	In Following Year (4)
African-American	0.03894 (0.03626)	0.02898 (0.03571)	0.02396 (0.03557)	0.03741 (0.03616)
Asian-American	0.14699 * (0.08018)	0.17646 ** (0.07971)	0.17721 ** (0.08102)	0.17809 ** (0.07991)
Other race	0.07472 (0.04577)	0.05551 (0.04954)	0.05774 (0.04868)	0.06479 (0.04682)
Hispanic	0.16409 *** (0.05809)	0.17559 *** (0.06069)	0.17230 *** (0.06017)	0.16894 *** (0.05917)
Immigrant	0.00959 (0.04238)	0.01106 (0.04526)	0.01203 (0.04542)	0.00309 (0.04319)
Female	-0.06331 *** (0.01890)	-0.05483 *** (0.01918)	-0.05621 *** (0.01930)	-0.05773 *** (0.01906)
Some college	0.00085 (0.03252)	-0.00500 (0.03339)	-0.00987 (0.03360)	-0.00010 (0.03275)
College graduate	-0.00602 (0.03199)	-0.01526 (0.03296)	-0.01974 (0.03325)	-0.00837 (0.03234)
Industry work exp. > 10 years	0.03300 * (0.01880)	0.02418 (0.01911)	0.02488 (0.01916)	0.02854 (0.01900)
Revenues: \$1-\$10,000		-0.03554 (0.02421)	-0.03275 (0.02406)	
Revenues: \$10,001-\$25,000		-0.01943 (0.02797)	-0.00957 (0.02783)	
Revenues: \$25,001-\$100,000		-0.05796 *** (0.02247)	-0.04213 * (0.02206)	
Revenues: \$100,000 or more		0.04599 (0.03468)	0.05773 * (0.03438)	
Business assets: \$1-\$10,000		0.02405 (0.02680)		0.01376 (0.02571)
Business assets: \$10,001-\$25,000		0.09125 *** (0.03235)		0.07803 ** (0.03144)
Business assets: \$25,001-\$100,000		0.05284 * (0.03121)		0.04867 (0.02992)
Business assets: \$100,000 or more		0.03040 (0.03268)		0.03725 (0.03202)
Intellectual property		0.05320 ** (0.02617)	0.05464 ** (0.02620)	0.05574 ** (0.02612)
Mean of Dep. Variable	0.21624	0.21826	0.21818	0.21736
Sample size	3716	3497	3499	3587

Notes: (1) The sample consists of all non-employer observations in the services industries over sample period, 2004 to 2011. The unit observation is a business-year. (2) Industry and regional controls are included in all specifications. (3) *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 10: Regressions for Annual Probability of Hiring First Employee in Construction, Trade, Manufacturing, and Other Industries
Non-Employer Panel Data - Kauffman Firm Survey (2004-2011)

