How Did Young Firms Fare During the Great Recession? Evidence from the Kauffman Firm Survey

Rebecca Zarutskie*
Federal Reserve Board

Tiantian Yang
Duke University

August 5, 2016

Abstract

We examine the evolution of several key firm-level economic and financial variables in the years surrounding and during the Great Recession using the Kauffman Firm Survey, a large panel of young firms founded in 2004 and surveyed for eight consecutive years. We find that these young firms experienced slower growth in revenues, employment, and assets and faced tighter financing conditions during the recessionary years. While we find some evidence that firm growth picked up following the recession, it is not clear that it returned to the levels it would have been absent the recessionary shock. We find little evidence that financing conditions for young firms loosened following the recession and show that financing constraints, in addition to diminished demand, may have contributed to these firms' slower growth. We discuss the strengths and the limitations of the Kauffman Firm Survey in measuring the impact of the Great Recession on young firms and consider features of future data collection and measurement efforts that would be useful in studying entrepreneurial activity over the business cycle.

* We thank Howard Aldrich, Shai Bernstein, John Haltiwanger, and Antoinette Schoar, participants in the NBER/CRIW conference on Measuring Entrepreneurial Businesses, and the volume editors and reviewers for comments and suggestions. We acknowledge the Kauffman Foundation and NORC data enclave for providing secure and remote access to the data used in this research. We thank Daniel Lee with the NORC data enclave for assistance in clearing the statistical output. The analysis and conclusions in this paper are those of the authors and do not indicate concurrence by other staff or members of the Board of Governors of the Federal Reserve System. Zarutskie (corresponding author) can be reached at rebecca.zarutskie@frb.gov; Yang can be reached at tiantian.yang@duke.edu.

1. Introduction

While aggregate statistics on the dynamics of the U.S. economy and its firms around the Great Recession of 2007-2009 are widely published by federal agencies, such as the Bureau of Economic Analysis and Bureau of Labor Statistics, we have fewer statistics on the economic activity subsets of firms comprising aggregate economic activity over this time period, and even less empirical microeconomic evidence on the dynamics of subsets of firms, particularly young firms.

Such statistics and data are important to consider if certain firms, such as new firms, may have been disproportionately affected or respond differently to macroeconomic and policy shocks. Indeed, recent studies, document that a disproportionate share of job creation can be attributed to young firms (Haltiwanger, Jarmin, and Miranda (2013)), and that small and young firms may be more sensitive to the business cycle and monetary policy (e.g., Fort, Haltiwanger, Jarmin, and Miranda (2013); Gertler and Gilchrist (1994); Hancock and Wilcox (1998)). These studies highlight the importance of measuring a broad set of outcomes for young firms to gain a better understanding of entrepreneurial activity and young firms and their contribution to aggregate economic activity over the business cycle.

In this paper, we use the Kauffman Firm Survey (KFS), a large panel of young firms founded in 2004 and surveyed for eight consecutive years, to examine the dynamics of several key firm-level economic and financial variables in the years surrounding and during the Great Recession. We find that during the Great Recession, particularly 2008 and 2009, firms in the KFS were smaller than otherwise predicted, in terms of employment, assets, and revenues. In particular, we find that firm-level employment was about 10 percent lower than otherwise predicted during these years. This translates to each firm having on average 0.5 fewer employees – a meaningful estimate if aggregated across all young firms in the U.S. economy at the time. We also find that firm-level assets were around 20 percent lower and revenues around 30 percent lower at the depths of the recession, all else equal. Including firm fixed effects in our regression analysis does not reduce these estimates by much, suggesting that the reduction in firm size and growth experienced by young firms happened within individual firms during the recession and were not primarily driven by firm attrition.

We also examine whether the wages paid per employee at the firms varied during the recession. We find that wage per employee decreased in the cross-section of firms during the recession. However, when we include firm fixed effects, we find that within firms that survived over the recession, wages increased, while employment decreased. This suggests that surviving firms may have kept their most skilled employees during the recession, as well as that firms that paid higher wages on average may have been more likely to shut down during the recession.

We next examine whether financing conditions tightened and may have contributed to the decline in economic activity and growth experienced by these young firms during the recession. To do so, we use special questions added to the KFS which directly ask about whether a firm applied for external credit and whether firms did not apply for a new loan because they anticipated being turned down. We find that a greater percentage of firms did not apply for a loan because they anticipated being denied in 2008, 2009, and 2010 relative to 2007 and 2011. Indeed, firms were 20 percent more likely to report that they did not apply for a loan in these years because they would be denied, indicating that financing conditions were perceived as being much tighter during the recession and in period immediately following it.

Finally, we examine whether the firms that reported that they were financially constrained experienced different economic outcomes. We find that firms that reported they would be denied for a loan experienced lower asset growth and revenue growth in the year following their report. Moreover, these same firms reported that their owners worked more hours and that they employed a greater share of full-time employees, suggesting that these firms may have used labor as a substitute for purchasing assets using external financing.

Overall, our empirical analysis indicates that young firms were adversely affected by the Great Recession, both from diminished demand and economic activity and from tighter financing conditions. Our analysis also provides some direct estimates of the impact of the recession on firm employment, revenues, assets, and wages and the role of financing constraints in these estimates for very young firms. Existing research on the firm-level impact of the Great Recession, such as Chodorow-Reich (2014) and Duygan-Bump et al (2015), suggests that such large estimates would not be observed if older firms were included

in the KFS. Our estimates are an important component to understanding how business cycle shocks may translate to real effects in a particular segment of the economy – young entrepreneurial firms, their owners, and their employees – and how these shocks may spillover into broader measures of economic activity over the business cycle.

We conclude with a discussion of the drawbacks of the design of the KFS in addressing our main questions, in particular the difficulty of the survey design in allowing one to distinguish between firm age effects and time effects and in the limited ability to exploit geographical variation in local economic conditions due to small sample sizes of firms surveyed within each particular geography in the U.S. We also consider some features of future data collection and measurement efforts that would be useful in studying entrepreneurial activity and young firms over the business cycle and the impact of economic and financial shocks on young firms and their founders.

2. The Kauffman Firm Survey

The KFS is a longitudinal survey of U.S. businesses that began their operations in 2004. Intended to examine new business characteristics, the financing and operating strategy used by new businesses, and how these businesses subsequently evolved, the KFS questionnaire focuses on the four major aspects of businesses: business characteristics, financing and economic outcomes, owner and worker demographics, and business strategy and organization.[1]

To obtain a representative sample of new businesses, KFS used the businesses listed in the Dun and Bradstreet (D&B) database in 2004 as the sampling frame. In particular, firms are considered as candidates for inclusion in the sample if they meet at least one of the following five criteria – (1) payment of state unemployment taxes, (2) payment of Federal Insurance Contributions Act (FICA) taxes, (3) presence of a legal status for the business, (4) use of an Employer Identification Number (EIN), or (5) use

[1] See http://www1.kauffman.org/kfs/KFSWiki/Data-Dictionary.aspx for detailed data dictionary as well as downloadable questionnaires. See also Farhat and Robb (2014) for more detail on the KFS questionnaire and survey design.

of Schedule C to report business income on a personal tax return. The KFS includes both employer firms and non-employer firms in its base sample. The D&B database was partitioned into six sampling strata defined by a classification of the firm's high-technology status and the gender of the firm's owner or CEO (based on the D&B data element). 32,469 businesses were sampled to achieve 4,928 completed questionnaires.

The data collection process began with a mailed advance letter to prospective businesses inviting them to participate using the KFS self-administered Web questionnaire. Following the invitation, business owners who did not complete the questionnaire on the Web received telephone calls from trained interviewers to determine their eligibility and to complete an interview with those that were eligible. Overall, 77 percent of the Baseline Survey questionnaires were completed in telephone interviews, and 23 percent were completed using the self-administered Web questionnaire. For a more detailed discussion of the design and sampling methodology underlying the KFS see DeRoches et al. (2007), Robb et al. (2010), and Farhat and Robb (2014).

Since the initial interview in 2004, KFS conducted follow-up interviews with businesses selected in the sample annually, and completed 7 annual interviews in 2011. Because the 2008 economic recession happened 4 years later after the initial or baseline interview, KFS permits an empirical analysis of business growth and job creation over this time period. In 2008, KFS added some questions about the challenges that the economic recession imposed on new businesses, including the extent to which business owners think their businesses were affected by the financial crisis and recession. We use some of these questions in our analysis below to examine the impact of the recession on the KFS firms' financing and economic outcomes

The KFS is the only panel dataset of young firms spanning the Great Recession that includes both information on firm-level financial and economic outcomes. However, as Reynolds and Curtin (2009) note in a recent review, only 7 out of 26 data sets which they identified as relevant for research on entrepreneurship provided longitudinal information on new venture creation, but none of the 7 data sets applied selection criteria that would lead to a representative sample of new businesses. Some data sets

were designed to examine innovative firms, and thus intentionally excluded less innovative ones, and vice versa. An example of the latter is the Longitudinal Research Database (LRD) maintained by the U.S. Census Bureau. This data set oversamples manufacturing companies with sizable numbers of employees, but does contain information on capital and revenues (McGuckin and Pascoe (1988)). There are other databases, such as the U.S. Census Bureau's Longitudinal Business Database (LBD) and the Bureau of Labor Statistics' Longitudinal Database (LDB), that contain a representative sample of new employer firms every year, in the case of the LBD, and every quarter, in the case of the LBD, but these databases do not track non-employer firms, nor do they contain information on assets, revenues or financing (Jarmin and Miranda (2002), Searson, Robertson, and Clayton (2000)). Likewise, data from the Business Employment Dynamics (BED), maintained by the Bureau of Labor Statistics, are derived from quarterly reports submitted by private sector employers (BED (2011)). Recent efforts at the U.S. Census Bureau have been undertaken to combine information on non-employer businesses and employer business in the form of the Integrated Longitudinal Database (ILBD), but even so, this database does not contain detailed information on important firm characteristics such as revenues, assets, and financing (Davis et al. (2007)).

3. Estimating the Impact of the Great Recession on Young Firms using the KFS

To examine the question of how young firms fared in the years leading up to, during, and following the Great Recession we employ two empirical strategies using the KFS. First, we examine the changes in the weighted sample averages in our outcome variables of interest. In particular, we examine weighted means of firm-level revenues, profits, employment, assets, wages, as well as amounts and types of financing used. We also present weighted means for key firm-level conditioning variables, such as whether the firm has intellectual property and whether the firm is in a high tech industry, as well as several owner demographic characteristics. These population averages allow a first-look at how young firm performance may have changed in the recession years and how this may have also affected the firms' owners and employees.

Second, we employ regression and other statistical model estimation to examine the evolution of firm-level outcome variables over time conditional on firm-specific characteristics, and in some cases, geographical characteristics. Doing so allows us to refine our estimates of the impact of the economic and financial shocks experienced by the U.S. on the firms represented in the KFS by controlling for other factors that may have also influenced the evolution of these firm-level variables.

3.1. Weighted Sample Average Dynamics

Tables 1a -1c presents weighted averages and standard errors in italics below each average value for the entire panel time frame of 2004 to 2011. Table 1a presents weighted averages for our firm-level economic outcome variables of interest – employment outcomes (including wages, full-time employment and owner hours), assets, revenues, profits, and likelihood of shutting down. We see that the firms in the KFS grow rapidly in terms of employment size between 2004 and 2005, when average employment increases from 1.87 to 3.20. Employment size further increases over the 2005 to 2007 period reaching 3.69 employees, on average. Over the period 2007 to 2009, the recessionary years, average employment remains flat, even slightly dipping in 2009. Average employment begins to rise again in 2010, reaching 4.57 employees in 2011. These averages suggest that the recession weighed on the employment growth of young firms.

Insert Table 1a here.

