Does school choice increase the rate of youth entrepreneurship?

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Abstract

Because entrepreneurial activity is a key source of economic growth, promoting youth entrepreneurship has become a priority for policymakers. School choice programs force administrators and teachers to be more entrepreneurial in their jobs by encouraging innovation and by creating competition and a more business-like environment in K-12 education. Does going to school in this climate make students more likely to become entrepreneurs? In this paper we test whether youth entrepreneurship rates are higher in counties with school choice programs. We find that voucher programs create higher rates of youth entrepreneurship, while charter schools do not, relative to traditional public schools.
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1. Introduction

The costs and benefits of school choice have been debated extensively over the past decade. Previous research quantifying the beneficial effects of school choice has focused almost exclusively on analyzing student achievement scores. School choice programs, however, may have other effects on student outcomes that cannot be captured in these scores. One such effect may be on the post-graduation career choice of students. This paper provides

evidence on one such career choice, specifically whether students participating in school choice programs are more likely to become young entrepreneurs. Because entrepreneurship is a critical component of economic growth, promoting entrepreneurship has been a focus of recent state and local economic development policy. If school choice fosters youth entrepreneurship, this provides yet another reason to implement these programs in addition to any positive impact they might have on student test scores.

School choice programs create an atmosphere of competition, innovation, and risk-taking within the administrative infrastructure of schools. These are also precisely the qualities that must be embraced and learned by individuals wanting to become entrepreneurs. Our hypothesis is that the

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entrepreneurial environment created within schools by school choice programs fosters a sense of competition and innovation among the administrators and teachers in the school that is infectious, being witnessed and copied by the students in their own personal lives. That is, school choice might promote youth entrepreneurship not because these schools actually teach entrepreneurship, but rather because the formative years for these students are spent in a more business-like and entrepreneurial environment.

Using US county-level youth self-employment data, we perform a cross-sectional analysis to see whether counties with either charter schools or voucher programs tend to have higher rates of youth entrepreneurship. Our results confirm our hypothesis that counties with voucher programs have significantly higher rates of youth self-employment. The effect is not only statistically significant, but economically as well. Counties with voucher programs have rates of youth entrepreneurship approximately one percentage point higher (an additional 1 in 100 students becoming entrepreneurs). This suggests that an additional benefit of voucher programs above any impact on student achievement is that they also foster youth entrepreneurship, and thus overall economic growth.[2] In addition, our results would suggest that state and local governments attempting to foster entrepreneurial activity might be well served to adopt school vouchers.

Our paper proceeds by first discussing the prevalence of school choice in the form of charter schools and voucher programs, and then reviews the literature on school choice, with a particular emphasis on the impact school choice has on student achievement scores. We then also review the literature on entrepreneurship and economic growth, and discuss the research that has been done on youth entrepreneurship. The following sections describe our data and empirical methodology, and present the results of our estimations. We conclude by discussing the policy implications of our findings.

2. Literature review

Over the past decade, the school choice movement has become a heated topic among educators and policymakers. Charter schools and vouchers are arguably the most common forms of school choice and therefore are the subjects of our paper. There are currently about 4000 charter schools serving over one million students across the United States.[3] With regards to vouchers, the states of Florida, Maine, Ohio (Cleveland only), Vermont, Utah, Wisconsin (Milwaukee only) and the District of Columbia are currently providing government funds for students to attend the public or private school of their choosing.[4]

The effects of charter schools and voucher programs on traditional public school performance have been widely studied and the findings indicate some gains in productivity in public schools that are created by the competition that school choice generates. The first piece of evidence suggesting that public schools react to outside competition is demonstrated by Hoxby (1994) who finds that public schools in areas that have larger concentrations of private Catholic schools perform better than those facing less private competition. In more recent studies Hoxby (2003) and Hoxby and Rockoff (2004) find that students enrolling in charter schools have exhibited some improvement in test scores when compared to students who stay in the traditional public school setting.