Explanatory Variables	In Following Year (1)	In Following Year (2)	In Following Year (3)	In Following Year (4)
African-American	-0.03484 (0.05637)	-0.04780 (0.05927)	-0.05602 (0.05912)	-0.02316 (0.05934)
Asian-American	0.19793 * (0.11080)	0.25723 *** (0.09885)	0.25749 ** (0.10667)	0.24691 ** (0.10188)
Other race	0.23075 *** (0.08747)	0.19378 ** (0.09173)	0.21335 ** (0.08937)	0.20403 ** (0.08994)
Hispanic	0.03478 (0.08394)	0.03300 (0.07932)	0.03479 (0.08121)	0.03585 (0.08065)
Immigrant	0.02244 (0.06389)	0.01363 (0.06578)	0.01496 (0.06441)	0.02534 (0.06662)
Female	-0.02926 (0.03135)	0.00097 (0.03182)	-0.01004 (0.03204)	-0.00195 (0.03122)
Some college	-0.03824 (0.03881)	-0.02776 (0.03749)	-0.03390 (0.03778)	-0.03336 (0.03774)
College graduate	0.03947 (0.04166)	0.03275 (0.04101)	0.03417 (0.04134)	0.03898 (0.04129)
Industry work exp. > 10 years	0.06054 ** (0.02998)	0.07212 ** (0.03050)	0.06709 ** (0.03023)	0.07133 ** (0.03019)
Revenues: \$1-\$10,000		-0.11233 *** (0.03512)	-0.12286 *** (0.03478)	
Revenues: \$10,001-\$25,000		-0.16260 *** (0.03960)	-0.16098 *** (0.03915)	
Revenues: \$25,001-\$100,000		-0.06566 * (0.03636)	-0.03727 (0.03526)	
Revenues: \$100,000 or more		-0.06664 (0.04792)	-0.00680 (0.04435)	
Business assets: \$1-\$10,000		0.00669 (0.04470)		-0.05468 (0.04473)
Business assets: \$10,001-\$25,000		0.02643 (0.05019)		-0.03355 (0.04936)
Business assets: \$25,001-\$100,000		0.12735 ** (0.04961)		0.06840 (0.04809)
Business assets: \$100,000 or more		0.13181 ** (0.05703)		0.07935 (0.05426)
Intellectual property		0.09773 ** (0.04302)	0.10088 ** (0.04369)	0.11985 *** (0.04356)
Mean of Dep. Variable	0.26185	0.26283	0.26282	0.26441
Sample size	2077	1955	1956	2006

Notes: (1) The sample consists of all non-employer observations in the construction, manufacturing, trade, and other industries over sample period, 2004 to 2011. The unit observation is a business-year. (2) Industry and regional controls are included in all specifications. (3) *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Does Entrepreneurship Training Help Owners Hire Their First Employee?

Can entrepreneurship training help overcome some of the barriers to hiring employees? Entrepreneurship training often specifically teaches self-employed business owners strategies for hiring and managing employees, and provides training on registering for EINs, tax and insurance compliance, and legal issues, but does it increase the likelihood of hiring the first employee? Data from the largest random experiment providing entrepreneurship training—the GATE experiment—are used to examine this question.

In the experiment, 4,197 individuals completed the application process and were randomly assigned to the treatment (N=2,094) or control (N=2,103) group. Among participants, 19 percent were self-employed business owners at the time of application (N=774), and 44 percent of the businesses owned reported not ever having employees (N=343). For this study, the focus is on these non-employer business owners participating in the experiment. Previous research on the full sample of participants generally finds small or no effects of entrepreneurship training on outcomes (Benus et al. 2009; Fairlie, Karlan and Zinman 2012), but these studies do not estimate the effects of entrepreneurship training on hiring the first employee among the group of non-employer business owners participating in the experiment. This analysis provides the first evidence in the literature on this question.

The training and providers in the GATE experiment are representative of the current market for entrepreneurship training. As noted above, GATE training was provided by 14 different SBDCs and CBOS, which are the primary providers of subsidized self-employment training in the United States. These providers and their programs existed prior to the experiment, and the sites participating in GATE are located across rural and urban areas and 3 states.

Table 11 starts by comparing mean baseline characteristics across the treatment and control groups to check the randomization. If a comparison of these means of characteristics reveals differences between the two groups then it is possible that the randomization did not create similar groups prior to providing free entrepreneurship training to the treatment group. The groups appear to be similar. Among the numerous baseline characteristics measured in the application, only one, age, is statistically different between treatment and control. One would expect to find one or two significant differences by chance, and the magnitude of the age difference is small (< 1 year). In any case, in the estimates of treatment effects, results are presented both without controls and with controls for a large set of detailed baseline characteristics.