The yearly averages for wage per employee follow a similar pattern as total employment over the survey time frame. Average wage per employee rises from $15,281 to $40,844 between 2004 and 2006 (in nominal dollars). In 2007, nominal wage per employee drops to an average of $30,784, and rises by small amount in both 2008 and 2009. Wage per employee exhibits more robust growth in 2011, averaging $75,159. In contrast, neither the percentage of employees who are full-time nor the number of hours worked by the primary owner-operator per week exhibit a pronounced decline during the recessionary years. Rather, both variables exhibit a steady decline over the sample period, making it difficult to distinguish to what extent the declines are due to the recession or other factors related to firm age. Thus, the population

averages suggest that employment and wage per employee may have suffered declines due to the economic and financial shocks arising from the Great Recession.

Turning to total assets, the other main firm input, we also see that, like employment, firms' assets grow quite rapidly in the first year, rising from $346,388 to $721,356 between 2004 and 2005.[2] Assets continue to rise into 2007, reaching over $1 million on average, but decline to around $774 million in 2008 and hover around $1 million dollar level into 2009 and 2010, until rising sharply to over $3 million on average in 2011. Firm revenues and profits display a similar dynamic pattern, growing into 2007, then decreasing in 2008, the height of the recession, and only regaining their growth in 2011.

Finally, turning to the percentage of firms that shut down in a given year, we see that the highest percentage of firms, 14.6% go out of business in 2008, and that the percentage hovers around 12% for the remainder the following two years, and declines to 11.4% in 2011. Overall, the averages presented in Table 1, Panel A suggest that the economic and financial shocks associated with the Great Recession affected the employment, assets base, revenues, profits, and probability of survival of young firm.

Table 1b shows weighted means and standard errors for firm-level financing variables. The first two rows show the percentage of firms that have bank debt taken out by the business and that have bank debt taken out by the owners. The two variables display different dynamics. The percentage of firms having a bank loan on behalf of the business increases over time, peaking in 2008, and then declines in 2009 and 2010. The percentage of firms having a bank loan taken out by their owners is at its highest in 2004 and falls steadily over the sample period. These different patterns likely reflect the fact that firms become more able to obtain bank loans backed by the business itself as revenues and assets grow and the firms establish track records. This cycle of financing has been documented in prior studies and in several time periods. See, for example, Berger and Udell (1998) and Robb and Robinson (2014).

Insert Table 1b here.

[2] Total assets include physical assets reported by firms such as property, plant and equipment as well as cash and other investment assets.

The dynamics of the percentage of firms having a business bank loan suggest that financing conditions may have become tighter in 2009 for many firms. This notion is confirmed in the dynamics of the ratio of business debt to total assets, which rises steadily from 2005 to 2008, and the drops sharply in 2009 and 2010. In contrast, the ratio of personal debt to total firm assets hovers around 0.40 after an initial high of around 0.50 in 2004.[3] These averages suggest that the supply of debt backed by business assets was more sensitive to the recessionary shock that was the supply of deb backed by the personal assets of the firms' owners.

Both the ratio of equity invested by owner-operators to total assets and the ratio of equity invested by non-owner-operators to total assets are at their peak when firms first begin, consistent with most theories of firm capital structure. However, we see a slight uptick in the ratio of owner-operator equity invested to total assets in 2010 and 2011, and an uptick in ratio of non-owner-operator equity invested to total assets in 2008 and 2009, suggesting that perhaps these sources of funds were used to partially offset the tighter credit market conditions faced by many firms during and following the recession.

Table 1c presents weighted averages for firm characteristics, which will serve as controls in the regression analysis. The number of owners remains fairly constant over the sample period at around 1.8. The percentage of the firm's equity owned by the primary owner rises slightly over the sample period from 80.4% to 83.4%. Firms' primary owners are around 44.5 years old when they start their firms, and they age with their firms, until 2010, when more firms with older primary owners exit the panel, lowering the average primary owner age to 45.4. Around 70% of firms' primary owners are male, and between 82 and

[3] Business debt includes bank loans, credit card balances, and other forms of debt taken out at the level of the firm. Personal debt includes bank loans, credit card balances, and other forms of debt taken out personally by the firms' owners (and often backed by the owners' personal assets).

83% are white. Around 6% of firms are in high-tech industries over the sample period, and around 19% have intellectual property.[4,5]

Insert Table 1c here.

3.2. Regression Analysis

We next turn to our regression analysis to examine any differences in the dynamics of firms' economic outcome and financing choices during the recession years, conditional on firm characteristics and past outcomes.

We model firm economic outcomes in log levels as a linear function of lagged log employment and log assets (the two main inputs to production) plus a random error term that reflects variation in the demand for the firm's product or service as well as productivity shocks, as in Equation 1 below.

$$\ln\big(\text{FirmOutcome}(i,t)\big) = \varphi + \alpha \ln\big(\text{Employment}(i,t-1)\big) + \beta \ln\big(\text{Assets}(i,t-1)\big) + \gamma \ln\big(\text{Revenues}(i,t-1)\big) + \delta X(i,t-1) + \theta(t) + \mu(i) + \varepsilon(i,t) \quad (1)$$

When the firm outcome measure is employment, Equation 1 states that the firm's choice of employment input in the current year will be a function of last year's employment and last year's assets, as well as last year's revenues, which reflect the lagged error term in the production function stemming from changes in the demand for the firm's goods or services or the firm's productivity, for example. Likewise, when the firm outcome measure is assets, Equation 1 states that the firm's current choice of assets in the current year will be a function of last year's employment and assets choices as well as last year's revenues.

[4] The KFS defines high-tech industries as those with 2-digit SIC codes: 28 Chemicals and allied products 35 Industrial machinery and equipment, 36 Electrical and electronic equipment, and 38 Instruments and related products. The KFS defines medium-tech industries with those as 3-digit SIC codes: 131 Crude Petroleum and natural gas operations, 211 Cigarettes, 229 Miscellaneous textile goods, 261 Pulp mills, 267 Miscellaneous converted paper products, 291 Petroleum refining, 299 Miscellaneous petroleum and coal products, 335 Nonferrous rolling and drawing, 348 Ordnance and accessories, not elsewhere classified, 371 Motor vehicles and equipment, 372 Aircraft and parts, 376 Guided missiles, space vehicles, parts, 379 Miscellaneous transportation equipment, 737 Computer and data processing services, 871 Engineering and architectural services, 873 Research and testing services, 874 Management and public relations, 899 Services, not elsewhere classified.

[5] Firms are coded as having intellectual property if they report owning copyrights, trademarks or patents.

Equations 1 and 2 also contain a matrix, X, of firm-level controls, which include owner characteristics, past financing choices, and firm sector and industry characteristics. Year and firm fixed effects are also specified, though in some specifications we exclude firm fixed effects in order to estimate the cross-sectional variation in employment and assets over time, conditional on firm characteristics. In all cases, we estimate the regressions using the population weights according to the stratified sample design of the KFS. We begin our estimation sample in 2006, rather than 2005, the first year in the KFS, since many firms report missing or zero values for many of the control and dependent variables in the first year of the KFS. Including this first year does not change the flavor of our results, but does make the comparative coefficients on the year fixed effects harder to interpret when the base year is 2005 instead of 2006.

In addition to estimating the impact of the recession years on firms' employment levels, the KFS also allows us to estimate how many employees are full-time employees, the number of hours worked by owner-operators in the firm, and the wages paid per employee. Firms may have responded to reduced demand for the products and services during the recession by reducing the hours worked by employees in the firm or by lowering the wages they paid their employees. We, therefore, also estimate the following three regression specifications in which the firm outcome measure is fraction of employees working full-time, hours worked by the primary owner, and wage per employee

We also examine the impact of the recession the probability a firm shuts down. To do so we estimate a Probit model as in Equation 2 below:

$$\Pr(\text{Firm Exit}(i,t)) = \text{NormalCDF}(\alpha \ln(\text{Revenues}(i,t-1)) + \beta \ln(\text{Employment}(i,t-1)) + \gamma \ln(\text{Assets}(i,t-1)) + \delta X(i,t-1) + \theta(t) + \varepsilon(i,t)) \quad (2)$$

After estimating the residual effect of the recession years and the evolution of firm outcome variables in the years preceding and following the recession, we examine whether firms' use of financing changed during the recession. We are interested in changes in the use of the types and amounts of financing

to better understand whether shocks to the financial markets, in addition to economic shocks, may have also affected how the young firms fared during and after the recession. We estimate regressions which examine whether firms use external debt backed by the assets of the business or by the personal assets of the owners, as well as the amounts of external debt and equity financing outstanding, as a function of firm characteristics and year fixed effects. In particular, we estimate regressions of the following form:

$$\text{Financing}(i,t) = \varphi + \alpha \ln\big(\text{Revenues}(i,t-1)\big) + \beta \ln\big(\text{Employment}(i,t-1)\big) +$$

$$\gamma \ln\big(\text{Assets}(i,t-1)\big) + \delta Y(i,t-1) + \theta(t) + \mu(i) + \varepsilon(i,t) \qquad (3)$$

Equation 3 estimates the types and amounts of financing used as a function of past employment, assets, and revenues and the firm characteristics considered in the previous regression. In addition, the matrix, Y, of firm level controls contains county-level variables on the structuring of banking markets, as well as other factors that might influence the supply of financing available to firms and underlying economic conditions. These variables matter more in estimates of Equation 8 that exclude firm fixed effects. Equation 8 shows the overall changes in financing choices by firms in the years during and surrounding the recession. The independent variables included are meant to help us better understand whether changes in financing reflect changes in underlying demand for financing by the firms versus reduced supply of financing or financing constraints.

Finally, we consider whether we can isolate plausibly exogenous variation in the supply of external financing to firms to estimate the relation between being turned down for financing and our main firm outcomes of employment, assets and revenues. To do so, we estimate regression equations similar to Equations 1 and 2, but use special questions asked during and after the recession on availability of external debt financing as additional control variables and also include the geographic controls measuring the financing supply factors and local economic conditions included the matrix Y in Equation (3).

3.2.1. Firm-level Economic Outcomes

Table 2 present estimates of Equations 1 without firm fixed effects; hence, the identifying variation is largely cross-sectional. For each of the four firm employment outcome variables, we estimate three specifications: The first specification only includes year fixed effects. The second specification adds lagged log employment, asset and revenues. The third specification adds additional controls for owner characteristics and firms' use of debt and equity financing. We begin our estimation sample in 2006, so the base year in the regression is 2006, and the coefficients on the year dummies use year 2006 as the benchmark. Our focus in the discussion of the estimates will be on the coefficients on the year dummies, since these coefficients tell us the impact of the particular year conditional on what we would have expected given the firm's characteristics and past performance.

Insert Table 2 here.

First, focusing on log employment, column 1 shows us that log employment grew in all years relative to year 2006, but that growth as slowest in 2007. Adding lagged log employment, assets and revenues in column 2, we see that growth in employment was slower in all years relative to year 2006, but was slowest in 2008 and 2009, both recession years. The coefficients on the year 2008 and 2009 indicators are -0.110 and are significantly different than the coefficients on the other year indicator variables. Translating to non-logged values, employment at the firm level was on average almost half an employee lower in these recessionary years. Adding further controls for owner characteristics and firm financing in column 3, does not change the nature of the results. Firm-level employment growth in all years looks similar to 2006 once we control for firm characteristics, except in 2008 and 2009, when employment is about 10 percent lower.

