Local Labor Market Endowments, New Business Characteristics, and Performance

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Abstract

It is often asserted that a highly educated workforce is vital to improving the competitive position of American businesses, especially by boosting entrepreneurship. To examine this contention, we use population Census data and a rich, new, nationally representative panel of startup firms, to examine how the education and skill level of the local labor force are related to the creation and success of new businesses. We find that areas that possess more skilled labor also possess higher rates of self-employment and more skilled entrepreneurs. As in previous studies, we find that education of the business owner is strongly linked to improved business outcomes. Potentially consistent with the popular view, we also find that, conditional on owner's education, higher education levels in the local market are positively correlated with improved business outcomes.

I. Introduction

It has long been recognized that education plays a vital role in economic growth, though identifying the exact channels has proved somewhat elusive. In the United States, for instance, highly educated cities generally posted above average wage growth over the past several decades (see Beaudry, Doms, and Lewis 2007; Glaeser 2007; and Figure 1).[1] A firm-specific channel through which education may affect economic growth is through entrepreneurship. In this paper, we exploit the Kauffman Firm Survey (KFS), a new panel dataset with more than 4,000 firms that began operations in 2004, to ask how education levels in local markets are related to entrepreneurship and business outcomes.

The relationship between education and entrepreneurship can be thought of in two, inter-related ways: the education of business owners and the average education in the local labor market. More educated markets may have more educated entrepreneurs, and it has long been recognized that the education of business owners is one of the more important variables found in models of small business success. For instance, Fairlie and Robb (2008) document that businesses with more educated owners had higher sales and profits, were more likely to hire employees, and were more likely to survive.[2] Owner's education may play an important role in business success because of self selection (higher-educated people may be more motivated or innately gifted in characteristics that would be beneficial to new businesses) and/or human capital (the education itself may be useful in starting and running a business).

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[1] There are many possible reasons why this result could emerge. One possible explanation for this above average performance since 1980 could be that highly educated cities were better able to take advantage of the information technology revolution (the Beaudry et al, 2007), while another is that highly educated cities are natural magnets for highly skilled industries (Beaudry, et al, in progress)

[2] See van der Sluis, van Praag and Vijverberg (2004) for a recent review of the literature on the relationship between education and entrepreneurship, and Card (1999) for a review of the literature on the returns to education in the labor market.

Entrepreneurs may also benefit from a more educated local population. Educated workers appear to have better access to information (Wozniak, 2006) and are better at implementing new ideas (Bartel and Lichtenberg, 1987). Indeed, supplies of educated workers are associated with faster adoption of new technologies (Staiger and Skinner, 2005; Doms and Lewis, 2007) and production techniques (Lin, 2007). Acs, Armington, and Zhang (2007) point out, furthermore, that more educated populations provide an environment "rich in social networks," and it is the exchange of existing ideas from disparate sources which may lead to new ideas that help sustain businesses (Jacobs, 1969).[3]

Although there is plenty of research on the role owner education plays in business success, and the role average education plays in the success of an area's businesses, these two roles for education have rarely been considered together. In this paper, we explore the relationship between both area- and owner-level education and subsequent business performance. One of the primary reasons for examining these issues is that many government policies are directed towards the assistance of small businesses. In this paper we address to what extent the education of the local labor force is related to small business creation and performance. It could be that policies promoting and retaining a highly educated workforce could be at least, if not more, important than policies that attempting to more directly foster new business development.

We use several datasets to examine these relationships. For the characteristics of business owners, we use a firm level panel dataset of approximately 4,000 businesses that began in 2004, which are tracked through 2007. This dataset, the Kauffman Firm Survey (KFS), has only recently become available. We merge to the KFS information on local labor market

[3] A skilled workforce may also be more adept at adapting to unexpected shocks (Glaeser and Saiz, 2003) something originally suggested by Schultz (1964, 1975).

conditions, where the local market is defined as the consolidated metropolitan statistical area (CMSA). The characteristics of the local labor market are constructed using the 2000 Decennial Census (DC). We use an additional source of information on entrepreneurship from the DC. In that survey, workers are asked whether they are primarily self employed or work for others. While self employment and entrepreneurship are not one in the same, a comparative advantage of the DC data, over the KFS data, is a larger sample size; in 2000, our sample from the DC contains 234,000 full-time workers that are self-described as self-employed.

Our analyses of these data produce three major findings. First, unsurprisingly, more educated cities have more educated business owners, even within detailed industries. The educational attainment of primary business owners (KFS data) and self-employed workers (DC data) is strongly and positively related to the education of the local labor force before and after controlling for industry.[4] This reinforces our paper's motivation for considering jointly the influence of workforce and owner education.

Second, a city's average education level is positively associated with entrepreneurial activity. The share of the population that is self-employed increases with the education level of a city, even after controlling for industry and occupation. That is, cities that are highly educated, conditional on their industry and occupational mix, also possess larger rates of full-time self employment. However, this result appears to be mostly an owner-level or "compositional" phenomenon, driven by the fact that more educated individuals are more likely to start businesses.

Third, we obtain mixed findings on whether city- or owner-level education matter for business outcomes of entrepreneurs. Using the KFS data, we do consistently replicate the

[4] The result implies, say, that a self-employed taxi driver in San Francisco (a highly educated city) is likely to have a higher educational attainment than a self employed taxi driver in Hickory, North Carolina (a city on the lower end of the educational attainment spectrum).

finding of previous studies that the education of the business owner is associated with improved business outcomes. Conditional on owner's education, however, the average education level of local labor market has an ambiguous association with improved business outcomes in these data due to lack of statistical precision. DC data on the self-employed, however, suggest strong role separate roles for both entrepreneur and workforce education in business earnings.

II. Data, Motivation, and Approach

II.1 Data

We merge two main datasets to examine the issues of how local labor market conditions are related to various aspects of new businesses. The first dataset, the Kauffman Firm Survey (KFS), is a firm level survey, which consists of three years of longitudinal data. The second dataset, which comes from the five percent Public Use Microdata Sample (PUMS) from the Decennial Census (DC), contains demographic information on education levels and self employment rates at the Consolidated Metropolitan Statistical Area (CMSA) level. We also in some cases exploit tabulations by the Small Business Administration (SBA) giving the number of establishment "births" and "deaths" by metropolitan area.

The KFS is a survey of new businesses in the United States. This survey collected information on 4,928 firms that started in 2004 and surveys them annually. This cohort is the first large national sample of firm startups that will be tracked over time. These data contain detailed information on both the firm and business owner(s). In addition to the 2004 baseline year data, there are three years of follow up data now available. Four additional years are planned. Detailed information on the firm includes three-digit NAICS industry, physical

location, employment, sales, profits, intellectual property, and financial capital (equity and debt) used at start-up and over time. Information on up to ten business owners per firm includes age, education, work experience, previous startup experience, and gender, race, and ethnicity.[5]

We use the confidential dataset because the public use microdata do not contain any geographical detail. This research uses a subset of the data, those firms having data for all four years and those verified as going out of business (as opposed to not responding to the survey) over the 2004-2007 period. This reduces the sample size to 3,974 businesses. Given that we analyze characteristics at the CMSA level, businesses not in CMSAs are dropped. This drops the sample size to 3,213. The method for assigning owner demographics at the firm level was to first define a primary owner. For firms with multiple owners (35 percent of the sample), the primary owner was designated by the largest equity share. In cases where two or more owners owned equal shares, hours worked and a series of other variables were used to create a rank ordering of owners in order to define a primary owner. (For more information on this methodology, see Ballou et. al, 2008.) For this research, multi-race/ethnic owners are classified into one race/ethnicity category based on the following hierarchy: black, Asian, other, Hispanic, and white. For example, an owner is defined as black, even if he/she is also Hispanic. As a result of the ordering, the white category includes only non-Hispanic white.