Table 11: Treatment/Control Comparison of Baseline Characteristics for GATE Experiment

	Treatment Group	Control Group	P-Value for Treatment Control
	(1)	(2)	(3)
Philadelphia	19.0%	16.0%	0.47
Pittsburgh	10.3%	14.8%	0.22
Minneapolis-St. Paul	52.3%	49.1%	0.56
Duluth	3.5%	5.3%	0.40
Maine	14.9%	14.8%	0.97
Female	46.0%	45.0%	0.85
Black	25.3%	23.8%	0.75
Latino	8.6%	4.8%	0.15
Asian	2.9%	4.2%	0.52
Other	6.9%	8.3%	0.62
Not U.S. born	9.2%	9.5%	0.93
Age	44.19	43.70	0.66
Married	46.6%	55.1%	0.12
Has children	46.0%	47.3%	0.80
Highest grade completed	15.07	15.21	0.56
HH Income \$25,000-49,999	28.3%	29.2%	0.86
HH Income \$50,000-74,999	19.7%	20.8%	0.79
HH Income \$75,000-99,999	5.2%	5.4%	0.95
HH Income \$100,000+	5.2%	6.6%	0.60
Has a health problem	7.5%	5.9%	0.57
Has relatives or friends who have been previously S.E.	75.3%	74.6%	0.88
Ever worked for relatives or friends who are S.E.	30.5%	26.6%	0.43
Has a bad credit history	41.4%	37.3%	0.44
Currently receiving UI benefits	31.6%	25.6%	0.22
Sample Size	174	169	

Notes: (1) All reported characteristics are measured at time of application, prior to random assignment. (2) Sample includes only non-employer business owners at time of application.

With any random experiment, the control group cannot be restricted from obtaining training elsewhere. They cannot receive free services through the GATE program, but they can seek assistance through the existing market for training services. Given this limitation with an experiment, it is important to examine whether and how the GATE treatment actually changed the use of training services. Table 12 reports the percentage of participants receiving entrepreneurship training and the mean hours of training separately for the two main types of training: classroom, workshops and seminars, and one-on-one counseling or technical assistance. The treatment group was an estimated 32 percentage points more likely to receive

Table 12: Treatment and Control Groups Receipt of Entrepreneurship Training

	R.A. to Wave 1 (6 month period)		Wave 1 to Wave 2 (12 month period)		Year Prior to Wave 3 (12 month period)		Cumulative to Wave 2		Cumulative to Wave 3	
	Percent Receiving	Mean Hours	Percent Receiving	Mean Hours	Percent Receiving	Mean Hours	Percent Receiving	Mean Hours	Percent Receiving	Mean Hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment group										
Any entrepreneurship training	86.0%	18.0	50.0%	9.7	31.7%	6.8	86.4%	27.8	88.7%	34.5
Attended classes, workshops or seminars	72.0%	15.9	45.8%	8.9	28.5%	5.9	74.1%	24.8	77.0%	30.7
Received one-on-one counseling or technical	57.3%	2.1	18.1%	1.1	17.1%	0.7	58.8%	3.2	63.7%	3.9
Control group										
Any entrepreneurship training	53.7%	9.1	47.8%	8.7	40.2%	7.9	57.3%	17.8	65.4%	25.7
Attended classes, workshops or seminars	46.3%	8.2	44.0%	7.3	37.4%	7.3	50.6%	15.5	58.7%	22.8
Received one-on-one counseling or technical	22.4%	0.9	20.1%	1.5	11.2%	0.6	27.9%	2.5	34.4%	3.1

Note: The wave 1, wave 2 and wave 3 surveys are conducted at 6, 18, and 60 months after time of application.

R.A. = random assignment.

any training in the 6 months following random assignment than the control group. The first 6 months after random assignment was the most intensive period for receiving training, with less training received during the subsequent 12-month period (i.e. between Wave 1 and Wave 2) and the last 12-month period (i.e. before Wave 3).

The treatment group also received more than twice the number of hours of training by the first follow-up wave. The difference in training received is 9 hours at Wave 1 and summing across waves. The extra hours of instructional time are likely to result in substantially more “homework” time. Although students learn or receive guidance in the classroom or one-on-one counseling, research and calculations for planning and strategies for business growth are done elsewhere, and thus not reported as “training” hours. Among those who received any training, the treatment group received on average 21.0 hours of training in the first 6 months, which is roughly two-thirds the instructional time for a 5-unit college course over a quarter.