Columns 4, 5, and 6 examine log wage per employee. We see that wage per employee is on average lower in 2009 and 2010 relative to 2006 and other years controlling for firm industry and past assets, employment and revenues. However, adding additional controls for owner characteristics in column 5 eliminates the statistical significance of the negative coefficients on the year 2009 and 2010 dummies. As suggested when we examined the dynamics of estimated population averages of the fraction of full-time employees and the number of hours worked by the primary owner in Table 1, we see a general decline in

both variables over time, as evidenced by the negative coefficients on the year dummies in columns 7 and 10. These coefficients do not change very much when we add controls for past firm performance and owner and financing characteristics in columns 8 and 9 and columns 11 and 12.

Overall, the estimates in Table 2 show that firms experienced significantly slower growth in employment in 2008 and 2009 relative to other years in the 2006 to 2011 period. However, evidence on whether wages and usage of full-time workers and owner labor changed significantly during the recession is inconclusive.

Table 3 present estimates for the regressions specified in Equations 1 and 2. As in Table 2, we estimate three specifications for each dependent variable. Focusing first on log assets, we see that when we control for lagged firm outcomes in column 2, firms' assets levels were significantly smaller in 2007, 2008 and 2009 compared to 2006. In these three years, firm-level assets were between 10 to 20 percent lower, all else equal. Evaluated at the weighted sample mean, the estimated coefficient on the year 2009 indicator implies a reduction in the of firm assets from around $88,000 to around $74,000. The statistical significance on the year 2007 and 2008 dummies disappears when we control for firm financing and owner characteristics in column 3, but we still see that in 2009 firms' asset levels were still around 2 percent lower than in 2006.

Insert Table 3 here.

Focusing on firm revenues in columns 4, 5, and 6, we see that revenues were higher in 2007, 2008, and 2011 relative to those in 2006 (column 4). However, when we control for lagged firm outcomes in column 5, and for financing and owner characteristics in column 6, we see that revenues were lower in all years relative to 2006, especially in the recessionary years of 2008 and 2009, in which firm-level revenues were between 20 and 30 percent lower than otherwise predicted. Translated into dollars, these estimates imply that instead of around $240,000, average firm revenues were $194,000 and $170,000 in 2008 and 2009, all else equal.

Finally, turning to the probability of firms shutting down estimated in columns 7, 8, and 9, we see that without controlling for firm characteristics and past outcome (column 7), firms are 2.4 percentages

points (18 percent) more likely to shut down in 2007 and 3.2 percentage points (25 percent) more likely to shut down in 2008 compared to the probability of failure in 2006.[6] Adding controls for past outcomes in column 8, however, eliminates the statistical significance and magnitudes of estimated coefficients on the yearly indicator variables, suggesting that these greater probabilities of shutting down in the recession years observed in column 7 may be explained by lower firm performance in those years. Adding controls for financing and owner characteristics in column 9 shows that conditional on these characteristics the probability of shutting down was actually lower in 2008, 2010, and 2011 compared to 2006. These results are consistent with prior studies which document that the likelihood of firm failure diminishes as firms age (e.g., Puri and Zarutskie (2012)).

The regression analysis in Tables 2 and 3 are panel regressions that primarly use both cross-sectional variation in the independent and dependent variables to estimate the displayed coefficients. In Table 4, we include firm fixed effects in the panel regressions to only allow within-firm variation to identify the estimated coefficients. Including firm fixed effects allows us to hold constant firm-specific determinants of the dependent variables. Doing so means that selection effects driven by firms exiting the sample will not affect our estimated coefficients.

In Table 4, we estimate regressions for each of the dependent variables considered in Tables 2 and 3. For each dependent variable, we estimate two specifications – one with only year dummies and one with lagged firm controls. Note that because many of the firm characteristic controls we used in Tables 2 and 3 do not vary at the firm-level over the sample period, we exclude them from the second specification in Table 4.[7]

Insert Table 4 here.

Focusing first on the employment variables – log employment, log wage per employee, full-time employment ratio, and log owner hours worked – we find similar results to those observed in Table 2, with

[6] Note that marginal probabilities, rather than coefficients, are reported for the probit models in Table 3.
[7] We also exclude the controls for financing in the second specifications in Table 4. There is modest firm-level variation for these variables. Including them does not change our results, but does reduce our sample size and statistical power.

the exception of log wage per employee. In particular, we find that controlling for past outcomes (column 2) that firm-level employment is 6.5 percent lower in 2008 and 9.6 percent lower in 2009 all else equal. These estimates translate to the number of firm-level employees falling by one quarter to one third of any employee, all else equal. Full-time employment declines over the sample period (column 5), but after controlling for firm characteristics, we see that it declines more in 2009 and 2010 (column 6). We also see that hours worked by owners decline fairly steadily over the sample period (columns 7 and 8), similar to the pattern observed in Table 2. Interestingly, we see that once we include firm fixed effects log wage per employee actually increases in the recessionary years 2008 and 2009 (columns 3 and 4). This stands in contrast to the negative coefficients estimated on these year dummies in Tables 2. These differences in the overall and within-firm panel estimates suggest that firms that exited the sample in 2008 and 2009 paid their employees higher average wages but firms that did survive paid higher wages over the recession, perhaps because their lower wage, and lower skilled, employees left the firm, consistent with the reduced employment levels we observe in these same years in both Tables 2 and 4.

Turning to log firm assets, we see that firms experience a decline in assets in years 2009 to 2011 relative to 2006 (column 10). Controlling for firm characteristics and past outcomes, we see that decline remains statistically significant only in 2009 and 2010 (column 11) with firms having 17 percent lower assets in 2010 all else equal. Turning to log firm revenues, we see that firms experience a decline in their revenues in 2009 and 2010 relative to 2006, but the decline is not statistically significant (columns 12 and 13).

The results in Table 4 are broadly consistent with those in Tables 2 and 3, indicating that the decline in employment, asset, and revenues during the recession years was experienced at the firm level, and not just cross-sectional differences driven by firms exiting the sample. Overall, the empirical results in this section suggest that the economic and financial shocks stemming from the Great Recession adversely affected young firms, such as those surveyed in the KFS, by reducing their employment and asset bases as well as their revenues.

Figure 1 plots the year fixed effects for the regressions of employment, revenues and assets in the third specifications of Tables 2 and 3 (without firm fixed effects) and the second specification of Table 4 (with firm fixed effects). The graphs show that firms experienced a decline in all three measures, but also experienced a significant recovery. Including firm fixed effects mutes the dynamics of the changes in these three variables, as one would expect given that cross-sectional variation in performance and recovery across firms is eliminated. The graphs in Figure 1 look similar if we limit our sample to firms that survive until 2011. The dip in performance and strength of the recovery is slightly muted in the case of including firm fixed effects if we eliminate firms that exit the panel before 2011. These results suggest that the decline in performance subsequent recovery were experienced at the firm level rather than being driven by attrition of firms during the recession.

Insert Figure 1 here.

3.2.2. Which Firms Survive?

A related question is which firms survive and which firms were more likely to recover after the recession. The answer to this question can be partly seen in the estimated coefficients on the covariates in specifications 9 and 10 in Table 4. Across all years in the KFS panel, firms are more likely to survive if they are larger, in terms of revenues and assets. In addition, firms in high-tech industries are more likely to survive. In comparing summary statistics of surviving and non-surviving firms (not shown), we see that surviving firms are more likely to have business debt, but conditional on having business debt, surviving firms have lower leverage ratios. This suggests that financial conditions have an impact on which firms survive. We also find evidence, discussed in the next section that firms that are less dependent on external debt finance recover more quickly.

3.2.3. Firm Financing

The decline in firm growth during the recession and in the few years after could stem from reduced demand and fewer investment opportunities, as well as financial constraints that limited firms' ability to obtain funds necessary to expand and invest. In this section, we examine how firms' use of financing

changed during the recession to shed light on to what extent financial constraints may have contributed to the decline in firm growth during the recession and in the following years.

We begin by noting that when we controlled for lagged debt ratios, both business and personal debt, in the firm outcome regressions in Tables 2 and 3 that these variables did not bear a statistically significant relation with the primary firm outcomes of employment, assets and revenues. The amount of equity invested in the prior year was positively related to firm assets. These results suggest that firms are choosing their capital structures in a way that is not correlated with their outcomes, after controlling for lagged outcomes. This could suggest that financing or its availability in general did not influence firm outcomes during the sample period. Or it could be the case financial constraints did impact firm outcomes, but that these financial constraints did not affect the debt ratios of the firms, just firms' overall size.

We first examine whether the probability that firms have a bank loan, backed either by the business or the personal assets of the owners, changed during the recession. In Table 5, we estimate probit models of the probability that a firm has a bank loan of either type as a function of firm characteristics and year dummies. The estimates are reported in columns 1 through 4. In columns 1 and 2, we see that the probability that a firm has a business bank loan does not vary significantly by year. In contrast, the probability of having a personal bank loan to finance the firm declines each year from 2006.

Insert Table 5 here.

We then estimate the relation between year dummies and firm characteristics to both business and personal debt ratios as well as the ratio of equity invested to total assets in columns 5 through 11 in Table 5. In column 5, we see that the ratio of business debt to total assets is significantly lower in 2009 onward compared to its level in 2006. However, controlling for firm characteristics in column 6, the statistical significance of these coefficients is reduced, suggesting that it may have been changing firm characteristics, rather than supply constraints, that lowered firms' business debt ratios.

Turning to the ratio of personal debt to total assets in columns 7 and 8 we likewise see a substantial decline in the ratio beginning in 2009, but only the coefficient on 2009 is significant in the specification including firm controls. Finally, in columns 9 and 10, we see that the ratio of equity invested to total assets

declines steadily over the sample period, suggesting that firm age effects, rather than the effects of the recession, may be partly responsible for the decline in equity to asset ratios.

Overall the evidence in Table 5 suggests that use of external debt financing became less frequent and less intense in toward the end of the recession in 2009, when many financial institutions were still experiencing stresses. However, it is difficult to disentangle to what extent this reduction is due to firms' aging, fewer investment opportunities, or financing supply constraints.

Note that in the second specification for each dependent variable in Table 5 we include a number of geographical controls, which we match to the KFS based on firm's county. In particular, we include county-level unemployment rate and labor force size as controls for underlying economic conditions. We include total savings institution deposits and number of offices to control for supply-side conditions in the banking market. We also include the number of new single-family houses as a gauge of how affected a county may have been by the housing crisis that occurred during this time. While we find some evidence that having more banks in a firm's county is positively associated with greater use of bank financing, we do not have the power to use these county-level variables as instruments for the availability of financing to further investigate to what extent financing constraints may have affected firm outcomes.

In addition to the regressions presented in Table 5, we also divide firms based on dependence on debt financing, measured at the 2-digit industry level, and explore whether the dynamics of employment, revenues and assets changes based on whether firms are financially dependent. We define financially dependent firms as those in industries for which the average ratio of business debt to total assets is above the population average, as measured in 2006. Figure 2 plots the year fixed effects for regressions of the form in the second specifications in Table 4 (with firm fixed effects). We see that firms in financially dependent industries experience steeper declines in employment and assets during the recession and do not recover as quickly. There is no discernable difference in the dynamics of revenues, however. These results suggest that financial conditions affected firms' experience during the recession and subsequent recovery.

Insert Figure 2 here.

The KFS added special questions starting in 2007 about whether firms applied for new loans and whether they did not apply for new loans because they anticipated being turned down. We use these variables to gauge to what extent firm financing may have been driven by demand conditions versus supply conditions. In Table 6, we estimate probit models (marginal probabilities are reported instead of coefficients) for whether a firm applied for a new loan and for whether a firm wanted to apply but did not because they anticipated being turned down.

Insert Table 6 here.

Columns 1 through 3 of Table 6 estimate probits for whether a firm applied for a new loan. Column 1 just includes year dummies, while columns 2 and 3 include other firm controls. In all specifications, we see that the probability that a firm applied for a loan did not significantly change from during the recession years, but did drop in 2011.[8] However, in columns 4 through 6, we do find evidence that a greater percentage of firms did not apply for loans because they anticipated being denied over the period 2008 to 2010. In particular, over this period, firms were between 4 and 5 percentage point more likely to not apply for loans because they anticipated being turned down compared to 2007. There is no statistically significant difference between the estimated probability in 2011 and 2007.