The other data used in this paper are the Decennial Census (DC) of population which identify metropolitan areas and allow us to construct information on each area's labor force. There are many different ways to define a local labor market; we have chosen the largest

[5] For more information about the KFS survey design and methodology, please see Ballou et. al (2008). A public use dataset is available for download from the Kauffman Foundation's website and a more detailed confidential dataset is available to researchers through a data enclave provided by the National Opinion Research Center (NORC). For more details about how to access these data, please see www.kauffman.org/kfs.

definition used in the DC, the so-called "Consolidated Metropolitan Statistical Area (CMSA)."[6] We include approximately 230 CMSAs. At the individual level, we categorize workers into one of five mutually exclusive categories based on their highest educational achievement: less than high school, high school graduates, some college, college graduates, and more than college. At the market level, we use a measure often used in research on skill-biased technological change, the so-called "college equivalent share" (Katz and Murphy, 1992; Autor, Katz, and Krueger, 1998; and Card and DiNardo, 2002). It is defined as the share of the full-time work force with at least 16 years of education plus half of the share of those with some college but no four year degree. We will sometimes refer to this as just the "college share."[7]

II.2 Motivation and Approach

A key motivation for examining the relationship between a city's education level and entrepreneurship is the above average performance of highly educated U.S. cities over the past several decades. As shown in Figure 1, average wages, adjusted for individual level influences (education, experience, gender, nativity) increased the fastest between 1980 and 2000 in highly educated cities; in fact, wages in the most highly educated cities, such as San Francisco, increased about 20 percent percentage points faster than cities like Hickory NC (not very highly educated). Notice this is not just the result of the fact that the returns to college rose between 1980 and 2000: Figure 1 controls for the influence of individual-level education. Furthermore,

[6] The question is whether, say, Oakland and San Francisco (or, say, New York and northern New Jersey) should be treated as separate markets or the same market. For the purpose of this paper, we consider them, along with the whole San Francisco Bay Area (New York Area), to be a single labor market. This type of issue comes up in a minority of cases for densely populated parts of the country. In much of the country, it is easier to define individual labor markets, as the Census Bureau has done.

[7] Distilling the education distribution of a city into a single measure, such as the college-equivalent share, requires many assumptions. However, many of the results in this paper are robust to how education is measured; where the results do vary, it will be noted.

one can look separately at wage growth among less-educated workers, and even among them, the wages growth is similarly strongly related to initial college share in their labor market.

The relationship in Figures 1 is not necessarily driven by a causal impact of initial skill mix on productivity growth. For example, higher quality workers within educational categories might differentially migrate to initially more skilled cities. Although this cannot be ruled out, an illustrative fact supporting the productivity growth interpretation is that the educational differentials across cities are surprisingly stable. As shown in Figure 2, relative rankings of education are remarkably robust between 1980 and 2000. In fact (not shown in figure) for a smaller sample of cities it can been shown that the same cities that were highly educated in 1940 tended to remain highly educated in 2000 (Beaudry, Doms, Lewis, 2008). In other words, skilled workers did not migrate differentially to more educated cities skilled between 1980 and 2000, at least when skill is measured with observable education.[8]

Highly educated cities may also grow faster because they have an industry mix which favors growth; industry mix may even have a direct effect on entrepreneurship (e.g., Glaeser and Kerr, 2007). So in order to study the effects of education mix on entrepreneurship it will be important to control for industry mix. On the other hand, it is worth noting that that the link between local education mix and industry mix is much weaker than many expect. Lewis (2004) finds education mix differences account for less than 10 percent of the differences in detailed industry mix across markets. To put it differently, Los Angeles, for example, has nearly double the proportion of low-skill workers of the rest of the U.S.; because L.A.'s industry mix is not that different than the rest of the U.S., even looking within any narrow industry (say, retail banking) Los Angeles also has twice the proportion of low skill workers as other cities.

[8] Glaeser and Saiz (2003) make this same sort of point by showing that growth has little correlation with changes in college share.

Moretti's (2004) argued that the type of relationship in Figure 1 represents an externality to education. But what mechanism underlies this externality? Put more simply, why have more skilled cities enjoyed faster wage growth? Two candidate explanations include are that high-skilled cities adopt new technologies more rapidly (Beaudry, Doms, and Lewis, 2008) and that they move more quickly into new, higher productivity sectors. Related to the latter, Glaeser and Saiz (2003) describe how more educated cities are better at "reinventing" themselves in response to shocks (like the decline in manufacturing). The present paper asks to what degree entrepreneurship and entrepreneurial success plays a role in this relationship.

III. Education of owners and education of the city

Previous research has found the success of an individual business is linked to the education level of the business's owner. A variety of factors may account for this relationship: the knowledge and skills acquired through formal education may be useful for running a successful business; education may proxy for an owner's ability or send a positive signal to potential customers, lenders, and business suppliers; and education might simply be correlated with other traits that influence business success, such as access to social networks.

Another reason why more educated business owners might be more successful, and one not considered in previous studies on the effect of owner education, is that highly educated business owners are more likely to have access to a highly educated local labor force. To oversimplify, if an area's entrepreneurs are drawn randomly from the local population, then areas with higher more educated populations are likely to have more educated business owners. Interestingly, this oversimplified description turns out to be not inconsistent with the empirical

facts. Using the KFS data, a regression of owner's college completion on the college share in the surrounding area fails to reject a coefficient of one. Using the DC data, a regression of the college share among the self-employed on the college share among non-self-employed (wage and salary workers) also fails to reject a coefficient of 1. Figure 3 plots this relationship for our sample of 230 cities. It shows the two series are highly related (R^2 of 0.80).

The strength of these empirical relationships does not imply that entrepreneurs are really just " draws" from the local workforce. For example, perhaps high tech areas attract both more educated entrepreneurs and more educated workers. Underlying this example is the view that sector mix is a common third factor driving the cross-regional correlation between the education of workers and the education of entrepreneurs. In fact, however, this correlation is quite strong even within sector. Figure 4 is the same as Figure 3, except it looks within narrow industry by occupation categories, which divides the workforce into 37,748 cells.[9] Even with these narrow cells, the education of self-employed and non-self-employed workers are highly correlated (R^2 = .64).[10] In light of the fact that workforce and entrepreneur education are so highly related at the aggregate level, even within sector, it seems appropriate to consider them jointly rather than separately whenever the data allow. (Where the data do not allow their separate consideration, coefficients should be interpreted cautiously.)