The competition created through vouchers has also contributed to positive student outcomes as demonstrated by Hoxby (2004) and Rouse (1998) when analyzing vouchers in Milwaukee, and Greene (2001) when analyzing the effects of Florida's voucher program. In addition, Metcalf, Boone, Stacey, and Legan (2001) reports that students who participated in the Cleveland voucher program had significantly higher test scores than public school students in language and science. Thus, there is evidence in the literature that school choice programs do tend to result in higher student achievement.

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[2]See King (2005) for additional evidence on how school choice programs can be a factor in promoting regional economic growth.

[3]For the most up to date information regarding charter school laws, the number of schools operating, and the total number of students being served see The Center for Education Reform (2004) at www.edreform.com.

[4]In Vermont, there are over 6300 high school students participating in the voucher program and in Maine there are over 13,700 participating. In Milwaukee there are over 13,000 students using vouchers, and in Ohio there are over 6000. Florida serves over 13,000 students through McKay Scholarships, and Washington, DC and Utah provide vouchers to approximately 1000 and 54,000 students, respectively. Facts and figures were collected from the Milton and Rose D. Friedman Foundation (2002), available at www.friedmanfoundation.org.

While the impact of school choice on student test scores has been widely studied, in this paper we ask a different question that has yet to receive attention in this literature. We ask whether another important gain from school choice programs might also be that they positively impact the career choices of students, and society's level of wealth as a result. In particular, we have in mind the choice a graduating student makes between working for someone else as an employee versus opening their own business. Finding that school choice increases youth entrepreneurship would be an interesting result both within the school choice literature, and the literature on how to increase the rate of entrepreneurship. It would be an important result because in that literature, the large expenditures on youth entrepreneurship programs do not seem to have had a statistically significant impact on the overall rate of youth entrepreneurship.

Fostering entrepreneurship is important because previous research has consistently demonstrated that it is a key factor contributing to economic growth. Empirical studies find that much of the difference in economic growth rates among areas can be explained by differing rates of entrepreneurship. Reynolds, Hay, and Camp (1999), for example, show that different rates of entrepreneurship account for up to one-third of the difference in country economic growth rates, while Zacharakis, Bygrave, and Shepherd (2000) find that it can explain approximately half of the difference. Kreft and Sobel (2005) find this relationship to be true across US states, and Henderson (2002) finds it to hold at the local level within the United States. The literature seems to clearly and consistently find that higher rates of entrepreneurship are associated with higher rates of economic growth.

Based on the increasing awareness of entrepreneurship as a driving force behind economic growth, state and local economic development efforts have been more heavily directed toward promoting entrepreneurship in recent decades. Government programs have been created to help provide funding to start-up companies, and resources have been devoted to creating youth entrepreneurship programs across the United States. However, as mentioned earlier, evidence that these programs actually increase entrepreneurial activity has been illusive. State-run, funded, or managed loan funds are notoriously inefficient and ineffective, and assessments of youth entrepreneurship programs are anecdotal at best. Because of the

lack of statistical evidence on the effectiveness of these youth entrepreneurship programs, some of the major grant-making foundations have begun to cut their investments in these programs. What we have learned from the last decade is that government programs have had limited success, at best, in fostering entrepreneurial activity.

More recently, authors such as Baumol (1990, 2002), Boettke (2001), Boettke and Coyne (2003), and Kreft and Sobel (2005) have found that the best way to foster entrepreneurship is through better institutions, rather than new government programs. The main hypothesis advanced in this literature is that the creative spirit of these individuals will be directed in different directions depending on the prevailing economic and political institutions. In areas with institutions providing secure property rights, a fair and balanced judicial system, contract enforcement, and low regulations and taxes, creative individuals are more likely to engage in the creation of new wealth through productive market entrepreneurship. In areas without these institutions, creative individuals are more likely to engage in attempts to capture transfers of existing wealth through unproductive political lobbying and lawsuit abuse. Our hypothesis in this paper is strongly in line with this literature. School choice is itself an institution that decreases government involvement and expands the role of the private sector. School choice is an institutional reform, similar to reforming the judicial system, tax code, or body of regulations. Relative to the older idea of instituting new government programs, these institutional reforms have the advantage of actually decreasing the need for public sector funding, rather than increasing it.