The evidence in Table 6 suggests that financing conditions were tighter during the recession. We next turn to an investigation of whether firms that anticipated being denied a loan experienced worse outcomes in the following year, to gain a better sense of how financing constraints arising during the Great Recession may have amplified the response in firm outcomes. Table 7 estimates regressions similar to those in Tables2 and 3, but includes the lagged indicator variable for whether a firm did not apply for a loan because they thought they would be denied.

Insert Table 7 here.

Of our main outcome variables – employment (column 1), assets (column 5), and revenues (column 6) – the indicator variable for anticipation of loan denial only enters significantly and negatively for assets,

[8] Unfortunately, it is difficult to know which of these applications were approved or denied. While the KFS asks this question, the response rate is too low to run a regression including all of the control variables.

making a connection between financing constraints and firm asset size. The indicator variable enters negatively for revenues, as well, but is not statistically significant. Interestingly, we also find that firms that anticipate being denied a loan have more full-time employees (column 3) and their owners work more hours (column 4), suggesting that these firms may compensate by being able to obtain more assets or employees by having their existing employee base work more hours.

Overall the evidence presented in Table 7 provides some evidence that financing constraints do negatively affect firm growth and may have contributed to the dampened growth they experienced during the recession and in the years following it.

4. Discussion

In this section we discuss our analysis of the impact of the Great Recession on young firm outcomes in the context of the existing empirical literature. We then discuss the limitations of the KFS in addressing our main question of how the Great Recession affected young firms and consider ways in which future data collection efforts may address them.

4.1. Other Empirical Studies Estimating the Impact of the Great Recession by Firm Age and Size

To our knowledge, there are no papers which systematically estimate the response of firms' assets and investment, employment, wages and revenues to the Great Recession for very young firms. However, it is instructive to discuss several other recent studies for older and larger firms to help gauge how the Great Recession may have had a differential effect on the youngest firms.

Regarding the employment effects of the Great Recession, Chodorow-Reich (2014), Siemer (2014) and Duygan-Bump et al. (2014) each examine the response of employment by different types of firms, based on firms' being financially constrained or more dependent on external financing. Each study finds evidence of a credit channel in reducing firm-level employment during the Great Recession. Chodorow-Reich (2014) finds that during the financial crisis and Great Recession lender health had an economically and statistically significant effect on employment at small and medium firms, but that his data cannot

reject the hypothesis of no effect at the largest or most transparent firms. The firms in his estimation are much larger than in the KFS; the employment size at the 10 percentile in Chodorow-Reich's sample is 77 employees. Likewise, Siemer (2014) shows that financial constraints reduced employment growth in small relative to large firms by 4.8 to 10.5 percentage points. The effect of financial constraints is robust to controlling for aggregate demand and is particularly strong in small young firms. Siemer (2014) defines small firms as those with 50 or fewer employees, and young firms as those aged 5 years or younger. Siemer (2014) cannot observe financing behavior of the firms in his sample directly, but rather relies on industry measures of financial dependence for his estimates. Finally, Duygan-Bump et al (2015) show that workers in small firms, defined as those with fewer than 100 employees, were more likely to become unemployed during the 2007–2009 recession than comparable workers in large firms, but only if they were employed in industries with high financing needs.

These three recent empirical studies suggest that the estimates found in our study for very young firms would not likely be observed if the KFS also surveyed older firms and support the notion that young firms were disproportionately affected by the Great Recession, partially through financial constraints, as well as through the demand channel, as measured by employment. These studies cannot comment on assets or other measures of investment due to the nature of the data they examine. Edgerton (2012) examines whether the Great Recession affected investment in machines by smaller businesses and finds that firms that were dependent on lenders that experienced the most distress during the crisis financed significantly less equipment than average firms after the crisis, consistent with younger and smaller firms being more affected by the Great Recession, in this particular study due to greater financial constraints.

Overall, existing studies on the firm-level effects of the Great Recession indicate that younger firms, particularly those that suffered from greater financial constraints, suffered lower growth in employment and lower investment. These studies cannot, however, examine several economic and financing outcomes at the firm-level simultaneously as we do in our study.

4.2. Weaknesses of the KFS in Measuring the Impact of the Great Recession on Young Firms

While the KFS provides the largest panel data on the economic and financial outcomes of young firms over the Great Recession, allowing us to examine the evolution of several key firm-level outcomes and financing variables over this time period, there are several limitations imposed on the analysis due to the design of the KFS. In this section, we discuss these limitations and consider ways in which future data collection efforts may address them in the subsequent section.

First, because the KFS tracks only one cohort of firms, those founded in 2004, it is difficult, if not impossible, to disentangle age effect from time effects. Indeed, research on Age-Period-Cohort models has shown that panel data from multiple cohorts best identify the causal effects of periodic changes (Yang and Land (2013)). Without multiple cohorts of new businesses, we cannot see the evolution of firm outcomes and financing by young firms as if they never went through an economic crisis during their life cycles. Without reference groups of firms that operate in normal economic conditions, it is difficult to attribute the observed yearly changes in new businesses to the periodic effects of economic recession, because theses may reflect the age-dependent pattern of firm growth rather than a response to fluctuations in economic conditions. Further, to form estimates of how the population of young firms, as a whole, fared during the Great Recession we need panel data from multiple cohorts of firms to examine how the recession affected young firms of different cohorts and ages.

A second limitation of the KFS data is the overall size of the sample. While the survey begins with 4,928 firms in 2004, the size of the sample diminishes over time as some firms go out of business and other simply do not respond to follow-on surveys. During the Great Recession, the number of firms in the KFS ranges between 2,500 and 3,000. Further, if we condition on these firms having non-missing values for the variables we analyze, the number drops to around 2,000, less than half the original sample size. While over 2,000 firms is still a non-trivial sample size, it does mean that there is not large variation at the local geographical level. The KFS collects information on the county in which a firm is located, potentially allowing one to use this geographical information to exploit differential changes in the local economic and financial environment of firms. However, with only a couple thousand firms, there are only a few firms

from each county, at best, not have enough businesses from each county in order to support rigorous county-level analysis.

A third limitation of the KFS is that it does not collect many variables on the terms of financing and types of institutions that provide financing. The KFS does not ask what the typical interest rate charged on debt financing is, which is a key variable to trace of the business cycle in order to assess the impact of financing on economic outcomes. Moreover, information on the type of institution providing financing and its characteristics would allow for a richer examination of which institutions may have cut back their supply of financing during the economic downturn and for what types of firms. Past studies have shown that financial institution characteristics matter for both the pricing and supply of financing. (e.g., Rajan (1992), Petersen and Rajan (1994, 2000), Leary (2009)).

Finally, the KFS collects very little information on the personal wealth, income and finances of the founders of the firms it surveys. Given that the existing literature has established that personal wealth and income is both a determinant of entry into entrepreneurship and a potential source of collateral and financing over the firm's lifecycle (Avery et al. (1998), Hurst and Lusardi (2004) and Holtz-Eakin et al (1994)), such variables would be useful to examine in our analysis of the impact of financing constraints on firm outcomes during the Great Recession.

4.3. Suggestions for Future Data Collection and Measurement Efforts

The Kauffman Foundation has conducted its final survey in 2011 of the panel of firms in the KFS and is currently engaged in new data collection efforts to measure entrepreneurial activity in the U.S. In addition, U.S. government agencies, such as the Census Bureau, are currently considering ways to improve the collection of data and measurement of entrepreneurial activity and the performance of new businesses. Given the limitations of the KFS for our analysis that we considered above, we offer some suggestions for the features of these future data collections efforts that may prove useful in studying the future impact of business cycles on entrepreneurs and their new businesses.

First, while panel data are key to studying firm-level outcomes over time, it is important that multiple cohorts be simultaneously sampled and that one can hopefully disentangle firm age effects from time effects, as well as generate more representative statistics for the population of young firms in the U.S. Because it may be costly to sample new firms every year, it might be feasible to adopt a sampling strategy similar to that employed by the Federal Reserve's Survey of Small Business Finances (SSBF) or the Census Bureau's Longitudinal Research Database (LRD), both of which re-establish a representative stratified random sample of firms at a lower frequency – 3 years in the case of the SSBF and 5 years in the case of the LRD. The re-sampling frame of the SSBF may be more desirable in the case of young firms, since these firms fail at a high frequency and enter at a high frequency. The LRD, which focuses on established manufacturing firms, re-samples at a relatively lower frequency because such firms exhibit less turnover. However, since the LRD both re-samples and tracks of panel of firms over time (McGuckin and Pascoe (1988)), adding new firms to the panel after re-sampling, future data collection efforts for new firms might follow this general approach but with the higher frequency adopted by the SSBF.

Second, in order to ensure a large and representative sample of firms, future data collection efforts should focus on increasing the sample size, perhaps by joining forces with U.S. government agencies also focusing on collecting information on firms. Resampling every several years would serve to maintain the sample size as firms that enter replace those that exit. However, it might be possible to increase the overall sample size. For example, instead of, or in addition to using the D&B database as the basis for the sample, future efforts might use the standard statistical establishment (SSEL) database maintained by the U.S. Census Bureau (in conjunction with the Internal Revenue Service). Using such administrative records as a basis for generating the survey sample might also serve to generate both a more representative and larger sample. As noted above, a larger sample would give greater geographical coverage. With more businesses from the same county, one would be able to merge the data with census level about counties and then test how county-level environmental conditions amplify or reduce the negative influence of economic recessions. In addition, one might be able to exploit plausibly exogenous shocks to some counties in the

local economic environment to better identify the impact of economic and financial shocks on firm outcomes.

Third, future data collection efforts should collect more information on the terms of financing received, the types of institutions providing that financing, as well as the wealth and income of the firms' owners. Such information is needed to assess the interplay between availability and cost of financing and economic outcomes of firms, as distinct from the direct impact of economic shocks. One could envision adding questions to a future survey that are similar to those that have appeared on the SSBF which inquire about the price and sources of financing (e.g., Petersen and Rajan (1994, 2000) and Mach and Wolken (2006)). Questions could also be added on the income and wealth of the equity owners in the firm. One could also envision special questions, asking for more detailed information on the types, pricing, and sources of financing, to be asked on a less frequent basis. In addition, future efforts that are joint with U.S. government agencies might try to realize synergies between datasets collected by those agencies by allowing researchers to link firms across datasets.

Currently the Kauffman Foundation is involved in an effort to revitalize the U.S. Census Survey of Business Owners (SBO) by broadening the survey and expanding the set of questions asked of firms surveyed. This expanded version of the SBO is termed the SBO-X. While still in the early stages of planning and implementation, such an effort holds promise for the study of entrepreneurs and their firms, especially if the effort results in the compilation of a representative panel of firms over a number of years implementing some of the suggestions above.

5. Conclusion

We use the Kauffman Firm Survey (KFS), the largest survey of a panel of young firms spanning the years around and during the Great Recession, to measure and assess the impact of this economic and financial crisis on the performance of young firms.

We find that young firms experienced much lower employment, assets, and revenue growth than would have been otherwise expected during the primary years of the recession. Moreover, our firm-level

estimates that, when aggregated, these effects are economically meaningful. We also find evidence that firms were more financially constrained during the recession and in the period immediately following. More firms reported not applying for loans because they anticipated being turned down. Moreover, such firms experienced lower asset and revenue growth, despite their owners and employees working more hours. This evidence suggests that financing constraints, in addition to demand shocks, played a role in the diminished performance experienced by young firms during the Great Recession.