Before turning to the question of how a labor market's average education affects business performance, are more educated markets more entrepreneurial? Figure 5 shows for two measures of "entrpreneurship" that the answer is "yes." It shows that business establishment formation (Panel A) and self-employment rates (Panel B) are positively related to an area's

[9] The industry and occupation categories used are the detailed 1990 categories constructed for IPUMS.
[10] The slope of this relationship is closer to 0.5 than one. Most of the decrease in slope is due to the occupation cells. As occupation is another proxy for skill, though, it is to be expected that education mix difference across cities are smaller within occupation cells.

college share.[11] For the latter, it can be shown that this is not an industry mix phenomenon: the correlation holds up within the detailed industry-occupation cells used in Figure 4. While this may seem surprising, it is useful to keep in mind that not all entrepreneurs – not even most entrepreneurs – are opening cutting-edge technology firms. Entrepreneurship is a widespread activity: even the least educated markets have a significant amount of entrepreneurship. Over one-quarter of self-employed individuals work in construction or retail, for example. (In contrast, 1.41 percent are computer consultants, and 0.01 percent are software developers.)[12]

However, the relationship in Figure 5 is not, it turns out, a city-level phenomenon. More educated people are more likely to be entrepreneurs, and once this is taken into account, the city-level relationship disappears. This is shown in Table 1, which uses DC data and regresses a dummy for self-employment on four education categories of the individual (high school dropout is excluded) plus our city-level measure of college share. The coefficient on the individual-level education variables are significant, but there is no significant relationship with college share conditional on individual education. Controls for other individual attributes and for three-digit NAICS industry (columns 2,3) do not revive the city-level relationship.[13] Table 1 is one last reminder that city-level associations may reflect an aggregate or "spillover" effect (as they are sometimes interpreted in papers which use aggregate data) or merely reflect compositional differences, in this case, that more educated individuals are more likely to become entrepreneurs. In the regressions in the remainder of the paper we will examine associations with owner and city education simultaneously.

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[11] The count of new establishments overstates the rate at which new businesses are formed, since some new establishments are created by existing businesses. The SBA data unfortunately do not distinguish between the two types of establishment openings. However, the rate of formation of very small establishments is also correlated with college share.

[12] Calculated using the 2000 Census of Population.

[13] Columns 2 and 3 are added largely to be consistent with the specifications used in later tables.

IV. Education of cities and owners and business performance

IV.1 Findings

Using the KFS, we investigate whether owner education and the education level of cities are positively correlated with a variety of outcomes we use to measure business performance. We will examine outcomes from the fourth wave, calendar year 2007, three years after startup. A dummy for survival through 2007 is our first outcome. About 72 percent of the firms in the KFS sample survived through year end 2007. Respondents of surviving firms were asked a series of questions annually regarding revenue, expenses, profits, and assets of their firms. Survivors are likely to be selected on these outcomes, and to avoid selection issues we will start by examining dummies for being above specific thresholds (assigning "0" for non-survivors) for revenues, profits, and assets of $100,000 or more by 2007.[14] About 23 percent of firms in our sample had assets of $100,000 or more by 2007, while about 28 percent had revenues of this amount or more, and about 7 percent had profits of this amount or more.

Table 2 shows estimated marginal effects from probit regressions.[15] The other independent variables include primary owner's education, race, ethnicity, age (and age squared), years of work experience, and average hours worked in a week. Industry is controlled for at the three-digit NAICS level in all specifications, but coefficients are not presented.[16]

The omitted dummy for education level is less than high school graduation. Table 2 shows all four outcomes are close to monotonically increasing in the owner's education.[17] The owner education coefficients are all positive and statistically significant in the profits and

[14] Continuous versions of these variables are examined in Table 3, described below.
[15] For dummy variables the table reports the discrete change in probability.
[16] Subject to meeting confidentiality restrictions, industry coefficients are available from the authors.
[17] Interestingly, though, a model which combined the three college level groups into a single category, as we essentially do with the aggregate variable, is not ruled out by the data.

survival regressions estimates, while only the two highest categories are statistically significant in the revenue and profits regressions.

As for the aggregate college share variable, its coefficient is positive in the revenue regression, but negative in the other three regressions. Unfortunately the standard errors are large and confidence intervals include both zero and large effects. Thus, we are unable to say in these regressions whether the education of a city's workforce matters for business performance.

The results for the various other owner characteristics that are controlled for in the models are consistent with previous research in this area. Businesses with primary owners who are African American underperform businesses owned by whites. For all four outcome measures, the coefficient on black is negative and statistically significant. Our findings regarding female-led firms are identical to those for blacks. For all four outcome measures, women-owned firms do worse on average than do businesses owned by men. The coefficients on the other race category and Hispanic are always negative and statistically significant in about half of the regressions. The coefficient on Asian is positive in all regressions, but only statistically significant in the assets and profits regressions.

Owner age (and age squared) are statistically significant in three of the models. Years of previous work experience has a positive and statistically significant effect in all four outcome models, as does average hours worked in a week. Higher educated, experienced owners committing significant hours to their business venture had higher outcomes than those with lower education and experience levels or who committed fewer hours to the business. The final variable used in the models was "comparative advantage" which derives from a KFS question asking respondents whether they felt they had a comparative advantage in the marketplace. Those owners answering yes to that question had firms that had better outcomes. The coefficient

on this variable is positive in all four models, but statistically significant in just two of the four models.

Lest the reader be concerned that the qualitative results in Table 2 were derived from the particular thresholds chosen, Table 3 shows OLS regressions of the natural log of profits, revenues, assets, and employment on the same set of variables in Table 2 for the subset of firms which survive until 2007. The pattern on the owner education variables is largely unchanged: there is a monotonic relationship with owner education which is significant in most regressions. The coefficient on college share is again sizeable but again imprecisely estimated and is not statistically significant in any of the regressions.[18]

The large standard errors on the KFS results for college share make the results uninformative. So another way we attempt to measure business performance is with data on the income from self-employment activities in the DC, where sample sizes are larger. Table 4 studies the self-employment income for all individuals who report being self-employed. In the first two columns of the Table, the dependent variable is simply a dummy for having positive self-employment earnings. This has a weak and unexpectedly negative relationship with owner education; the coefficient on college share is also negative but not statistically significant. It may be that more educated entrepreneurs are able to pursue riskier business enterprises and which have higher variance – both larger positive and negative – outcomes. Further evidence of this will be presented below. In the next two colmns of the table the dependent variable is the natural log of self-employment income among those who have positive self-employment income. Here, both individual-level education and citywide college share are strongly positively related to business income. In addition, while detailed controls for industry weaken the individual-level

[18] We also obtain quite similar results if the revenue, assets, and profits variables are examined in "per worker" terms: we have found no evidence so far of a significant association between the education variables and firm's employment.

relationship, they do not weaken the relationship with college share. In these data, at least, an area's aggregate college share appears to have a strong, independent, and positive association with entrepreneurial earnings among those with positive earnings .