3. Charter schools versus voucher programs

Research has shown that school choice programs generate an environment of innovation, competition, and risk-taking within the administrative infrastructure of schools. For example, Teske, Schneider, Buckley, and Clark (2000) find that school administrators respond to the competitive pressures introduced with school choice programs by enhancing school efficiency and adopting more innovations at their school. A study by Rapp (2000) has also shown that school choice promotes a better work ethic among public school teachers. Economists such as Friedman and Friedman (1979) have long pointed to these competitive pressures and

incentives as the reason why school choice programs improve the quality of education.

Lubienski (2004) finds that unlike public schools, charter schools engage in a number of innovative practices at the administrative level, such as merit pay, marketing, parental incentive contracts, and the use of private financing arrangements. In addition, many charter schools enlist private firms referred to as educational management organizations (EMOs) to manage their schools, providing further competition and possibilities of innovation. With regard to teachers, Hoxby (2002) finds that in charter schools, teachers are more likely to have master's degrees in fields like business, arts, and science, and they were more likely to have held jobs in business or public service organizations. These results provide some evidence that teachers in charter schools would be more apt to exhibit business-like or entrepreneurial behavior than teachers in traditional public schools.

Levin (2006) argues that "the most complete approach to seeking educational change and innovation is that of promoting a marketplace of private alternatives to existing public schools through educational vouchers." He believes that the success of vouchers is based on the assumption that government-run schools are "more rigid, restrictive, and less risk-taking than private institutions that rely on competition in the marketplace." In conclusion Levin (2006) claims that, "the rewards of the marketplace provide incentives for undertaking the risk of innovation that is required to develop better educational alternatives."

As mentioned earlier, this type of an innovative and risk-taking environment is something that is generally not present, and often discouraged, in the public school system.[5] Public schools are often bureaucratic, resistant to change, and they tend to stifle innovation. Public school administrators who are not in competition for students against other schools have a much weaker incentive to care about their school's competitive position, and about trying new risky ideas that might not work. A child going to school everyday in an environment of competition and innovation has an advantage in learning these entrepreneurial

principles and applying them to their personal life after graduation.

Our hypothesis asserts that this heightened entrepreneurial environment gets passed along to students in their personal lives when they are educated. This idea is highly consistent with the literature that focuses on teachers and school administrators being role models for students. This literature in the education field finds that these individuals significantly impact the personality and life choices of their students. Almquist and Angrist (1971) have defined role models as people who do more than just provide technical information. The authors claim that role models set norms and values and orient behaviors on a certain course. Teachers are observed by students on a daily basis and are arguably one of the most important role models student have. In fact, Muss (1975) contends that a student's observation of her teacher may have a more powerful impact on the student than instructional methods.

Given that teachers usually need the approval of administrators when it comes to adopting innovative ideas in the classroom, it is important to foster an environment conducive to change at the administrative level first. Because school choice creates competition and increased accountability, it is argued that administrators will be more apt to encourage educators to take risks when it comes to new teaching methods in order to attract new students. It is here that students witness innovation by their teachers that may lead them to being more innovative and entrepreneurial in their own personal lives.

Teachers as role models, (the "role model hypothesis") is often discussed in the realm of gender and minority issues and the conclusions are somewhat mixed. Authors such as King (1993) and Dei (1995) find support for this hypothesis and contend that minority teachers who serve as role models can improve the plight of minority students. Dissenting opinions also exist and are well documented by Cizek (1995) who points to the lack of theoretical foundation for the role model hypothesis. Although the literature on the importance of diversity in role models in schools does not contain a definitive answer, it is commonly accepted that teachers are in general an important influence for students in their formative years. Therefore, we contend that students are more likely to take risks and become entrepreneurs themselves after observing their teachers in the

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[5] Chubb and Moe (1990) explain that institutions and incentives matter because government run schools lack the incentives and motivation to reform themselves, thus finding choice to be the kind of reform necessary to improve the current educational system.

risk-taking, business-like environment that school choice creates.

While youth entrepreneurs may be cultivated by this institutional environment created within school choice programs, not all school choice programs are alike. In particular, there is reason to believe that voucher programs create this environment to a much greater extent than charter school programs. Educational vouchers are a school choice program that allows the use of public money for students to gain access to any participating public *or* private school.[6] In contrast, charter schools are nonsectarian *public* schools of choice that are only free from a few of the numerous regulations that apply to traditional public schools.