While the KFS allows a unique view of young firm economic and financing outcomes over the Great Recession, its design makes it difficult in some cases to disentangle firm age effects from time effects. Moreover, the relatively small sample sizes within specific local geographies eliminates the ability to use local geographical variation in economic and financial conditions to better identify the impact of the recession on young firms. We conclude with some suggestions for how future data collection and measurement efforts may overcome these limitations.

References

Adrian, Tobias, Paolo Colla, and Hyun Song Shin, 2013, ‘‘Which Financial Frictions? Parsing the Evidence from the Financial Crisis of 2007–09,’’ in Daron Acemoglu, Jonathan Parker, and Michael Woodford, eds., *NBER Macroeconomics Annual 2012* (Chicago: University of Chicago Press).

Avery, Robert B. and Raphael W. Bostic and Katherine A. Samolyk, 1998. “The role of personal wealth in small business finance," *Journal of Banking and Finance*, 22: 1019 - 1061

BED. 2011, "http://www.bls.gov/Bdm/Bdmfaq.Htm#5": Bureau of Labor Statistics. Retrieved June 14th, 2011.

Chodorow-Reich, Gabriel. 2014, “The Employment Effects of Credit Market Disruptions: Evidence from the Financial Crisis of 2008-2009”, *Quarterly Journal of Economics* 129(1): 1-59.

Davis, Steven J., John Haltiwanger, Ron S. Jarmin, C. J. Krizan, Javier Miranda, Alfred Nucci, Kristen Sandusky. 2007, “Measuring the Dynamics of Young and Small Businesses: Integrating the Employer and Non-Employer Universes”, NBER Working Paper #13226.

DesRoches, David, Tom Barton, Janice Ballou, Frank Potter, Zhanyun Zhao, Betsy Santos and Jaceey Sebastian. 2007. "Kauffman Firm Survey (KFS) Baseline Methodology Report." Kauffman Foundation.

Duygan-Bump, Burcu, Alexey Levkov, and Judit Montoriol-Garriga, 2015, ‘‘Financing Constraints and Unemployment: Evidence from the Great Recession,’’ *Journal of Monetary Economics*, 75, 89-105.

Edgerton, Jesse, 2012, “Credit Supply and Business Investment During the Great Recession: Evidence from Public Records of Equipment Financing”, working paper.

Farhat, Joseph and Alicia Robb. 2014, “Applied Survey Analysis Using STATA: The Kauffman Firm Survey”, Kansas City, MO: Ewing Marion Kauffman Foundation.

Fort, Teresa, John Haltiwanger, Ron S. Jarmin and Javier Miranda, 2013, “How Firms Respond to Business Cycles: The Role of the Firm Age and Firm Size” *IMF Economic Review* 520-559.

Gertler, Mark and Simon Gilchrest, 1994, “Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms,” *The Quarterly Journal of Economics*, 109 (2), 309-340.

Haltiwanger, John, Ron S. Jarmin and Javier Miranda. 2013, “Who Creates Jobs? Small vs. Large vs. Young”, *Review of Economics and Statistics*, 95(2): 347-361.

Haltiwanger, John and Ron S. Jarmin, 2007, “Integrated Longitudinal Business Database: Data Overview”, available at http://papers.ssrn.com/paper=1028258

Hancock, Diana, and James A. Wilcox, 1998, “The “credit crunch” and the availability of credit to small businesses,” *Journal of Banking and Finance* 22, 983–1014.

Hurst, Erik and Annamaria Lusardi, 2004. “Liquidity Constraints, Household Wealth, and

Entrepreneurship", *Journal of Political Economy*, 112:319-324.

Holtz-Eakin, Douglas, David Joulfaian and Harvey S. Rosen. 1994, "Sticking It Out: Entrepreneurial Survival and Liquidity Constraints", *Journal of Political Economy* 102: 53-75.

Jarmin, Ron S. and Javier Miranda. 2002, "The Longitudinal Business Database", CES-WP-02-17, U.S. Census Bureau.

Leary, Mark T., 2009, "Bank Loan Supply, Lender Choice, and Corporate Capital Structure", *Journal of Finance* 64(3): 1143-1185.

Mach, Traci, and John Wolken, 2006 ''Financial Services Used by Small Businesses: Evidence from the 2003 Survey of Small Business Finances,'' *Federal Reserve Bulletin* (October 2006), 167–195

McGuckin, Robert H. and Geroge A. Pascoe. 1988, "The Longitudinal Research Database (LRD): Status and Research Possibilities", CES-WP-88-02, U.S. Census Bureau.

Petersen, Mitchell and Raghuram Rajan, 1994. "The benefits of lending relationships: evidence from small business lending," *Journal of Finance* 49(1): 3-37.

Petersen, Mitchell and Raghuram Rajan, 2000. "Does distance still matter? The information revolution in small business lending," NBER Working Paper #7685.

Puri, Manju and Rebecca Zarutskie, 2012, "On the Lifecycle Dynamics of Venture-Capital- and Non-Venture-Capital-Financed Firms," *Journal of Finance* 67(6): 2247-2293.

Rajan, Raghuram G., 1992, "Insiders and outsiders: The choice between informed and arm's length debt", *Journal of Finance* 47: 1367–1400.

Reynolds, Paul D. and Richard Curtin, eds. 2009. *New Firm Creation in the United States: Initial Explorations with the PSED II Data Set* New York: Springer.

Robb, Alicia, E. J. Reedy, Janice Ballou, David DesRoches, Frank Potter and Zhao Zhanyun. 2010. "An Overview of the Kauffman Firm Survey: Results from the 2004-2008 Data." Kansas City, MO: Kauffman Foundation.

Robb, Alicia M. and David T. Robinson, 2014, "The Capital Structure Decisions of New Firms", *Review of Financial Studies*, 27(1): 153-179.

Searson, Michael, Kenneth Robertson and Richard L. Clayton. 2000, "The U.S. Bureau of Labor Statistics Longitudinal Establishment Database", BLS working paper available at http://www.bls.gov/ore/pdf/st000060.pdf

Siemer, Michael, 2014, "Firm Entry and Employment Dynamics During the Great Recession", Federal Reserve Board: FEDS Working paper 2014-56.

Yang, Tiantian and Howard Edward Aldrich. 2012. "Out of Sight but Not out of Mind: Why Failure to Account for Left Truncation Biases Research on Failure Rates." *Journal of Business Venturing* 27(4):477-92.

Yang, Yang and Kenneth Land. 2013. *Age-Period-Cohort Analysis: New Models, Methods, and Empirical Applications*. New York: Chapmen & Hall/CRC Press

Table 1a. Firm-level Economic Variables

	2004-2011	2004	2005	2006	2007	2008	2009	2010	2011
Total Employees	3.36	1.87	3.20	3.53	3.69	3.73	3.70	3.92	4.57
	0.16	*0.09*	*0.14*	*0.16*	*0.23*	*0.25*	*0.28*	*0.32*	*0.46*
% Full Time Employees	65.6%	67.1%	66.3%	68.2%	64.7%	63.7%	64.3%	62.6%	64.9%
	0.7%	*1.0%*	*1.0%*	*1.0%*	*1.1%*	*1.2%*	*1.3%*	*1.4%*	*1.4%*
Wage per Employee	36,740	15,281	31,241	40,844	30,784	32,735	35,906	49,086	75,159
	2,837	*749*	*6,823*	*8,138*	*1,766*	*1,701*	*2,496*	*11,133*	*19,467*
Hours Worked per Week by Primary Owner	41.0	42.6	43.0	42.4	40.8	39.8	39.0	38.1	38.4
	0.37	*0.40*	*0.41*	*0.47*	*0.50*	*0.53*	*0.56*	*0.56*	*0.59*
Total Assets (dollars)	1,037,596	346,338	721,356	791,815	1,163,242	774,371	1,360,510	1,048,598	3,169,027
	212,057	*132,284*	*330,397*	*250,713*	*408,710*	*254,457*	*598,936*	*403,375*	*1,267,405*
Revenues (dollars)	726,622	157,915	411,720	624,541	717,468	643,055	1,078,788	1,142,535	1,901,893
	81,481	*21,350*	*75,814*	*138,828*	*130,032*	*112,547*	*315,555*	*279,879*	*578,752*
Profits (dollars)	64,627	-3,906	19,005	27,264	47,140	14,505	21,459	31,954	535,490
	41,407	*2,800*	*7,879*	*17,042*	*21,182*	*18,333*	*22,927*	*15,343*	*480,441*
% Shut Down	9.5%	0.0%	7.5%	11.5%	13.8%	14.6%	12.3%	12.3%	11.4%

Statistics are based on the Kauffman Firm Survey using the stratified sample weights. Sample means are reported; standard errors are reported in italics Please see Section 4 of the text for variable descriptions.

Table 1b. Firm-level Financing Variables

	2004-2011	2004	2005	2006	2007	2008	2009	2010	2011
Has Business Bank Debt	16.4%	12.7%	15.3%	17.4%	18.8%	18.9%	17.8%	16.5%	16.4%
Has Personal Bank Debt	12.5%	18.6%	14.4%	13.8%	11.2%	11.0%	9.7%	7.3%	6.0%
Business Debt/Total Assets	0.219	0.261	0.169	0.211	0.227	0.283	0.214	0.165	0.210
	0.011	*0.022*	*0.015*	*0.021*	*0.027*	*0.031*	*0.025*	*0.021*	*0.037*
Personal Debt/Total Assets	0.442	0.673	0.394	0.398	0.394	0.419	0.422	0.388	0.351
	0.017	*0.035*	*0.024*	*0.028*	*0.034*	*0.035*	*0.037*	*0.040*	*0.048*
Owner-Operator Equity	0.601	1.680	0.503	0.406	0.376	0.393	0.294	0.310	0.492
Invested/Total Assets	*0.037*	*0.138*	*0.040*	*0.069*	*0.087*	*0.098*	*0.043*	*0.066*	*0.147*
Non-Owner-Operator Equity	0.214	0.505	0.142	0.156	0.061	0.280	0.259	0.142	0.128
Invested/Total Assets	*0.057*	*0.131*	*0.026*	*0.074*	*0.015*	*0.230*	*0.219*	*0.098*	*0.059*

Statistics are based on the Kauffman Firm Survey using the stratified sample weights. Sample means are reported; standard errors are reported in italics Please see Section 4 of the text for variable descriptions.

Table 1c. Firm Owner Characteristics

	2004-2011	2004	2005	2006	2007	2008	2009	2010	2011
Number of Owners	1.81	1.69	1.83	1.84	1.79	1.89	1.90	1.76	1.88
	0.07	*0.05*	*0.08*	*0.08*	*0.08*	*0.12*	*0.13*	*0.12*	*0.13*
Percent Equity Owned by Primary Owner	81.4%	80.4%	80.3%	81.2%	81.2%	81.9%	82.2%	82.8%	83.4%
	0.46%	*0.46%*	*0.51%*	*0.55%*	*0.59%*	*0.62%*	*0.65%*	*0.69%*	*0.69%*
Primary Owner Age	46.8	44.5	45.7	46.8	48.0	49.1	50.1	45.4	46.3
	0.20	*0.18*	*0.20*	*0.22*	*0.23*	*0.25*	*0.25*	*0.27*	*0.28*
Primary Owner is Male	69.5%	68.5%	69.0%	70.3%	70.2%	69.4%	69.5%	69.9%	69.6%
Primary Owner is White	82.0%	81.0%	81.4%	81.9%	82.2%	82.8%	82.8%	82.7%	82.7%
High-Tech Industry	5.8%	5.6%	4.9%	5.6%	5.7%	5.9%	6.3%	6.9%	6.5%
Firm Has Intellectual Property	19.4%	19.1%	19.7%	20.6%	19.9%	19.9%	18.4%	19.0%	18.1%

Statistics are based on the Kauffman Firm Survey using the stratified sample weights. Sample means are reported; standard errors are reported in italics Please see Section 4 of the text for variable descriptions.