Follow-up survey responses also indicate that GATE participants were satisfied with services. Table 13 reports estimates for the treatment and control groups who received services. 48.6 percent of GATE recipients reported that “the overall usefulness” of the services received was “very useful,” with 31.3 percent responding “somewhat useful.” Most recipients of GATE training responded that services helped “a lot” or “somewhat” with at least one specific aspect of the business or business planning (e.g., marketing strategy, accounting, networking, information technology). The treatment group reported greater satisfaction overall, and for each of the training aspects, than control group trainees (who obtained non-GATE training of their own accord). One interesting finding is that a low percentage of the treatment group (and control group) reported that the entrepreneurship training they received helped “a lot” with “hiring and dealing with employees” relative to other areas in which it helped. Of course, this

may mean they were not looking for this kind of help, rather than that the training was not useful for hiring employees. Furthermore, these results must be interpreted with caution because they are only suggestive self-reports of how areas of training helped participants.

Table 13: Self-Reported Amount that Entrepreneurship Training Helped Recipients in Various Ways

	Very Useful	Somewhat Useful	Not Very Useful	Not at All Useful
How would you rate the overall usefulness of the services you have received?				
Treatment group	48.6%	31.3%	12.5%	7.6%
Control group	35.6%	45.5%	6.9%	11.9%

GATE Services	Treatment Group			Control Group		
	A Lot	Somewhat	Not at All	A Lot	Somewhat	Not at All
Helped with applying for loans	9.4%	23.2%	67.4%	0.0%	11.0%	89.0%
Helped with deciding whether to pursue self. em	37.1%	20.3%	42.7%	23.3%	24.3%	52.4%
Helped with refining the business idea	32.9%	37.1%	30.1%	25.2%	33.0%	41.7%
Helped with credit issues	18.2%	27.3%	54.5%	6.9%	18.8%	74.3%
Helped with developing a marketing strategy	34.3%	35.0%	30.8%	22.3%	31.1%	46.6%
Helped with legal issues	13.3%	32.9%	53.8%	10.7%	24.3%	65.0%
Helped with accounting issues	22.9%	34.0%	43.1%	8.7%	31.1%	60.2%
Helped with hiring and dealing with employees	9.2%	18.3%	72.5%	5.8%	17.5%	76.7%
Helped with networking	31.3%	32.6%	36.1%	23.3%	29.1%	47.6%
Helped with using computers and technology	8.3%	29.2%	62.5%	5.8%	23.3%	70.9%
Helped with dealing with clients	19.4%	36.1%	44.4%	13.6%	31.1%	55.3%
Helped with providing psychological support	19.0%	28.2%	52.8%	15.7%	21.6%	62.7%

Notes: (1) Sample includes treatment and control group participants who received any entrepreneurship training by wave 1 follow-up survey (6 months). (2) Evaluation of services was asked at W1.

Estimating Effects of Entrepreneurship Training on Hiring the First Employee

The next step was to examine the effects of entrepreneurship training on non-employer business owners hiring their first employee. Measures of employment at three follow-up waves after random assignment are available: Wave 1 at 6 months, Wave 2 at 18 months, and Wave 3 at 60 months. Employment at each of the waves is examined for the sample of non-employer firms participating in the experiment.

To estimate the effect of *receiving* entrepreneurship training on employment (referred to as the local average treatment effect), one has to be careful about how to deal with non-participation by the treatment group in training and receipt of alternative training by the control group. As reported in Table 12, 14.0 percent of the treatment group did not receive any entrepreneurship training in the first 6 months after random assignment, and 53.7 percent of the

control group received at least some entrepreneurship training in the 6 months after random assignment. By not accounting for these levels of receipt of training one can only estimate the effects of being *offered* free entrepreneurship training (referred to as the “intent-to-treat” effect). This is an interesting parameter to estimate for evaluating the potential impact of offering a new entrepreneurship training program to the market, but of more concern here is the impact of entrepreneurship training on the decision to hire the first employee. In other words, the goal is to better understand how entrepreneurship training affects employment decisions and not evaluate the specific impacts of the GATE program.