Interestingly, however, educated entrepreneurs, and entrepreneurs in more educated cities also run bigger losses. In the last two columns of Table 4, which show this, the dependent variable is the natural log of self employment losses among those with negative self-employment earnings. The magnitude of this relationship is smaller and weaker than the relationship between education and the log earnings of those with positive earnings, which suggests education is nevertheless associated with an increase in the average earnings (positive or negative) of entrepreneurs. However, Table 4 also says that education – of both business owners and the workforce in their labor market – is associated with higher variance of earnings.

IV.2 Discussion

How can we account for the simultaneous finding of an association with education with both greater business earnings and losses? It appears that more educated entrepreneurs and entrepreneurs (and workers) in more educated labor markets are involved in enterprises with more uncertain, but higher mean payoffs.[19] Consistent with this interpretation, not only are businesses born at higher in more educated cities (Figure 5, panel A), but they fail at higher rates in more educated cities (Figure 6). Educated markets thus appear to be generally more dynamic; and the superior ability of educated markets to "reinvent themselves" in response to negative shocks (Glaeser and Saiz, 2003) may be but one example of this greater dynamism.

[19] Factors which may make this added risk tolerable to the entrepreneurs and workers, in addition to the higher mean payoff, could include the potentially greater adaptability of the educated to shocks (Schulz, 1975) or simply the higher average wealth of more educated individuals.

These findings also circle back to one of the motivations for this paper: trying to explain why wage growth among observably similar workers seems to have been higher in more educated labor markets since 1980 (Figure 1). In exchange for tolerating greater uncertainty in the job market, it may be that ordinary workers in more educated markets are sharing in the larger average gains associated with working at these riskier enterprises. Consistent with this, new businesses are likely often formed at least partly on the basis of ideas for how to employ workers more productively than competitors. In a competitive labor market, worker pay would rise when such ideas turned out to be effective.

V. Conclusion

This paper studies relationship between education, entrepreneurship, and businesses outcomes, and unlike most of the previous research in this area, considers simultaneously both the education of the entrepreneur and of the workforce where the entrepreneurs operate their businesses. Consistent with this simultaneous focus, our initial results indicate that more educated entrepreneurs tend to be located in cities with more educated workforces. Moreover, highly educated cities may have above average entrepreneurship rates. Finally, the education of entrepreneurs is strongly related to positive business outcomes.

This paper also presents some indirect evidence that more educated markets grow faster potentially partly as a result of having a more dynamic, higher risk, higher reward business environment. Education is associated in some regressions with bigger losses as well as gains,

and higher rates of business failure as well as formation. Workers appear to share in the gains of these more entrepreneurial environments.

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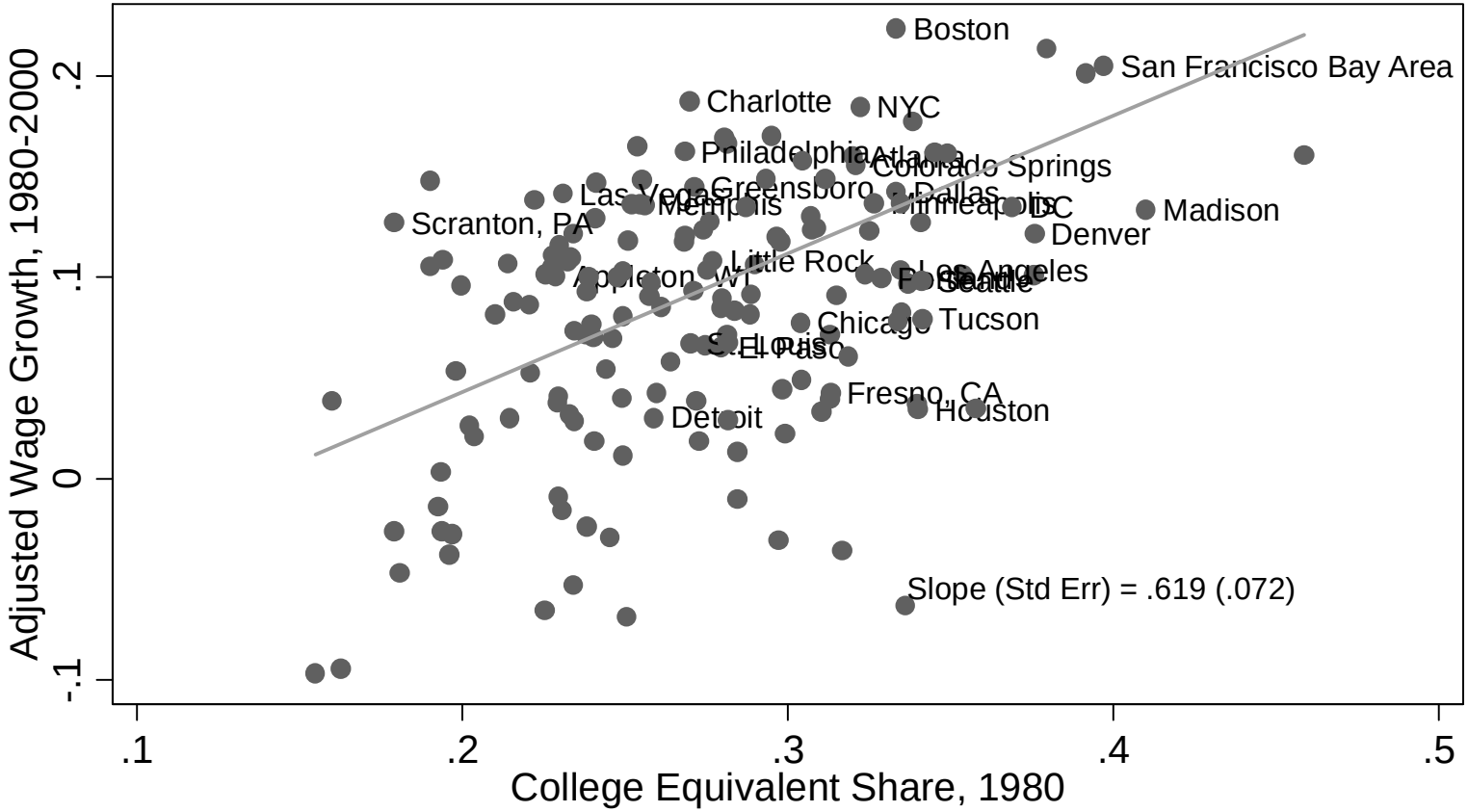
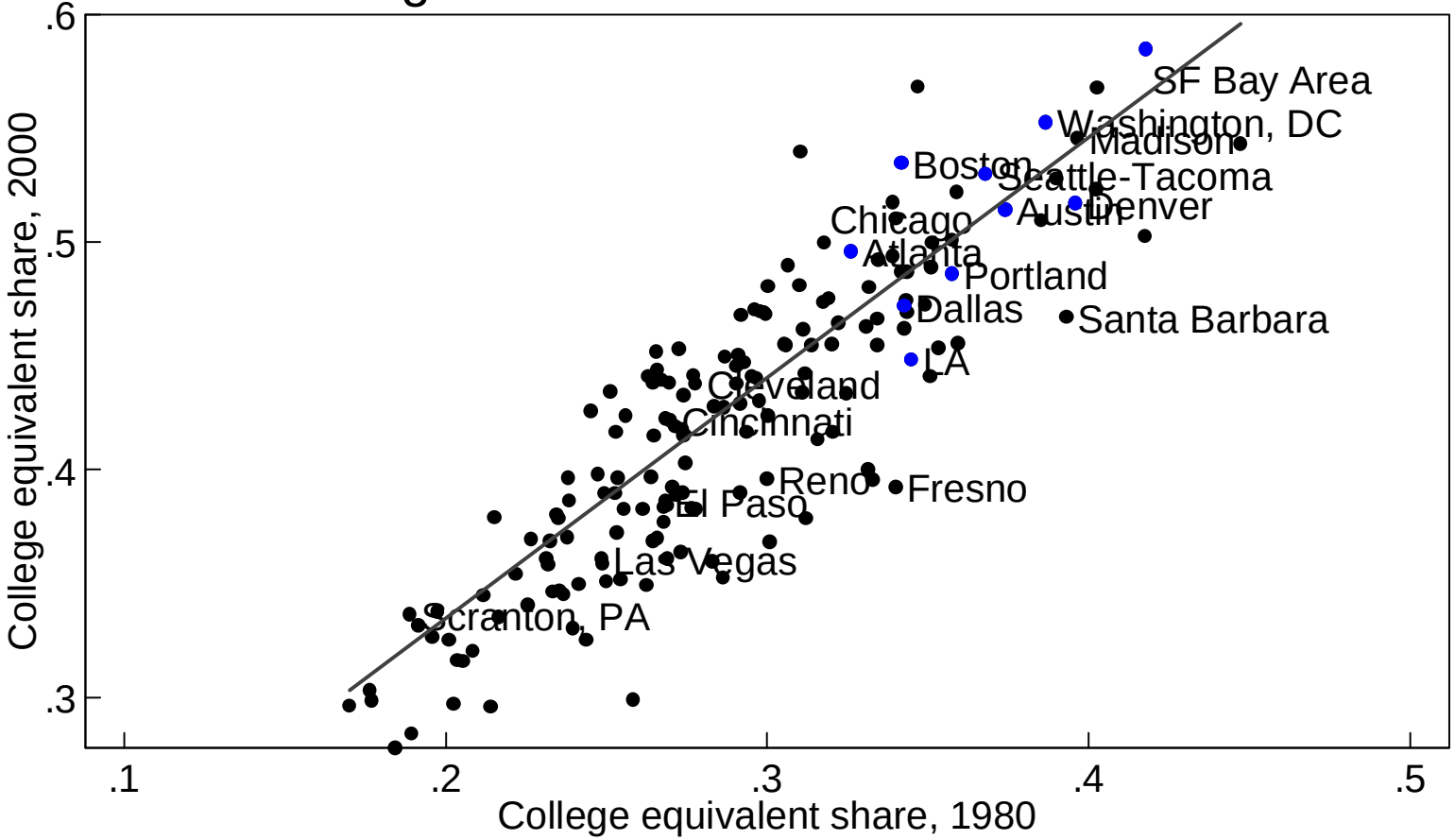
Figure 1: Adjusted Wage Growth, 1980-2000, and Initial Education