Table 2. Regression Analysis of Firm Employment Outcomes

	Ln(Employment)			Ln(Wages/Employment)			Full-Time Employment/Employment			Ln(Primary Owner Weekly Hours Worked)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Ln(Employment(t-1))		0.824**	0.816**		-0.314**	-0.328**		-0.072**	-0.073**		-0.021	-0.012
		58.79	*47.99*		*-10.40*	*-9.50*		*-3.23*	*-2.89*		*-1.03*	*-0.58*
Ln(Assets(t-1))		0.023**	0.021**		0.058**	0.027		0.020	0.025		0.010	0.025
		3.22	*2.60*		*2.71*	*1.00*		*1.56*	*1.49*		*0.69*	*1.59*
Ln(Revenues(t-1))		0.038**	0.035**		0.494**	0.506**		0.099**	0.098**		0.128**	0.133**
		5.15	*4.28*		*17.62*	*15.10*		*7.00*	*5.80*		*9.32*	*8.28*
High-Tech Industry		0.020	-0.008		0.531**	0.469		0.095*	0.070		-0.022	-0.012
		0.84	*-0.27*		*8.49*	*6.62*		*2.03*	*1.45*		*-0.48*	*-0.25*
Has Intellectual Property		0.033	0.020		0.029	-0.048		-0.074*	-0.111*		-0.004	-0.003
		1.56	*0.85*		*0.50*	*-0.66*		*-1.95*	*-2.51*		*-0.09*	*-0.07*
Constant	1.10**	-0.437**	0.025	9.72**	3.44**	4.14**	0.894**	-0.446**	0.151	3.49**	2.12**	2.33**
	42.71	*-5.84*	*0.14*	*232.08*	*12.76*	*6.92*	*36.78*	*-3.11*	*0.39*	*192.20*	*14.63*	*7.88*
Year 2007	0.100**	-0.063*	-0.040	0.015	-0.074	-0.032	-0.083**	-0.122**	-0.115**	-0.059**	-0.074**	-0.066*
	3.84	*-2.02*	*-1.22*	*0.30*	*-1.28*	*-0.49*	*-2.90*	*-3.52*	*-3.06*	*-3.47*	*-2.85*	*-2.29*
Year 2008	0.072*	-0.110**	-0.105**	0.089	-0.065	0.002	-0.109**	-0.183**	-0.167**	-0.071**	-0.094**	-0.088**
	2.45	*-4.02*	*-3.44*	*1.65*	*-1.08*	*0.04*	*-3.52*	*-4.80*	*-3.91*	*-3.75*	*-3.32*	*-2.74*
Year 2009	0.117**	-0.110**	-0.134**	-0.037	-0.184**	-0.086	-0.103**	-0.211**	-0.170**	-0.104**	-0.122**	-0.103**
	3.61	*-3.42*	*-3.86*	*-0.57*	*-2.74*	*-1.12*	*-3.09*	*-5.17*	*-3.64*	*-4.94*	*-3.92*	*-2.90*
Year 2010	0.166**	-0.043	-0.049	-0.043	-0.201**	-0.147	-0.148**	-0.212**	-0.183**	-0.126**	-0.095**	-0.095**
	4.68	*-1.52*	*-1.54*	*-0.65*	*-2.62*	*-1.50*	*-4.33*	*-5.35*	*-3.86*	*-5.45*	*-3.13*	*-2.62*
Year 2011	0.197**	-0.062*	-0.054	0.099	-0.083	0.017	-0.094**	-0.186**	-0.166**	-0.120**	-0.130**	-0.110**
	5.14	*-2.15*	*-1.52*	*1.38*	*-1.20*	*0.20*	*-2.68*	*-4.63*	*-3.42*	*-4.92*	*-4.06*	*-3.14*
R^2	0.004	0.759	0.758	0.001	0.330	0.346	----	----	----	0.002	0.132	0.149
F-statistic	----	----	----	----	----	----	4.30	11.96	5.98	----	----	----
Other Controls?	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Number of Observations	8,457	4,811	3,701	7,203	4,452	3,420	8,065	4,639	3,573	14,579	5,553	4,424
Number of Firms	2,752	1,739	1,522	2,328	1,591	1,392	2,673	1,696	1,479	3,610	2,106	1,878
Dependent Variable Mean	1.20	1.35	1.32	9.74	9.90	9.90	0.65	0.66	0.66	3.42	3.68	3.69
Estimation Method	OLS	OLS	OLS	OLS	OLS	OLS	Tobit	Tobit	Tobit	OLS	OLS	OLS

Estimates are based on the Kauffman Firm Survey years 2006-2011 using the stratified sample weights. Coefficients are reported follwed by t-statistics accounting for clustering at the firm level. Other controls include Business Debt(t-1)/Assets(t-1), Personal Debt(t-1)/Assets(t-1), Equity Invested(t-1)/Assets(t-1), Ln(Number of Owners(t-1)), Ln(Primary Owner Age(t-1)), and indicators for whether the primary owner is male and white. Please see Section 4 of the text for variable descriptions. ** indicates statistical significance at the 1% level; * indicates statistical significance at the 5% level.

Table 3. Regression Analysis of Firm Assets, Revenues, and Probability of Shutting Down

	Ln(Assets)			Ln(Revenues)			Firm Shuts Down		
	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)
Ln(Employment(t-1))		0.122**	0.091**		0.192**	0.188**		0.001	0.003
		5.40	*3.58*		*7.90*	*6.68*		*0.35*	*0.66*
Ln(Assets(t-1))		0.729**	0.725**		0.154**	0.153**		-0.005*	-0.002
		27.37	*23.61*		*8.32*	*6.65*		*-2.48*	*-0.85*
Ln(Revenues(t-1))		0.146**	0.146**		0.713**	0.701**		-0.004*	-0.005*
		7.15	*6.55*		*23.59*	*18.90*		*-2.00*	*-2.52*
High-Tech Industry		-0.025	-0.046		0.063	0.032		-0.026**	-0.018*
		-0.51	*-0.76*		*1.68*	*0.74*		*-3.44*	*-2.15*
Has Intellectual Property		0.042	0.020		0.072*	0.045		0.008	0.005
		1.06	*0.47*		*2.19*	*1.12*		*1.27*	*0.76*
Constant	10.73**	1.25**	1.44**	11.41**	1.75**	2.36**			
	240.84	*7.28*	*3.99*	*226.31*	*8.38*	*5.85*			
Year 2007	0.015	-0.118*	-0.083	0.123**	-0.138*	-0.105	0.024**	0.009	0.005
	0.34	*-2.21*	*-1.40*	*2.67*	*-2.42*	*-1.63*	*3.21*	*1.15*	*0.64*
Year 2008	-0.079	-0.142*	-0.100	0.111*	-0.218**	-0.177**	0.032**	-0.011	-0.018*
	-1.55	*-2.59*	*-1.63*	*2.16*	*-3.85*	*-2.75*	*4.00*	*-1.31*	*-2.03*
Year 2009	-0.085	-0.205**	-0.181**	-0.008	-0.348**	-0.310**	0.009	-0.007	-0.009
	-1.62	*-3.35*	*-2.84*	*-0.14*	*-6.27*	*-4.78*	*1.04*	*-0.77*	*-0.96*
Year 2010	-0.081	-0.093	-0.085	0.040	-0.188**	-0.130	0.009	-0.011	-0.020*
	-1.42	*-1.48*	*-1.21*	*0.69*	*-3.08*	*-1.77*	*1.00*	*-1.27*	*-2.08*
Year 2011	0.010	-0.077	-0.083	0.131*	-0.155**	-0.153*	0.000	-0.030**	-0.034**
	0.16	*-1.21*	*-1.26*	*2.09*	*-2.74*	*-2.40*	*-0.05*	*-3.50*	*-3.47*
R^2/Pseudo-R^2	0.000	0.709	0.703	0.001	0.760	0.759	0.002	0.030	0.034
Other Controls?	No	No	Yes	No	No	Yes	No	No	Yes
Number of Observations	13,052	5,267	4,095	12,232	5,269	4,065	17,975	6,260	4,830
Number of Firms	3,531	2,027	1,779	3,325	1,995	1,733	4,427	2,365	2,071
Dependent variable Mean	10.7	11.4	11.3	11.5	12.4	12.3	0.13	0.05	0.05
Estimation Method	OLS	OLS	OLS	OLS	OLS	OLS	Probit	Probit	Probit

Estimates are based on the Kauffman Firm Survey years 2006-2011 using the stratified sample weights. Columns 1 through 6 report estimated coefficients followed by t-statistics accounting for clustering at the firm level. Columns 7, 8 and 9 report marginal probabilities calculated at the sample mean, rather than coefficients, followed by z-statistics accounting for clustering at the firm level. Other controls include Business Debt(t-1)/Assets(t-1), Personal Debt(t-1)/Assets(t-1), Equity Invested(t-1)/Assets(t-1), Ln(Number of Owners(t-1)), Ln(Primary Owner Age(t-1)), and indicators for whether the primary owner is male and white. Please see Section 4 of the text for variable descriptions. ** indicates statistical significance at the 1% level; * indicates statistical significance at the 5% level.