To account for both types of non-compliance and estimate the effects of *receiving* entrepreneurship training on business outcomes, the following two-stage regression is estimated. The first-stage regression for the probability of receiving any entrepreneurship training is:

$$(5.1) E_i = \omega + \gamma X_i + \pi T_i + u_i.$$

The second-stage regression for the outcome of interest, y , is:

$$(5.2) y_i = \alpha + \beta X_i + \Delta \hat{E}_i + \varepsilon_i,$$

where X_i includes all of the baseline covariates reported in Table 11, T_i is the treatment indicator, \hat{E}_i is the predicted value of entrepreneurship training from (5.1), and u_i and ε_i are error terms. Δ provides an estimate of the effects of receiving entrepreneurship training (i.e. the local average treatment effect (LATE)).

Table 14 reports estimates of the effects of entrepreneurship training on employment. In the first panel, the effects on the probability of hiring the first employee by each of the follow-up waves are reported. The sample includes only business owners with no employees at the time they applied to the program. This is the time of random assignment. The point estimates for the effects of entrepreneurship training on hiring the first employee are large and positive, but are not statistically significant. These results are consistent for the 6-month, 18-month and 60-month follow-up periods. Although the imprecision of estimates rules out the ability to make definitive conclusions, the consistency of positive estimates across all specifications and time periods is at least suggestive of positive effects of entrepreneurship training on hiring an employee among non-employers.¹⁴

¹⁴ Examining the simple difference between treatment and control groups in the experiment that does not adjust for non-compliance reveals the same results. At Wave 1, 11.6 percent of the treatment group and 8.8 percent of the control group hired an employee for a difference of 2.8 percentage points. The difference in hiring rates carries through to the next wave. At Wave 2, which is 18 months after random assignment, 18.2 percent of the treatment group and 15.2 percent of the control group hired an employee for a difference of 3 percentage points. Five years after random assignment (Wave 3), 21.5 percent of the treatment group hired an employee and 17.3 percent of the control group hired an employee. None of these differences, however, are statistically significant.

Table 14 also reports estimates of the effects of entrepreneurship training on current employment at the point in time of each follow-up survey. In the second panel, the effects on the probability of hiring an employee *at* each of the follow-up waves are reported. The 6-month or Wave 1 results are the same as those reported in Panel 1 because Wave 1 is the first follow-up survey. At the 18-month and 60-month periods, the coefficient estimates are no longer positive. They remain statistically insignificant. A comparison of the simple difference between treatment and control groups in the experiment also reveals the same conclusion for employment at the Wave 2 and Wave 3 follow-up surveys. In both cases and across follow-up

Table 14: Impact of Entrepreneurship Training on Hiring Employees for Non-Employer Business Owners at Baseline

Dependent Variable	Treatment-Control (IV Estimates)		N
	No Covars (1)	Covariates (2)	
Has any employees by W1 survey date	0.0864 (0.1089)	0.0989 (0.1108)	302
Has any employees by W2 survey date	0.1257 (0.1868)	0.2192 (0.1802)	275
Has any employees by W3 survey date	0.2033 (0.2571)	0.1956 (0.2988)	225
Has any employees at W1 survey date	0.0864 (0.1089)	0.0989 (0.1108)	302
Has any employees at W2 survey date	-0.0104 (0.1580)	0.0404 (0.1546)	276
Has any employees at W3 survey date	-0.1545 (0.1963)	-0.2514 (0.2267)	228
Number of employees at W1	-0.3152 (0.4814)	-0.3570 (0.5073)	302
Number of employees at W2	-0.9478 (0.7251)	-0.8013 (0.6797)	276
Number of employees at W3	-0.5282 (1.0317)	-0.7336 (1.3029)	228

Notes: (1) The first-stage in the IV (LATE) model regresses receipt of entrepreneurship training on treatment. The second-stage regresses the listed outcome on predicted receipt of entrepreneurship training. (2) The wave 1, wave 2 and wave 3 surveys are conducted at 6, 18, and 60 months after time of application. (3) Covariates include program sites, female, race, immigrant, age, married, children, education level, household income, self-employed at application, health problems, worked in family business, bad credit history, unemployment compensation, employer provided health insurance, autonomy, and risk tolerance. (4) *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Also, the first panel captures whether the firm hires its first employee by the survey date whereas the second panel captures whether a firm has an employee at the survey date.

waves, insignificant estimates and inconsistent signs on those estimates are found. There is no evidence of positive effects of entrepreneurship training on increasing the likelihood that non-employer business owners hired an employee at each of the follow-up surveys.