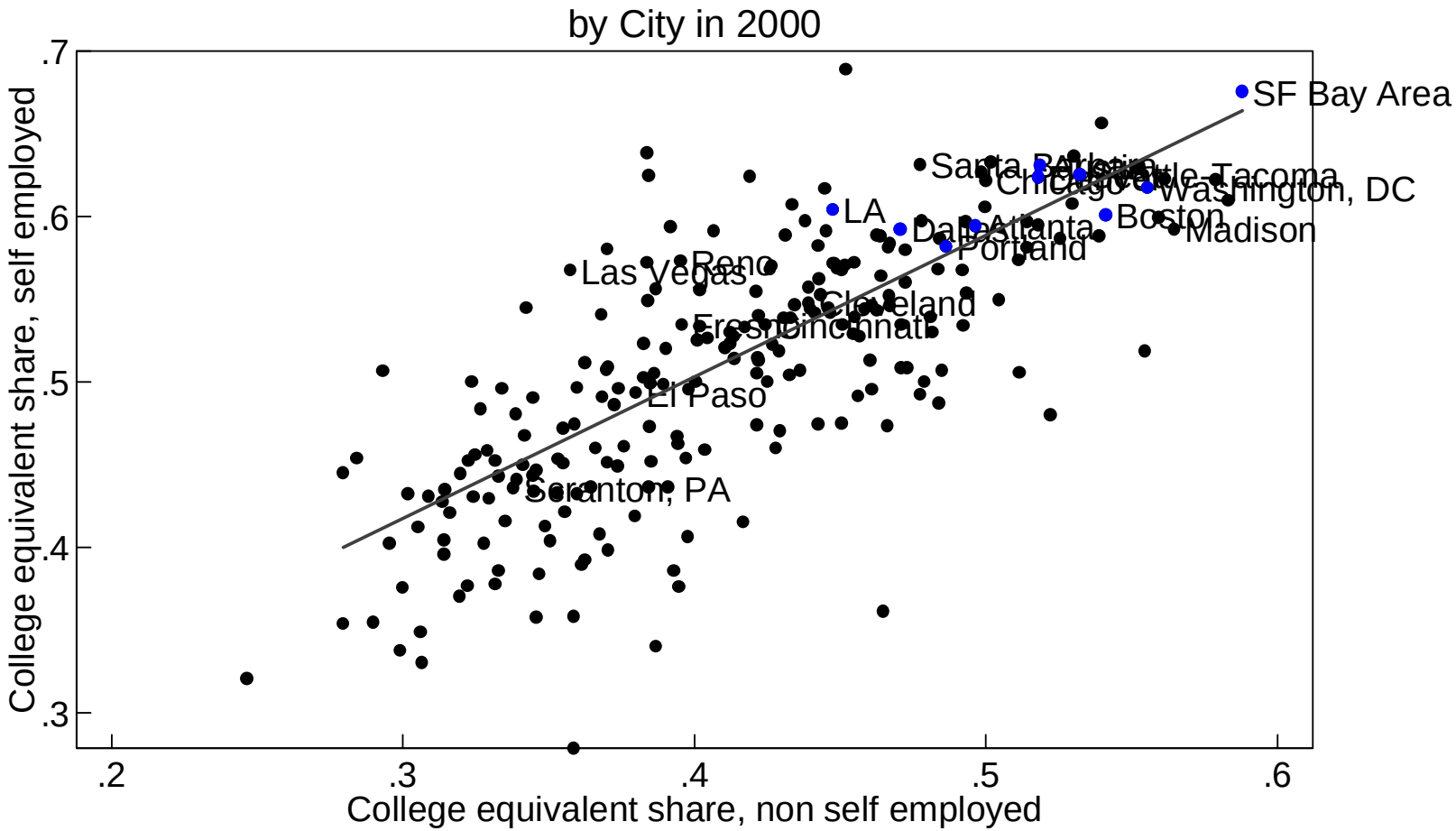
Y-axis shows the growth in the mean regression-adjusted ln wage 1980-2000
Adjustment includes a dummies for five education levels, a quadratic in potential work experience, and dummies for female, foreign-born, and post-1950 birth.