Table 4. Panel Regression Analysis with Firm Fixed Effects

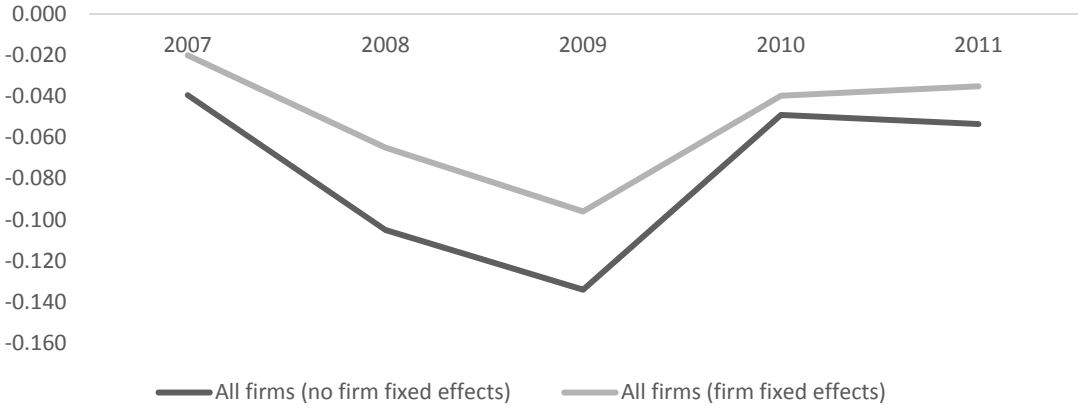
	Ln(Employment)		Ln(Wages/ Employment)		Full-Time Employment/ Employment		Ln(Primary Owner Weekly Hours Worked)		Ln(Assets)		Ln(Revenues)	
	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(11)	(12)	(13)
Ln(Employment(t-1))		0.228**		0.022**		0.006		0.014		0.177**		0.356**
		4.24		*2.80*		*0.33*		*1.06*		*2.60*		*5.28*
Ln(Assets(t-1))		0.022		0.034		0.004		0.009		0.041		0.086**
		1.38		*1.13*		*0.67*		*1.19*		*0.91*		*3.10*
Ln(Revenues(t-1))		0.026		0.012		0.008		0.008		0.086**		-0.047
		1.93		*0.44*		*1.09*		*0.83*		*3.58*		*-1.00*
Has Intellectual Property		-0.012		0.153		-0.003		0.010		0.026		0.028
		-0.23		*1.51*		*-0.12*		*0.51*		*0.24*		*0.38*
Constant	1.17**	0.490*	9.68**	9.01**	0.700**	0.552**	3.52**	3.57**	10.71**	9.71**	11.47**	11.56**
	70.99	*2.53*	*279.84*	*20.28*	*81.84*	*5.49*	*349.29*	*31.58*	*396.59*	*20.69*	*455.83*	*23.42*
Year 2007	0.007	-0.020	0.046	0.088	-0.500**	-0.040*	-0.071**	-0.060**	0.003	-0.052	0.060	0.074
	0.35	*-0.69*	*0.94*	*1.51*	*-3.98*	*-2.39*	*-5.24*	*-3.21*	*0.09*	*-1.00*	*1.90*	*1.50*
Year 2008	-0.005	-0.065*	0.116*	0.146*	-0.068**	-0.046*	-0.094**	-0.095**	-0.056	-0.056	0.057	0.015
	-0.22	*-2.16*	*2.34*	*2.20*	*-4.92*	*-2.50*	*-6.00*	*-4.66*	*-1.35*	*-0.89*	*1.58*	*0.23*
Year 2009	-0.033	-0.096**	0.113*	0.190**	-0.063**	-0.062**	-0.139**	-0.129**	-0.109*	-0.148*	-0.064	-0.061
	-1.15	*-2.63*	*1.99*	*2.79*	*-4.24*	*-3.24*	*-8.13*	*-5.71*	*-2.56*	*-2.20*	*-1.62*	*-0.93*
Year 2010	0.009	-0.040	0.036	0.044	-0.081**	-0.076**	-0.165**	-0.125**	-0.126*	-0.170*	-0.048	-0.065
	0.29	*-1.11*	*0.55*	*0.55*	*-5.22*	*-3.82*	*-9.01*	*-5.39*	*-2.52*	*-2.20*	*-1.08*	*-0.88*
Year 2011	0.021	-0.035	0.141*	0.140*	-0.066**	-0.057**	-0.209**	-0.171**	-0.123*	-0.078	0.005	0.021
	0.63	*-0.95*	*2.42*	*2.05*	*-4.20*	*-2.85*	*-10.79*	*-6.69*	*-2.55*	*-1.02*	*0.12*	*0.30*
R^2 (within)	0.002	0.079	0.004	0.022	0.015	0.012	0.027	0.036	0.003	0.027	0.004	0.056
Number of Observations	6,282	3,848	5,354	3,565	5,947	3,695	11,357	4,533	10,179	4,260	9,595	4,291
Number of Firms	1,850	1,266	1,543	1,157	1,788	1,230	2,458	1,581	2,414	1,523	2,287	1,503
Dependent Variable Mean	1.17	1.35	9.9	10.0	0.66	0.68	3.36	3.66	10.6	11.4	11.4	12.4
Estimation Method	OLS	OLS	OLS	OLS	Tobit	Tobit	OLS	OLS	OLS	OLS	OLS	OLS

Estimates are based on the Kauffman Firm Survey years 2006-2011 using the stratified sample weights. Coefficients are reported follwed by t-statistics accounting for clustering at the firm level. Please see Section 4 of the text for variable descriptions.
** indicates statistical significance at the 1% level; * indicates statistical significance at the 5% level.

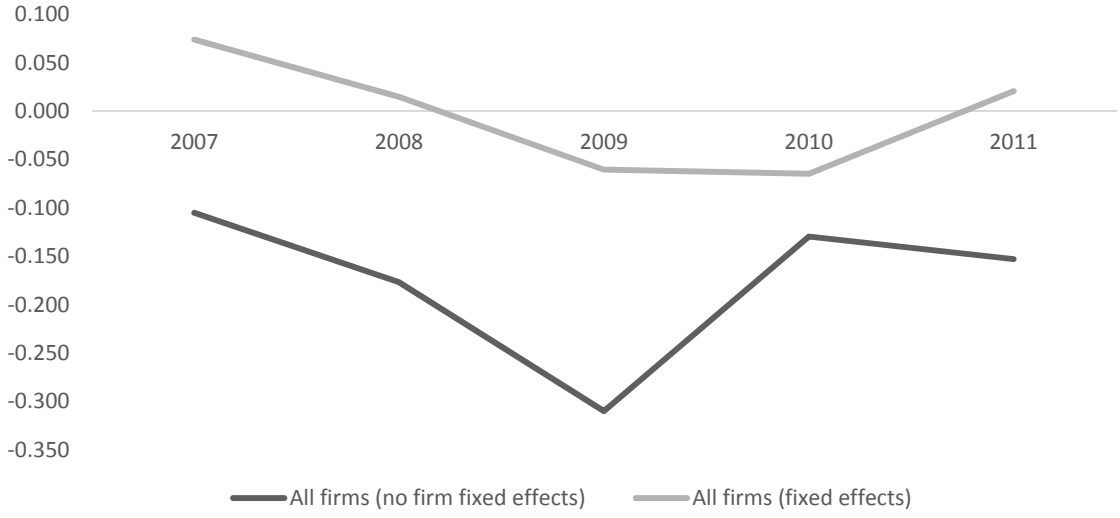
Figure 1. Change in Employment, Revenues and Assets 2007 to 2011 relative to 2006

Coefficients on the year fixed effects (relative to year 2006) are plotted for regressions using KFS panel data in the form of equation 1, 2, and 6 with covariates in the third specification of Tables 2 and 3 (no firm fixed effects) and the second specification of Table 4 (firm fixed effects).

a. Employment



b. Revenues



c. Assets

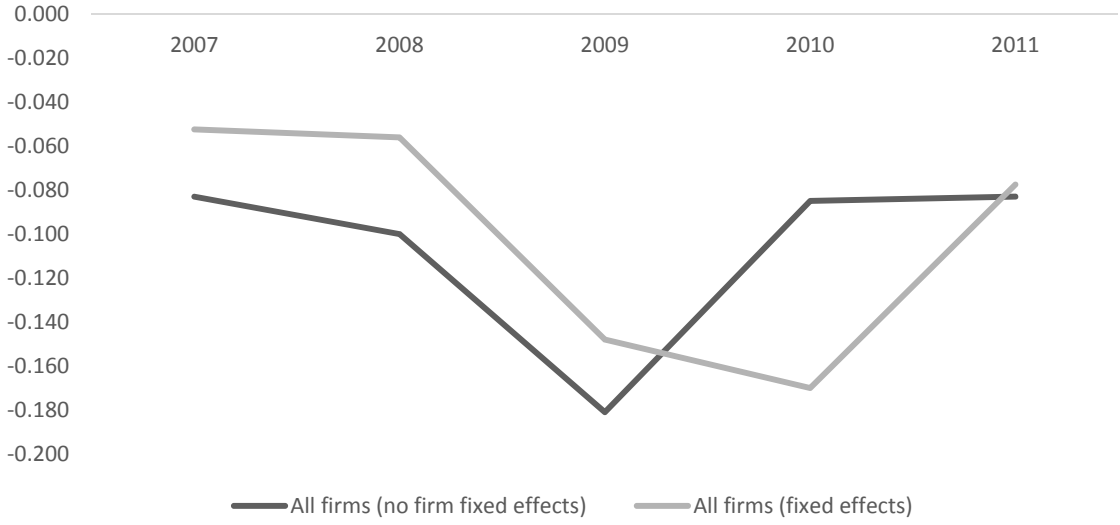


Table 5. Regression Analysis of Firm Financing

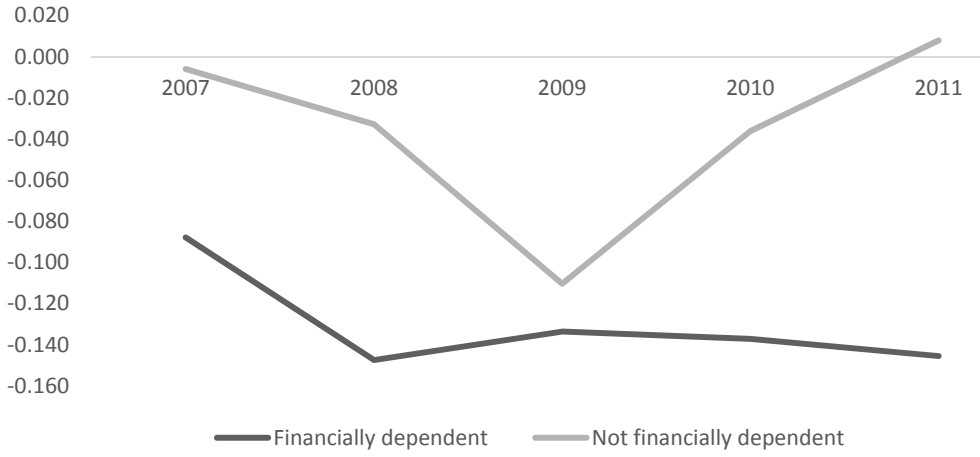
	Has Business Bank Loan		Has Personal Bank Loan		Business Debt/ Total Assets		Personal Debt/ Total Assets		Equity Invested/ Total Assets	
	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(11)
Ln(Employment(t-1))		0.038**		0.003		0.086		0.041		0.213*
		3.78		*0.48*		*1.94*		*0.84*		*2.22*
Ln(Assets(t-1))		0.022**		0.019**		0.044		-0.002		0.104
		3.31		*4.76*		*1.36*		*-0.08*		*1.67*
Ln(Revenues(t-1))		0.054**		-0.002		0.080*		-0.021		-0.419**
		7.92		*-0.42*		*2.33*		*-0.65*		*-4.60*
High-Tech Industry		0.034		-0.035*		-0.091		-0.405**		0.489
		1.38		*-2.46*		*-0.80*		*-3.10*		*1.29*
Has Intellectual Property		-0.006		0.018		0.162		0.176*		0.526**
		-0.32		*1.42*		*1.76*		*2.08*		*2.62*
Constant					-1.26**	-1.36	-0.675**	-0.680	-3.89**	-0.920
					-12.75	*-1.05*	*-11.05*	*-0.52*	*-5.83*	*-0.40*
Year 2007	0.012	-0.006	-0.017**	-0.018	0.005	-0.160	-0.029	-0.017	-0.795**	-0.176
	1.67	*-0.36*	*-3.01*	*-1.55*	*0.06*	*-1.73*	*-0.42*	*-0.15*	*-3.07*	*-1.03*
Year 2008	0.017*	-0.011	-0.020**	-0.022	0.130	0.082	0.055	0.067	-0.919**	-0.047
	2.24	*-0.58*	*-3.48*	*-1.84*	*1.62*	*0.83*	*0.74*	*0.60*	*-3.42*	*-0.25*
Year 2009	0.007	-0.037	-0.030**	-0.027	-0.088	-0.129	-0.027	-0.251*	-1.93**	-0.485*
	0.88	*-1.78*	*-4.63*	*-1.85*	*-1.02*	*-1.07*	*-0.34*	*-1.99*	*-5.87*	*-2.03*
Year 2010	-0.003	-0.029	-0.051**	-0.047*	-0.256**	-0.141	-0.151	-0.240	-2.23**	-0.817*
	-0.29	*-1.00*	*-7.81*	*-2.54*	*-2.82*	*-0.95*	*-1.75*	*-1.46*	*-5.15*	*-2.45*
Year 2011	-0.005	-0.062*	-0.056**	-0.049*	-0.210*	-0.044	-0.347	-0.310	-2.15**	-0.726*
	-0.49	*-2.14*	*-8.25*	*-2.58*	*-1.99*	*-0.25*	*0.00*	*-1.64*	*-4.58*	*-2.11*
Pseudo-R^2	0.000	0.115	0.010	0.032	----	----	----	----	----	----
F-statistic	----	----	----	----	3.67	6.20	3.27	6.92	8.21	2.53
Other Controls?	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Number of Observations	15,388	5,565	15,388	5,561	10,662	3,879	11,977	4,533	12,868	4,920
Number of Firms	3,704	2,114	3,703	2,118	3,198	1,675	3,380	1,838	3,515	1,948
Dependent Variable Mean	0.18	0.27	0.10	0.12	0.22	0.22	0.40	0.35	0.45	0.23
Estimation Method	Probit	Probit	Probit	Probit	Tobit	Tobit	Tobit	Tobit	Tobit	Tobit

Estimates are based on the Kauffman Firm Survey years 2006-2011 using the stratified sample weights. Columns 1 through 4 report marginal probabilities calculated at the sample mean, rather than coefficients, followed by z-statistics accounting for clustering at the firm level. Columns 5 through 6 report estimated coefficients followed by t-statistics accounting for clustering at the firm level. Other firm-level controls include Business Debt(t-1)/Assets(t-1), Personal Debt(t-1)/Assets(t-1), Equity Invested(t-1)/Assets(t-1), Ln(Number of Owners(t-1)), Ln(Primary Owner Age(t-1)), indicators for whether the primary owner is male and white. Other geography-level controls include Unemployment Rate(t-1), Ln(Labor Force(t-1)), Ln(Banking Institution Offices(t-1)), Ln(Banking Institution Deposits(t-1)), and Ln(New House Construction(t-1)). Please see Section 4 of the text for variable descriptions. ** indicates statistical significance at the 1% level; * indicates statistical significance at the 5% level.