Compared to voucher programs, charter school programs do not create the same entrepreneurial incentives, or at least clearly not as strongly. Charter schools are publicly funded, but privately run. They operate under a written contract that details how the school will be organized and managed, and what students will be taught. While students from public schools in the area may transfer to the charter school, the charter school program does not directly create competition between the other schools. Voucher programs, on the other hand, put all schools (public and private) into competition with one another. This distinction is best discussed in Hoxby (2004, p. 13) who notes:

> It may be best to think of charter policies as voucher policies with more constraints imposed on the schools. Although the constraints on charter schools vary widely among states, certain constraints are always imposed. First, charter schools are never allowed to practice "positive" selective admissions in the sense of excluding students with poor test scores or interviews. They are usually required to accept students by lottery or on the basis of certain characteristics that are considered "negative" (for instance, a student's having indicated that he would like to drop out of school). Second, charter schools must accept the charter school fee; they cannot allow or require parents to top up the fee. Third, charter schools are legally public institutions, so they must obey the same regulations on church state relations, racial and gender discrimination, et cetera as public schools. Fourth, the chartering process requires the school to meet certain government designated criteria at regular intervals: at the initiation of the charter school and again at periodic re-chartering.

As is illustrate in Hoxby's discussion, charter schools simply do not create as competitive an environment as a voucher system. A voucher system puts all schools in competition with one another, with a much higher degree of flexibility and autonomy. Based on this difference, we expect voucher programs to have a more significant effect on youth entrepreneurship than charter schools.

4. Empirical analysis

To estimate the impact of school choice programs on youth entrepreneurship we use US county-level data on youth self-employment from the 2000 US Census obtained from the Census Bureau. Self-employment is the most frequently used measure of entrepreneurship in the empirical literature. Our primary variable of interest is the rate of self-employment among those aged 16–25 years old. For robustness we also examine the rate of self-employment among those aged 16–30 years old. We included all self-employment data that was reported in the 2000 Census, and our full sample includes 2171 county-level observations for workers between the ages of 16–25 and 2543 observations for workers between the ages of 16 and 30.

Using the rate of entrepreneurship only for youths, rather than the entire adult population is important for two reasons: (1) because we need to ensure that the group we are examining went to school when these programs were in place, and (2) it helps to alleviate any potential reverse-causality or endogeneity problems in the data (i.e., more entrepreneurial areas being more likely to adopt school choice). However, prior to beginning our empirical analysis, the reverse-causality issue deserves further attention. The logic would be that more entrepreneurial areas might be more likely to adopt school choice programs, thus causing a bias in the coefficient estimates in our model. Using probit analysis we regress school choice in 1995 on self-employment in 1990 for all persons 16 and over and find no evidence that reverse-causality is an issue.[7] More specifically, the results of the probit

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[6]Students may be somewhat restricted on their choice of schools depending upon which public and private schools are eligible to participate in the voucher program.

[7]Self-employment data was collected from US Department of Commerce, Bureau of the Census, 1990.

model show that self-employment is statistically insignificant in predicting the presence of school choice programs.[8]

We now turn to our main analysis. For each county we express youth self-employment as a percentage of the employed civilian population (within each age group). Four different variants of this variable are used as dependent variables in our regressions. We first estimate the rate of self-employment only among those aged 16–25, and then also among those aged 16–30. In this manner we can see how sensitive our results are to the cutoff age we consider as the ending point of youth entrepreneurship. For each of these two age classes, we then estimate the model both using all self-employed persons, and restricting our analysis to only those self-employed persons who run a business that is not incorporated. These non-incorporated businesses are generally the smaller, early stage businesses most likely formed by budding entrepreneurs.