Although entrepreneurship training does not increase the likelihood a non-employer firm hires an employee at each follow-up wave, it might increase overall employment levels. In the second panel, the effects of entrepreneurship training on number of employees for non-employer business owners at each follow-up wave are investigated. Similarly, there is no evidence of positive effects of entrepreneurship training on the number of employees.

The lack of effects on entrepreneurship training on hiring employees does not appear to be due to differential rates of non-employer businesses ceasing operations over the study period. If a business stops operating, then technically it cannot hire employees. The estimates do not condition on survival because that could introduce a bias in estimating the effects of entrepreneurship training through the experiment.

Table 15 reports estimates of the effects of entrepreneurship training on whether the non-employer business owner at baseline continues owning a business at each of the follow-up

Table 15: Impact of Entrepreneurship Training on Business Ownership and Sales for Non-Employer Business Owners at Baseline

Dependent Variable	Treatment-Control (IV Estimates)		
	No Covars	Covariates	N
	(1)	(2)	(3)
Business owner at W1 survey date	-0.0923 (0.1416)	-0.0162 (0.1438)	302
Business owner at W2 survey date	-0.0068 (0.2207)	0.0186 (0.2243)	278
Business owner at W3 survey date	0.2779 (0.3138)	0.1232 (0.3854)	230
Monthly business sales at W1 survey date (000s)	-1.6920 (1.5546)	-1.4415 (1.5038)	252
Monthly business sales at W2 survey date (000s)	-4.8419 (2.7876)	* (2.8820)	235
Monthly business sales at W3 survey date (000s)	-3.9095 (13.4213)	-4.1935 (14.4340)	214

Notes: (1) The first-stage in the IV (LATE) model regresses receipt of entrepreneurship training on treatment. The second-stage regresses the listed outcome on predicted receipt of entrepreneurship training. (2) The wave 1, wave 2 and wave 3 surveys are conducted at 6, 18, and 60 months after time of application. (3) Covariates include program sites, female, race, immigrant, age, married, children, education level, household income, self-employed at application, health problems, worked in family business, bad credit history, unemployment compensation, employer provided health insurance, autonomy, and risk tolerance. (4) *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

waves. There is some drop-off in business ownership, as roughly 20 percent are no longer business owners at Wave 1, 28 percent at Wave 2, and 33 percent at Wave 3. The estimates, however, do not provide any clear and consistent evidence that entrepreneurship training increases the likelihood that non-employer business owners remain in business.

Conclusions

From the analysis of longitudinal data from the KFS, several interesting patterns emerge regarding the dynamics of non-employer startups hiring their first employee. A large percentage of non-employer startups hire their first employee in the first three years of existence, with only a small percentage hiring their first employee in the few years after that period. Among non-employer businesses, 38.1 percent hire the first employee by one year after startup and 54.0 percent hire the first employee by three years after startup.

The likelihood of making the transition from non-employer to employer business within the first several years of operation differs by the race, ethnicity and gender of the owner of the business. Non-employer businesses owned by Asians, other race, and Hispanics have higher probabilities of hiring employees than non-Hispanic, white-owned businesses, and African-American-owned businesses, all else equal.¹⁵ Male-owned non-employer firms have higher annual probabilities of hiring their first employee than female-owned firms. The owner's human capital, measured as owner's education and prior industry work experience, does not predict hiring employees, although there is some evidence of a positive relationship with prior industry work experience.