Figure 2: Persistence in Education



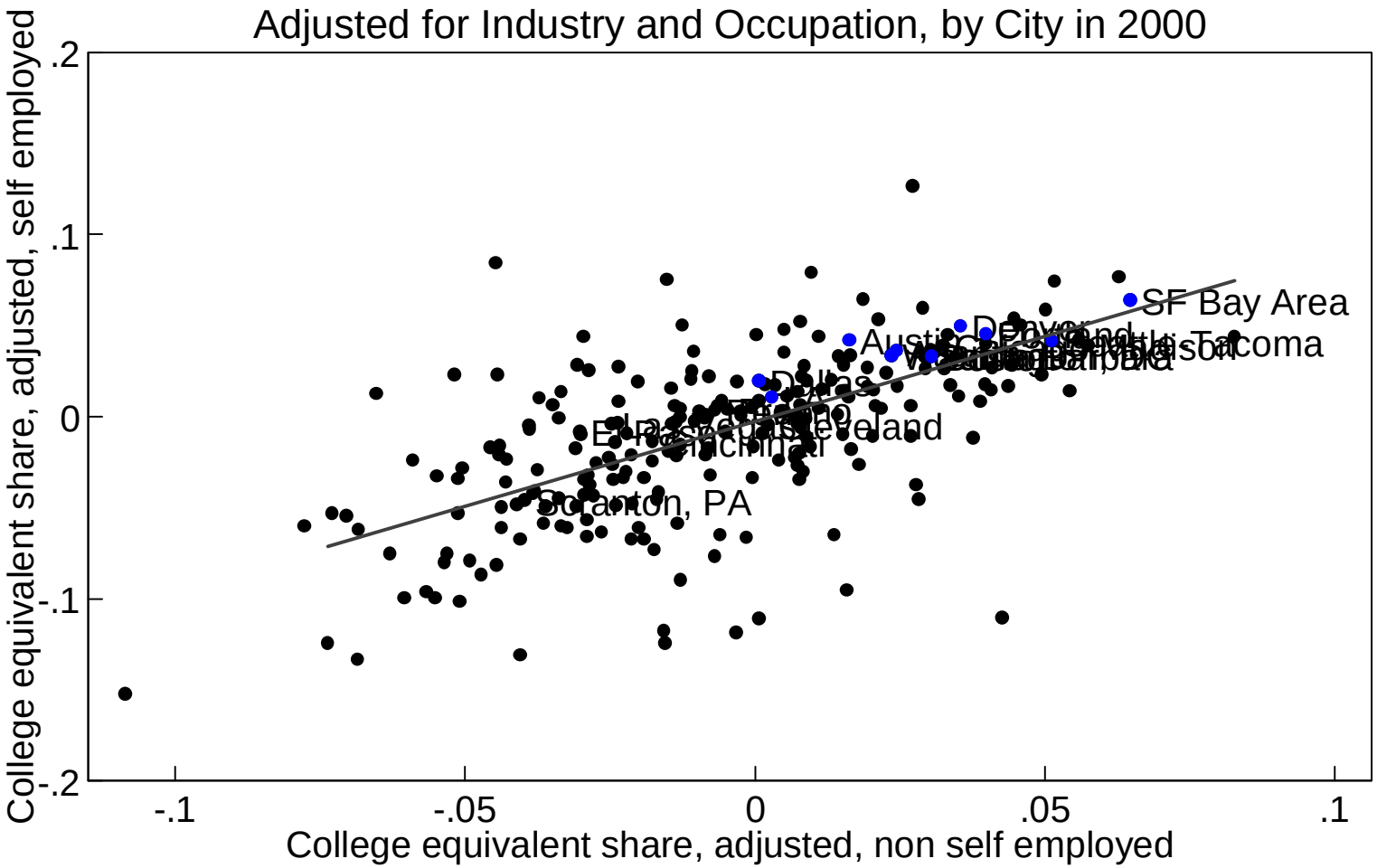
Note: Blue dots represent high-tech cities. College equivalent share is defined as the proportion of full time workers with at least 16 years of education plus 1/2 times the share with more than a high school education but less than a college education.
Source: Decennial Census.

Figure 3: Education of Self Employed and Non Self Employed



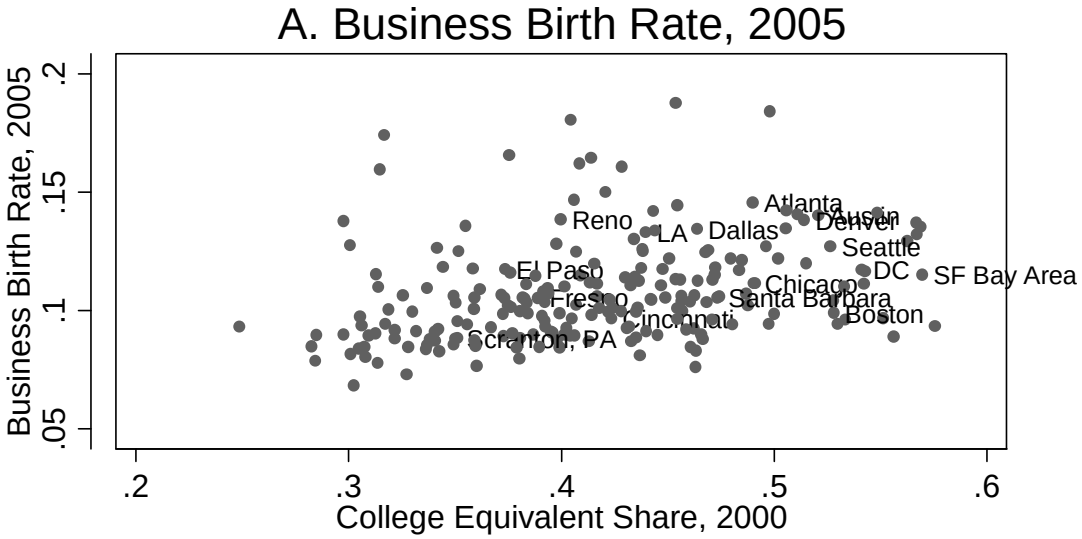
Source: 2000 Decennial Census and authors' calculations.

Figure 4: Education of Self Employed and Non Self Employed



Source: 2000 Decennial Census and authors' calculations.