Our key independent variables of interest are dummy variables reflecting the presence of charter schools and voucher programs in the county. The voucher variable is a dummy variable that takes the value of one for a county that had implemented a voucher program by 1990. The charter school variable is also a dummy variable that reflects the presence of at least one charter school in the county as of 1995.[9] Also included in the regression are a host of other control variables that have been used in other studies as determinants of self-employment rates. The first of these control variables is the percent of the county population with a high school degree. This is often used as a control variable because a high school education provides the basic training and skills needed to start up a business, while a college education provides more specific business training enhancing the managerial abilities of individuals. Gender and race are also included as control variables because previous literature has found that entrepreneurs are more likely to be male and Caucasian. Age is another important control variable that accounts for the fact that entrepre-

neurship rates generally differ among older and younger persons as older individuals tend to be more risk averse than younger individuals, although they also tend to start small businesses to have more control of their lifestyle. Unemployment is often used in studies of self-employment rates and can be interpreted in a couple of ways. One view held by Evans and Leighton (1989) and Blanchflower and Oswald (1998) is that unemployment motivates individuals into self-employment which would predict a positive effect on self-employment. Another view claims that the unemployment rate is a proxy for the health of the economy. A struggling economy would have fewer profitable opportunities for starting a new business. Percent service employment in the county is also included because authors such as Blau (1987) have found that entrepreneurship rates differ significantly in this sector. County median income is also included in the regression as a control variable. It has the potential to have two impacts on entrepreneurship rates as those with more financial capital are more able to finance the start up of a new business, and areas in which market opportunities are the weakest may find people turning to self-employment. Our final control variable is the crime rate in the county as previous research has found that high crime rates deter the formation of new businesses in an area.[10]

When using cross-sectional data at the county level, the possibility of spatial dependence arises causing OLS coefficient estimates to be biased and inconsistent. Therefore, we use a model that allows for either spatial dependence in the dependent variable, called a spatial autoregressive lag, or in the error component, termed a spatial error lag. As shown by Cliff and Ord (1981) and Anselin (1988), models of spatial dependence are used to account for direct influence from spatial neighbors, as well as spillover effects between cross-sectional units of observation. The first-order spatial lag model can be expressed as

$$y = \alpha + \rho W y + X\beta + \varepsilon, \tag{1}$$

where y is the $(N \times 1)$ dependent variable, ρ is the spatial autoregressive coefficient, W is a $(N \times N)$ spatial weight matrix (first-order contiguity), X is a $(N \times K)$ matrix of exogenous variables and ε is the $(N \times 1)$ random error term. A positive and sig-

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[8]The results of this analysis are available from the authors upon request.

[9]Charter school legislation was first enacted in 1991 and the first charter school opened in 1992. The year 1995 was used here due to data limitations in the earlier years. Charter school and voucher data was collected from the US Department of Education, National Center for Education Statistics, 1990–91 and 1995–96.

[10]Descriptive statistics for all variables are available from the authors upon request. Data for the crime index was collected from the US Department of Justice (2000).

Table 1
Spatial autoregressive lag regression estimates of youth entrepreneurship rates, 2000

Dependent variable	Self-employment rate (ages 16–25)		Self-employment rate (ages 16–30)	
	All business types	Non-incorporated business only	All business types	Non-incorporated business only
Constant	−7.5820*** (7.15)	−6.4716*** (7.58)	−10.2767*** (6.15)	−9.3943*** (13.46)
Percent with high school degree	−0.0204*** (4.28)	−0.0134*** (9.82)	−0.0350*** (3.27)	−0.0232*** (4.98)
Percent with bachelor's degree	0.0041 (0.86)	0.0011* (0.28)	0.007 (1.39)	−0.0002 (0.04)
FBI crime index	−0.0040** (2.08)	−0.0034** (2.05)	−0.0040* (1.90)	−0.0035* (1.86)
Median household income	−0.0218*** (7.28)	−0.0175*** (6.82)	−0.0091*** (3.69)	−0.0090*** (3.12)
Percent male	0.1826*** (14.83)	0.1454*** (10.21)	0.2111*** (11.80)	0.1857*** (11.69)
Percent white	0.0030* (1.62)	0.0027* (1.67)	0.0054 (1.47)	0.0058*** (3.05)
Percent service employment	−0.0442*** (4.71)	−0.0273*** (3.22)	−0.0382** (1.92)	−0.0215** (2.17)
Median age	0.0850*** (10.45)	0.0748*** (11.02)	0.1378*** (9.16)	0.1139*** (15.18)
Unemployment rate	0.0119** (2.06)	0.0013 (0.33)	−0.0056 (0.34)	−0.0102 (1.98)
Charter school program 1995	0.0091 (0.06)	0.0572 (0.44)	−0.0835 (0.58)	0.0018 (0.01)
Voucher program 1990	0.7779*** (3.15)	0.8466*** (3.97)	0.7984*** (2.95)	0.8711*** (3.64)
Rho	0.3450*** (11.25)	0.3330*** (11.31)	0.4670*** (3.19)	0.4420*** (3.24)
Observations	2171	2171	2543	2543
R-squared	0.1499	0.1491	0.1542	0.168