Using the longitudinal data from the KFS, another important question examined is whether there are milestones that non-employer startups often reach before hiring their first employee. Surprisingly, the evidence does not clearly indicate a strong relationship between the revenues of non-employer firms and the decision to hire. There is some evidence of a U-shaped relationship with the likelihood of hiring decreasing from the lowest revenue class to mid-levels, but then increasing to the highest revenue class. The evidence is less ambiguous that higher levels of business assets are associated with non-employer businesses making the transition to employer firms. It may be more important for non-employer firms to build up assets to use or borrow against to hire their first employee than to rely on large revenues in the current year. Policies attempting to encourage hiring among young non-employers might be better focused on careful investing in businesses instead of focusing on the rapid growth of businesses.

Having intellectual property also has a positive association with making the non-employer to employer transition during the sample period. Intellectual property, which includes patents, copyrights and trademarks, is associated with a 7 percentage point increase in the

¹⁵ Other race includes Native Americans and individuals reporting “Other” race.

annual probability of hiring the first employee. Intellectual property may be valuable for securing future revenues for hiring employees.

Data from the GATE experiment is used to examine the question of whether entrepreneurship training increases the likelihood that non-employers hire an employee within the next several years. The results are somewhat mixed and inconclusive. On one hand, the points estimates on the effects of entrepreneurship training on hiring the first employee by 6, 18 and 60 months are consistently positive, but on the other hand none of these estimates are statistically significant. Furthermore, the estimates do not provide evidence that the probability of hiring an employee or the number of employees increases with entrepreneurship training. Entrepreneurship training, however, might be more effective for business owners in specific industries or with specific backgrounds. More research with larger samples of non-employer business owners is needed on this important topic.

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Appendix Tables

Appendix Table 1: Industry Distribution of Non-Employer Startups in Kauffman Firm Survey (2004) and New Non-Employer Firms in Survey of Business Owners (2007)

Industry	Non-Employer Startups (KFS 2004)		New Non-Employers (SBO 2007)	
	Percent	N	Percent	N
Other industries	1.4%	2838	1.2%	151113
Construction	12.1%	2838	11.2%	151113
Manufacturing	5.8%	2838	1.5%	151113
Wholesale trade	5.6%	2838	1.8%	151113
Retail trade	13.6%	2838	9.8%	151113
Transportation and warehousing	2.7%	2838	4.9%	151113
Information	3.4%	2838	1.9%	151113
Finance, insurance and real estate	10.9%	2838	11.5%	151113
Professional services	17.0%	2838	18.0%	151113
Management	10.1%	2838	8.9%	151113
Health and educational services	3.4%	2838	12.0%	151113
Entertainment, accommodation and food services	3.9%	2838	6.3%	151113
Other services	10.3%	2838	11.1%	151113

Notes: (1) The KFS sample consists of businesses with no employees at startup in 2004. (2) The SBO sample consists of businesses with no employees starting in 2006 or 2007. (3) Sample weights are used for all estimates.

Appendix Table 2: Industries and Hiring Rates of First Employee among Non-Employer Startups Kauffman Firm Survey (2004-2011)

Industry	by 1 Year after Startup		by 2 Years after Startup		by 7 Years after Startup	
	Percent	N	Percent	N	Percent	N
Other industries	26.4%	26	39.7%	26	38.3%	12
Construction	42.2%	197	59.6%	171	79.4%	77
Manufacturing	45.4%	375	61.1%	250	76.2%	111
Wholesale trade	55.1%	88	69.6%	88	88.1%	44
Retail trade	36.9%	240	53.2%	205	73.6%	78
Transportation and warehousing	39.1%	49	69.4%	44	90.0%	19
Information	31.0%	95	54.8%	77	59.9%	42
Finance, insurance and real estate	25.0%	177	42.4%	163	59.2%	72
Professional services	43.5%	647	59.3%	552	78.0%	290
Management	40.2%	200	64.8%	149	80.7%	68
Health and educational services	37.5%	59	56.7%	55	79.2%	23
Entertainment, accommod. and food services	29.2%	80	49.8%	59	59.8%	36
Other services	30.3%	227	50.2%	193	66.8%	82

Note: The sample consists of businesses with no employees at startup in 2004.