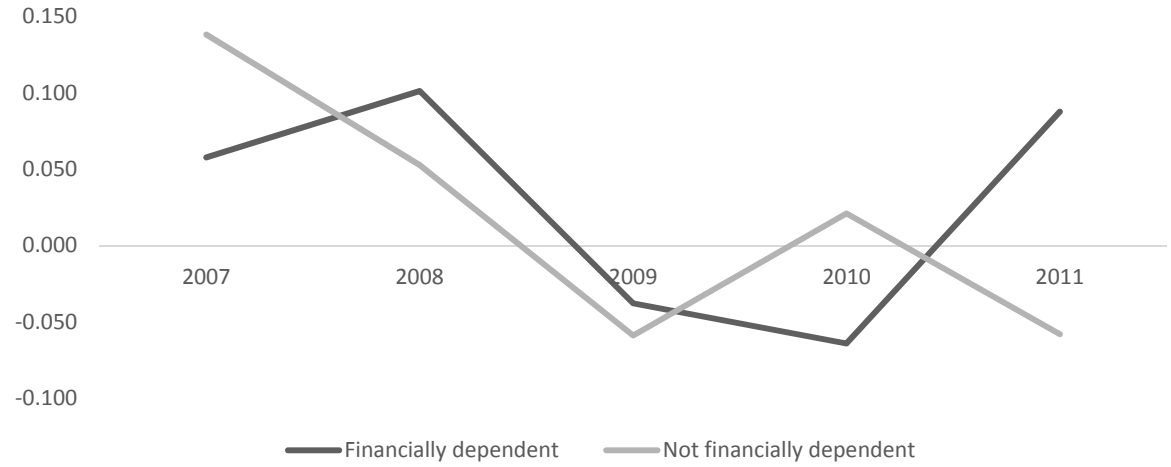
Figure 2. Change in Employment, Revenues and Assets 2007 to 2011 relative to 2006, by Financial Dependence

Coefficients on the year fixed effects (relative to year 2006) are plotted for regressions using KFS panel data in the form of equation 1, 2, and 6 with covariates in the second specification of Table 4 (firm fixed effects). Firms are classified as being financially dependent if they are in an industry with a debt to asset ratio above the population average in 2006.

a. Employment



b. Revenues



c. Assets

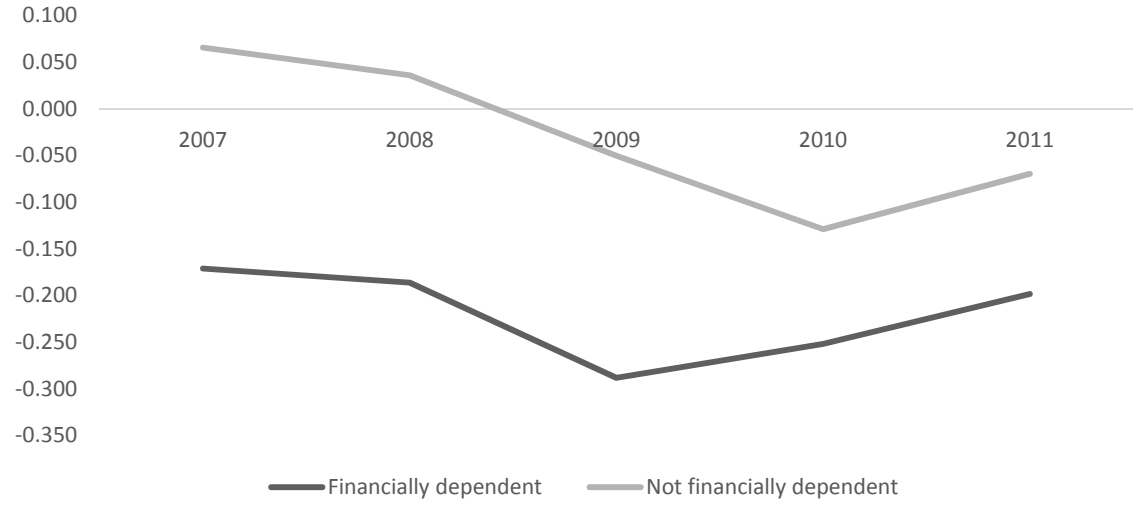


Table 6. Probit Analysis of Whether a Firm Applied for a New Loan, 2007-2011

	Applied for a New Loan			Did Not Apply Because Would be Denied		
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Employment(t-1))		0.009	0.005		0.013	0.010
		1.07	*0.53*		*1.44*	*1.01*
Ln(Assets(t-1))		0.020**	0.030**		0.001	0.008
		3.67	*4.84*		*0.15*	*1.30*
Ln(Revenues(t-1))		0.035**	0.030**		-0.016**	-0.016*
		5.98	*4.69*		*-2.83*	*-2.53*
Business Debt(t-1)/Assets(t-1)			0.030**			0.013
			3.71			*1.39*
Personal Debt(t-1)/Assets(t-1)			0.012			0.028**
			1.73			*4.35*
Equity Invested(t-1)/Assets(t-1)			-0.001			-0.001
			-0.51			*-0.38*
Ln(Number of Owners(t-1))		0.008	0.010		0.021	0.025
		0.72	*0.82*		*1.48*	*1.69*
Ln(Primary Owner Age(t-1))		-0.018	-0.024		-0.050	-0.053
		-0.52	*-0.65*		*-1.37*	*-1.33*
Primary Owner Male		-0.027	-0.027		-0.040	-0.052*
		-1.46	*-1.40*		*-1.86*	*-2.27*
Primary Owner White		0.033	0.037		-0.115**	-0.104**
		1.59	*1.63*		*-4.73*	*-3.91*
High-Tech Industry		0.028	0.028		-0.035	-0.034
		1.40	*1.34*		*-1.51*	*-1.37*
Has Intellectual Property		-0.043	-0.054**		0.063**	0.051*
		-2.70	*-3.19*		*3.46*	*2.54*
Year 2008	0.007	-0.003	-0.005	0.023**	0.046**	0.044*
	0.90	*-0.22*	*-0.29*	*2.85*	*2.99*	*2.53*
Year 2009	0.003	0.000	0.004	0.041**	0.046**	0.042*
	0.44	*0.03*	*0.23*	*4.68*	*2.67*	*2.13*
Year 2010	-0.012	-0.021	-0.029	0.028**	0.062**	0.054**
	-1.54	*-1.30*	*-1.54*	*2.99*	*3.46*	*2.63*
Year 2011	-0.016	-0.052**	-0.055**	0.011	0.023	0.024
	-1.91	*-3.20*	*-2.89*	*1.18*	*1.24*	*1.15*
Pseudo-R^2	0.001	0.082	0.091	0.002	0.028	0.034
Number of Observations	12,035	4,402	3,446	12,036	4,400	3,441
Number of Firms	3,234	1,786	1,550	3,236	1,787	1,549
Dependent Variable Mean	0.12	0.19	0.19	0.17	0.19	0.19
Estimation Method	Probit	Probit	Probit	Probit	Probit	Probit

Estimates are based on the Kauffman Firm Survey years 200-2011 using the stratified sample weights. The table reports marginal probabilities calculated at the sample mean, rather than coefficients, followed by z-statistics accounting for clustering at the firm level. Please see Section 4 of the text for variable descriptions. ** indicates statistical significance at the 1% level; * indicates statistical significance at the 5% level.

Table 7. Relation between Anticipated Loan Denial and Subsequent Firm Outcomes

	Ln(Employment)	Ln(Wages/ Employment)	Full-Time Employment/ Employment	Ln(Primary Owner Weekly Hours Worked)	Ln(Assets)	Ln(Revenues)
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Employment(t-1))	0.835**	-0.335**	-0.066*	-0.017	0.127**	0.179**
	46.30	*-8.60*	*-2.56*	*-0.79*	*4.38*	*7.37*
Ln(Assets(t-1))	0.009	0.038	0.011	-0.002	0.742**	0.107**
	1.13	*1.39*	*0.76*	*-0.14*	*19.45*	*5.93*
Ln(Revenues(t-1))	0.037**	0.529**	0.124**	0.14**	0.115**	0.751**
	4.04	*16.25*	*6.97*	*8.06*	*4.07*	*30.42*
Did Not Apply for Loans Because	0.018	-0.009	0.114*	0.165**	-0.133*	-0.054
Would be Denied(t-1)	*0.66*	*-0.12*	*2.33*	*4.49*	*-2.02*	*-1.10*
High-Tech Industry	0.003	0.455**	0.054	-0.02	-0.145*	-0.029
	0.12	*5.47*	*0.96*	*-0.35*	*-2.11*	*-0.59*
Has Intellectual Property	0.001	0.022	-0.025	-0.029	0.043	0.031
	0.03	*0.30*	*-0.57*	*-0.59*	*0.83*	*0.72*
Year 2009	-0.013	-0.099	-0.03	-0.037	-0.055	-0.113*
	-0.37	*-1.60*	*-0.83*	*-1.35*	*-0.78*	*-2.13*
Year 2010	0.065**	-0.093	-0.016	-0.022	0.034	0.05
	2.30	*-1.23*	*-0.41*	*-0.77*	*0.52*	*0.84*
Year 2011	0.048	-0.025	-0.015	-0.042	0.092	0.071
	1.55	*-0.37*	*-0.38*	*-1.41*	*1.43*	*1.32*
Constant	-0.305	3.87**	-0.604	2.11**	1.46**	1.63**
	-1.31	*5.42*	*-1.42*	*5.56*	*3.27*	*3.90*
R^2	0.786	0.349	----	0.135	0.710	0.768
Other Controls?	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,777	2,650	2,686	3,260	2,980	3,081
Number of Firms	1,181	1,134	1,152	1,456	1,367	1,380
Dependent Variable Mean	1.37	9.9	0.64	3.69	11.5	12.5
Estimation Method	OLS	OLS	Tobit	OLS	OLS	OLS

Estimates are based on the Kauffman Firm Survey years 2007-2011 using the stratified sample weights. Coefficients are reported follwed by t-statistics accounting for clustering at the firm level. Other controls include Ln(Number of Owners(t-1)), Ln(Primary Owner Age(t-1)), and indicators for whether the primary owner is male and white. Please see Section 4 of the text for variable descriptions. ** indicates statistical significance at the 1% level; * indicates statistical significance at the 5% level.