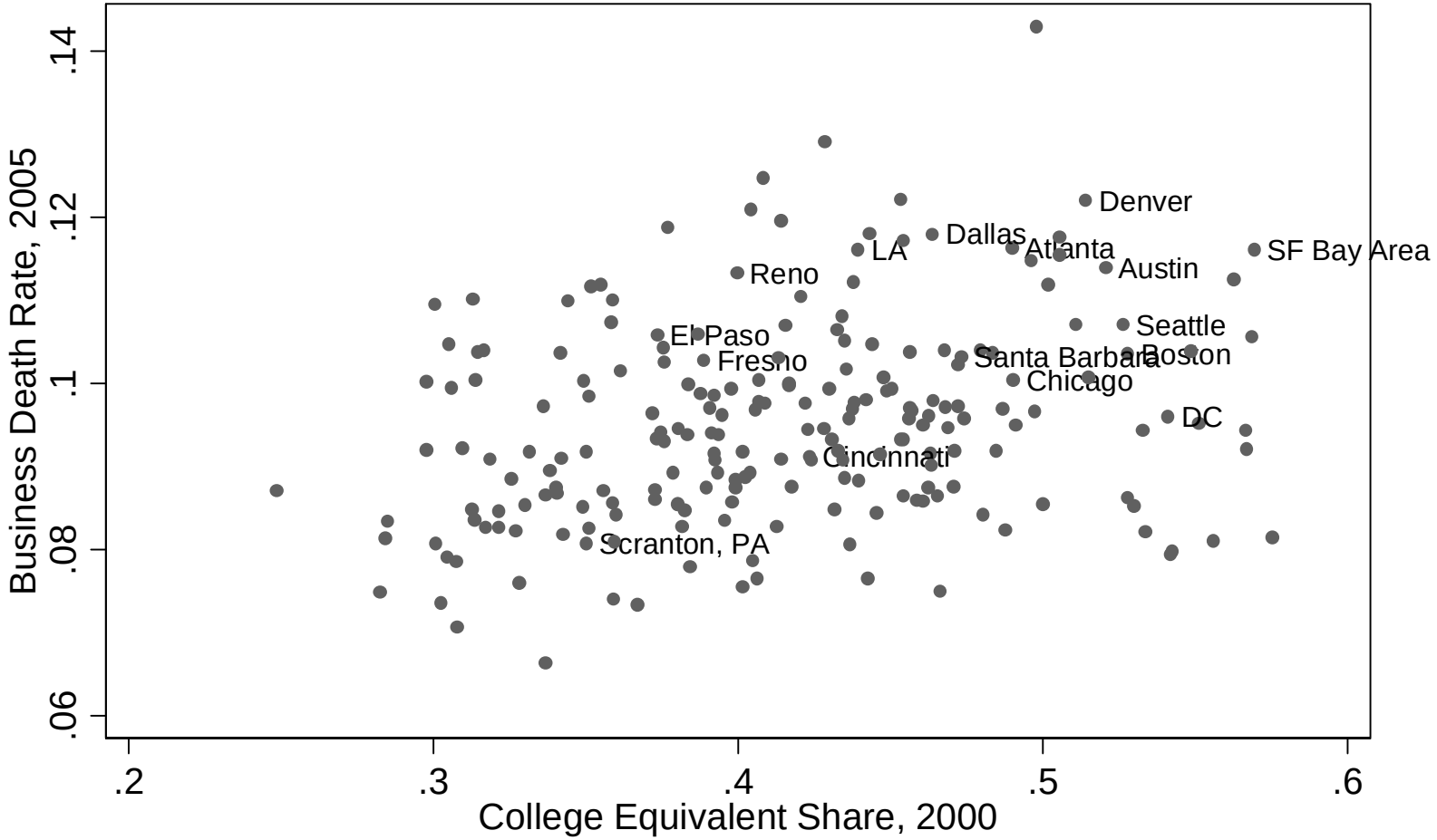
Figure 5: Entrepreneurship and Education



Y axis has number of new establishments in 2005/total # of estabs, end of 2004.
Source: Small Business Administration

Y axis has the ratio of self-employed/total employed
Data Sources: 2005 American Community Survey (y) and 2000 Census of Population (x).

Figure 6. Business Death Rate and Education



Number of Estabs Closing, 2005/number of Estabs, End of 2004
Source: Small Business Administration

Table 1
Self-Employment

Coefficient	Dependent Variable = Dummy for Self-Employment		
High School Graduate	0.00316**	-0.00868***	0.00731***
	(0.00155)	(0.00110)	(0.00123)
Some College	0.00229	-0.00657***	0.0201***
	(0.00147)	(0.00105)	(0.000957)
College Degree	0.0141***	-0.00317**	0.0360***
	(0.00180)	(0.00158)	(0.00101)
Graduate Degree	0.0516***	0.0188***	0.0696***
	(0.00302)	(0.00272)	(0.00186)
College Educated Share	-0.00927	0.0133	-0.0337*
	(0.0228)	(0.0197)	(0.0173)
Black		-0.0471***	-0.0310***
		(0.00148)	(0.00152)
Hispanic		-0.0186***	-0.0249***
		(0.00275)	(0.00227)
Female		-0.0431***	-0.0322***
		(0.00154)	(0.00124)
Age		0.00662***	0.00673***
		(0.000306)	(0.000245)
Age Squared		-4.50e-05***	-4.31e-05***
		(3.85e-06)	(3.16e-06)
Ln Hours (annual)		-0.00912***	-0.00449***
		(0.000804)	(0.000645)
Observations	2,617,992	2,617,992	2,617,992
R-squared	0.003	0.028	0.129
Three-Digit NAICS Controls?	No	No	Yes

Data source: 2000 Decennial Census of Population, 5% Public-Use Data files (via IPUMS). Estimated by OLS. Standard errors in parentheses robust to clustering on cmsa and heteroskedasticity.
*** p<0.01, ** p<0.05, * p<0.1

Table 2
New Firm Outcomes (with College Educated Share)

Coefficient	Revenue 100K+ (2007)	Assets 100K+ (2007)	Profits 100K+ (2007)	Survive (2007)
High School Graduate	0.0735	0.134	0.987***	0.122**
	(0.0832)	(0.0918)	(0.0101)	(0.0563)
Some College	0.0583	0.124	0.949***	0.156***
	(0.0729)	(0.0757)	(0.0907)	(0.0601)
College Degree	0.164**	0.197**	0.976***	0.182***
	(0.0775)	(0.0811)	(0.0520)	(0.0573)
Graduate Degree	0.212**	0.228**	0.995***	0.193***
	(0.0847)	(0.0907)	(0.0103)	(0.0504)
College Educated Share	0.135	-0.204	-0.0437	-0.161
	(0.158)	(0.137)	(0.0629)	(0.161)
Black	-0.166***	-0.100***	-0.0266***	-0.0655*
	(0.0219)	(0.0224)	(0.00852)	(0.0354)
Asian	0.0686	0.112**	0.0485*	0.0664
	(0.0481)	(0.0471)	(0.0281)	(0.0404)
Other	-0.192***	-0.100**	-0.0272	-0.135*
	(0.0328)	(0.0427)	(0.0176)	(0.0769)
Hispanic	-0.0597*	-0.000679	-0.0212*	-0.0517
	(0.0343)	(0.0356)	(0.0117)	(0.0439)
Female	-0.0983***	-0.0996***	-0.0199**	-0.0136
	(0.0220)	(0.0192)	(0.00928)	(0.0236)
Owner Age	0.0115*	0.0104*	0.00728**	0.00800
	(0.00619)	(0.00552)	(0.00299)	(0.00606)
Owner Age Squared	-0.000152**	-0.000124**	-0.0000875***	-0.0000821
	(0.0000653)	(0.0000584)	(0.0000320)	(0.0000648)
Work Experience (years)	0.00400***	0.00258***	0.00151***	0.00390***
	(0.00101)	(0.000903)	(0.000426)	(0.00104)
Owner Hours (per week)	0.00406***	0.00255***	0.000814***	0.00107**
	(0.000413)	(0.000375)	(0.000185)	(0.000429)
Comparative Advantage	0.0745***	0.0243	0.0136*	0.0271
	(0.0194)	(0.0181)	(0.00800)	(0.0209)
Observations	3080	3082	2759	3078

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Dprobit fits maximum-likelihood probit models and is an alternative to probit. Rather than reporting the coefficients, dprobit reports the marginal effect, that is the change in the probability for an infinitesimal change in each independent, continuous variable and, by default, reports the discrete change in the probability for dummy variables. Three digit NAICS controlled for in model.