Note: For the coefficient estimates, the *t*-statistics are in parentheses and the asterisks indicate statistical significance as follows: *** = 1%, ** = 5%, and * = 10%.

nificant value for ρ would indicate that observations of self-employment in county i are positively correlated with observations of self-employment in nearby counties. Failure to control for this correlation would lead to biased estimates of the explanatory variables.[11]

The spatial lag model assumes spatial correlation in the dependent variable only, which may arise because of simultaneous interaction between counties. However, spatial correlation may also occur due to spatial correlation in the error term. To model spatial error dependence, we assume a first-order spatial autoregressive structure where the error term is given as

$$\varepsilon = \lambda W \varepsilon + v = (I - \lambda W)^{-1} v, \qquad (2)$$

where ε is the ($N \times 1$) vector of error terms, v is a ($N \times 1$) component of the error terms made up of IID random variables, W is a ($N \times N$) spatial weighting or contiguity matrix, and λ is a scalar interpreted as the unobserved spatial error correlation coefficient. The error terms are positively correlated if $\lambda > 0$, negatively correlated if $\lambda < 0$,

and not correlated if $\lambda = 0$. Tables 1 and 2 present the regression estimates from the spatial lag and spatial error lag models of youth self-employment respectively.[12]

The control variables in the regressions perform as expected and are in line with the findings of other studies of self-employment among all age groups. Consistently significant in our models are the educational attainment of the population, crime rates, income, age, and gender. The variable measuring the presence of charter schools is never significant in our models, implying that the presence and extent of charter schools has no impact on the rate of youth entrepreneurship. The variable indicating the presence of a voucher program, however, is consistently significant in all of our specifications at the 1 percent level.[13] The estimated coefficient ranges from 0.7779 to 1.3260, suggesting

[11]We use a first-order contiguity-weighting matrix to capture the possible effects of spillovers and the direct influence of neighboring counties. Because school choice in one area could affect the laws and regulations in a neighboring county, counties within close proximity to one another should have weights to account for these possible influences.

[12]We also ran a Bayesian spatial autoregressive model and a Bayesian spatial error model, which allows the data to be corrected for heteroskedasticity if it is present. The results of these models do not differ substantially from the model described above and are available upon request. For further information on the Bayesian models see Smith and LeSage (2004).

[13]The correlation coefficient between charter schools and vouchers was −0.023 and −0.021 for our 16–25 and 16–30 samples, respectively, indicating that the degree of correlation between the two variables does not contribute to the insignificance of the charter school variable.

Table 2
Spatial error lag regression estimates of youth entrepreneurship rates, 2000