Table 3a
All Firm Log Outcomes (with College Educated Share), Closures=0

Coefficient	2007 Log Revenue	2007 Log Assets	2007 Log Profits	2007 Log Employment
High School Graduate	2.445	2.850*	4.461**	1.290**
	(1.949)	(1.531)	(2.192)	(0.548)
Some College	1.956	3.230**	2.721	1.316**
	(1.824)	(1.453)	(2.081)	(0.527)
College Degree	4.593**	4.288***	4.446**	1.777***
	(1.836)	(1.460)	(2.095)	(0.529)
Graduate Degree	5.249***	4.670***	5.413**	1.891***
	(1.871)	(1.483)	(2.118)	(0.535)
College Educated Share	-1.707	-4.416	-3.868	-0.755
	(3.914)	(2.723)	(4.085)	(0.907)
Black	-4.438***	-2.378***	-5.079***	-0.171
	(0.881)	(0.622)	(0.949)	(0.196)
Asian	0.0181	1.172	0.282	0.510**
	(1.126)	(0.726)	(1.165)	(0.235)
Other	-5.590***	-1.872	-4.223**	0.137
	(1.830)	(1.331)	(2.052)	(0.338)
Hispanic	-2.229**	-0.993	-3.145***	0.289
	(1.032)	(0.792)	(1.158)	(0.218)
Female	-1.576***	-1.008**	-1.225**	-0.528***
	(0.579)	(0.420)	(0.618)	(0.146)
Owner Age	0.252*	0.149	0.187	0.0548
	(0.145)	(0.108)	(0.159)	(0.0366)
Owner Age Squared	-0.00329**	-0.00168	-0.00312*	-0.000725*
	(0.00155)	(0.00114)	(0.00168)	(0.000393)
Work Experience (years)	0.0947***	0.0756***	0.140***	0.0172***
	(0.0252)	(0.0180)	(0.0262)	(0.00598)
Hours Worked	0.0599***	0.0422***	0.0390***	0.0223***
	(0.0105)	(0.00763)	(0.0109)	(0.00240)
Comparative Advantage	1.846***	0.551	1.258**	0.0719
	(0.517)	(0.368)	(0.538)	(0.121)
Constant	-4.059	-0.176	-4.500	-3.434*
	(14.40)	(11.39)	(10.51)	(1.947)
Observations	3112	3112	3112	3112

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Three digit NAICS controlled for in model.

Surviving Firm Log Outcomes (with College Educated Share)

Coefficient	2007 Log Revenue	2007 Log Assets	2007 Log Profits	2007 Log Employment
High School Graduate	-0.363	0.352	2.842	0.810
	(1.297)	(0.860)	(2.121)	(0.535)
Some College	-1.363	0.335	0.557	0.806
	(1.184)	(0.824)	(2.038)	(0.517)
College Degree	0.839	1.018	1.979	1.242**
	(1.189)	(0.824)	(2.048)	(0.520)
Graduate Degree	1.109	0.960	2.492	1.306**
	(1.226)	(0.833)	(2.069)	(0.524)
College Educated Share	0.563	-1.831	-2.142	-0.692
	(2.897)	(1.401)	(3.621)	(0.838)
Black	-3.333***	-1.560***	-3.983***	0.00687
	(0.735)	(0.392)	(0.902)	(0.190)
Asian	-0.715	0.204	-0.182	0.389*
	(0.861)	(0.384)	(1.010)	(0.220)
Other	-3.355**	-0.00801	-2.833	0.395
	(1.469)	(0.554)	(1.886)	(0.290)
Hispanic	-1.653**	-0.217	-2.543**	0.390**
	(0.822)	(0.450)	(1.076)	(0.193)
Female	-1.263***	-0.813***	-1.001*	-0.460***
	(0.444)	(0.241)	(0.555)	(0.135)
Owner Age	0.149	0.0368	0.0949	0.0408
	(0.114)	(0.0523)	(0.144)	(0.0342)
Owner Age Squared	-0.00223*	-0.000541	-0.00221	-0.000583
	(0.00122)	(0.000542)	(0.00154)	(0.000363)
Work Experience (years)	0.0375*	0.0225**	0.0988***	0.0117**
	(0.0193)	(0.00951)	(0.0240)	(0.00552)
Hours Worked	0.0451***	0.0292***	0.0275***	0.0201***
	(0.00844)	(0.00448)	(0.0100)	(0.00225)
Comparative Advantage	1.412***	0.155	0.908*	0.00576
	(0.412)	(0.198)	(0.483)	(0.110)
Constant	2.607	5.915	1.528	-2.214
	(10.81)	(7.445)	(9.117)	(1.733)
Observations	2281	2281	2281	2281

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Three digit NAICS controlled for in model.

Table 4
Self-Employment Income

	Dummy for SE Income>0		ln(self-employmt income) (for SE income>0)		ln(Losses) (for those with SE Income<0)	
Owner Variables:						
High School Graduate	-0.0433***	-0.0369***	0.0931***	0.0857***	-0.0711*	-0.0668*
	(0.00514)	(0.00475)	(0.0150)	(0.0139)	(0.0402)	(0.0397)
Some College	-0.0895***	-0.0741***	0.154***	0.0971***	-0.0594	-0.0425
	(0.00883)	(0.00799)	(0.0228)	(0.0203)	(0.0441)	(0.0435)
College Degree	-0.132***	-0.114***	0.421***	0.268***	0.00124	0.0364
	(0.00984)	(0.00796)	(0.0194)	(0.0179)	(0.0465)	(0.0486)
Graduate Degree	-0.103***	-0.0932***	0.902***	0.560***	0.0524	0.102*
	(0.0159)	(0.0108)	(0.0220)	(0.0201)	(0.0543)	(0.0545)
Metropolitan Area Variables						
College Educated Share	-0.0665	-0.103	1.204***	1.165***	0.200	0.347*
	(0.166)	(0.165)	(0.202)	(0.193)	(0.173)	(0.176)
Other Owner Controls[⊥]	Yes	Yes	Yes	Yes	Yes	Yes
Three-Digit NAICS Controls?	No	Yes	No	Yes	No	Yes
Observations	353,158	353,158	225,038	225,038	12,619	12,619
R-squared	0.023	0.060	0.115	0.146	0.024	0.040

Data source: 2000 Decennial Census of Population, 5% Public-Use Data files (via IPUMS). Estimated by OLS. Standard errors in parentheses robust to clustering on cmsa. ***p<0.001, **p<0.005, *p<0.1.

[⊥]Other owner controls include dummies for black, hispanic, and female, ln(annual hours worked), age, and age squared.