Dependent variable	Self-employment rate (ages 16–25)		Self-employment rate (ages 16–30)	
	All business types	Non-incorporated business only	All business types	Non-incorporated business only
Constant	−6.0732*** (5.47)	−5.4547*** (5.46)	−8.0158*** (6.91)	−7.9757*** (9.86)
Percent with high school degree	−0.0260*** (3.32)	−0.0146** (2.12)	−0.0375*** (4.03)	−0.0218*** (4.75)
Percent with bachelor's degree	−0.00001 (0.002)	−0.0032 (0.62)	−0.0027 (0.39)	−0.0098* (1.78)
FBI crime index	−0.0034** (1.72)	−0.0028* (1.63)	−0.0021 (0.93)	−0.0016 (0.83)
Median household income	−0.0214*** (5.57)	−0.0178*** (5.23)	−0.0089** (2.03)	−0.0096*** (2.57)
Percent male	0.1713*** (19.51)	0.1361*** (8.45)	0.2015*** (11.65)	0.1797*** (11.34)
Percent white	0.0043** (1.99)	0.0038* (1.88)	0.0092*** (3.73)	0.0090*** (4.29)
Percent service employment	−0.0489*** (4.88)	−0.0295*** (2.76)	−0.0491*** (4.19)	−0.0295*** (3.31)
Median age	0.1019*** (10.42)	0.0874*** (10.30)	0.1540*** (15.02)	0.1272*** (14.36)
Unemployment rate	0.0162** (2.06)	0.0033 (0.49)	0.000008 (0.001)	−0.0066 (1.04)
Charter school program 1995	0.0522 (0.32)	0.0945 (0.66)	−0.0234 (0.12)	0.0621 (0.38)
Voucher program 1990	1.0544*** (3.12)	1.1094*** (3.85)	1.2911*** (3.11)	1.3260*** (3.69)
Lambda	0.3980*** (18.06)	0.3730*** (25.29)	0.5230*** (27.10)	0.5040*** (20.81)
Observations	2171	2171	2543	2543
R-squared	0.2402	0.2288	0.3414	0.3312

Note: For the coefficient estimates, the *t*-statistics are in parentheses and the asterisks indicate statistical significance as follows: *** = 1%, ** = 5%, and * = 10%.

that the presence of a voucher program increases the rate of youth entrepreneurship by approximately one percentage point. This is a rather large effect given that the mean value of this variable ranges from two to four percent (depending on the sample). A one percentage point increase thus translates into a clearly significant 25–30 percent increase in the rate of youth self-employment in the county.

Our empirical results strongly suggest that voucher programs increase the rate of youth entrepreneurship. This result holds for both age groups 16–25 and 16–30, and for both definitions of self-employment (incorporated and non-incorporated). We find no significant effect of the presence of charter schools on youth entrepreneurship. We believe that our finding, that voucher programs have a more significant effect on youth entrepreneurship rates than do charter schools, is consistent with the different institutional arrangements and incentives created by these programs discussed earlier. These results are also consistent with Hoxby's (2004) findings on the differential effects of voucher programs and charter schools on student achievement scores. In her sample, the impact of competition created by voucher programs is much higher than the impact of charter schools. For mathematics scores, voucher programs result in a 8.0 national percentile point increase, while for charter schools the estimates range from a 1.1 to 2.7

percentile point increase. Thus, not only do voucher programs produce a larger impact on student achievement scores, but also our results suggest that voucher programs also have a much greater effect on the rate of youth entrepreneurship.

5. Conclusion

Previous research has found that charter schools and voucher programs tend to have beneficial effects on student achievement scores. In this paper, we postulate that these programs might also result in increases in the rate of youth entrepreneurship. This impact on the career choices of students is potentially a significant additional benefit of these programs. The channel through which these programs impact youth entrepreneurship is not through specific programs designed to teach students entrepreneurship, but rather is due to the business-like, competitive and innovative environment that these programs foster among school administrators and teachers. Students going to school in this type of environment, one in which their own school is in constant competition with other schools, are quite simply more likely to become entrepreneurs.

Our findings are particularly relevant given the recent emphasis at the state and local level on increasing entrepreneurship in an effort to foster economic growth. Years of experimentation with

new government programs designed to foster entrepreneurial activity have been met with weak results at best. The failure of government funded loan funds and youth entrepreneurship programs, are just two examples.

Our results find that counties with voucher programs have significantly higher rates of youth entrepreneurship. The effect is not only statistically significant, but economically as well. We do not, however, find this result to hold for charter schools. This is consistent with previous research that finds voucher programs tend to result in a larger impact on student achievement scores than do charter schools. Counties with voucher programs have rates of youth entrepreneurship approximately one percentage point higher. Our results suggest that an additional benefit of voucher programs above any impact on student achievement is that they also foster youth entrepreneurship, and thus overall economic growth. In addition, our results would suggest that state and local governments attempting to foster entrepreneurial activity might be well served to adopt school voucher programs.

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