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The effects of community social capital on school performance: A spatial approach

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ABSTRACT

The influence of social capital on economic activities has been a central theme in the literature for quite a long time, but the relationship between social connectedness and school choice has not been addressed. If the primary objective of social capital is to create cohesiveness through the connectivity of community members, then it is clear that parents' school choice decisions are influenced by the groups or organizations to which they belong. Ni (2007) argues that parents' decisions not only influence students' academic performance, but also affect school expenditures. Thus, it is worthwhile to investigate the effect of social capital on school performance. The measurement of social capital has been debated for a long time. In this paper we create a geographically bounded community around schools in Mississippi employing GIS instead of following the commonly used political boundaries such as school district or county to measure social capital. Then we estimate the social capital stock for each school to analyze the relationship between the school's performance and existing social capital. Data were collected from the Northeast Regional Center for Rural Development (NRCRD) and the Mississippi Department of Education for the academic year 2005–2006. We find that schools located in communities with a higher stock of social capital significantly outperform those with relatively low levels of social capital. The results also suggest that students' race and socio-economic status significantly reduce primary school performance, holding all else equal. This research helps to understand the importance of social capital from spatial perspectives and will guide policy makers in future resource allocations.

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1. Introduction

The United States is a world leader in educational investment. According to the U.S. Department of Education, total expenditures on elementary and secondary schools for the 2005–2006 academic year were \$558.3 billion. About 92% of this amount was spent on public elementary and secondary school systems (U.S. Department of Commerce, 2006). Moreover, public school expenditures nationwide increased almost 805 times in the past 30 years. In keeping with such a large educational investment, during the academic year 2003–2004, state and local governments in the state of Mississippi spent approximately \$3.4 billion dollars on

public schools.³ Unfortunately, this investment has not significantly affected standardized student test scores (Lips, 2004), and the resulting widespread concerns about public school performance have led to a public debate regarding alternative educational reforms while ignoring the effects of school communities on student's academic, hence, school's overall performances.

In Mississippi, public schools are different from each other in many ways and one of the most striking differences is the place where the school is located. For example, an urban (rural) public school can be located in a very different community than other public schools although they are in the same urban (rural) area. Therefore, the school community not only varies between rural or urban areas, but it also varies within the same geographical area. Students from these schools vary in their academic performances for several reasons. Generally researchers and policy makers are

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trying to minimize that gap by looking at various internal issues, such as teacher's quality, student's socio-economic or even school's political/geographical location (rural or urban) while ignoring some external factors. For example, social capital may have a significant impact on students' academic performance. In the next few paragraphs we will explore the linkage between social capital and students' academic performance.

Social capital is a measure of the connectivity between individuals in a community. In comparison to the location effect, which is inherently geographic, social capital in a community is derived from a connection between individuals and social networks. Coleman (1988), who developed the concept of social capital, argues that it is an equally important factor in personal development as is financial capital and human capital. Social capital plays a significant role in explaining student educational attainment.

Social capital in a community is created through connectedness among individuals through social organizations and clubs. There are different ways social capital can influence individual development, and the networking theory suggests one explanation. According to this theory, which is developed by Bryant and Norris (2002), there are three different aspects of social capital: bonding, bridging, and linking. Individuals optimize their relatedness with social organizations based on their personal goals, but all social organizations serve the common purpose of networking. One role of social networking is to inform community members about education and to provide ways to access and succeed in education.

The importance of social capital in the development of human capital (Coleman, 1988; Gregory, 2003; Putnam, 1993) and economic growth (Beugelsdijk and Smulders, 2009) is well established in the literature. Putman reports a growing disconnectedness in U.S. communities and believes that higher social capital improves student performance. More recent research shows that the accumulation of social capital positively influences the academic performance of students in a community (Meier, 2009). Evidence from some studies suggests that students obtain academic benefits from social capital (see Putman, 2000) while other authors such as (Meier, 2009) make the general argument that students' achievements are positively related to a school's overall performance. There are reasons to believe that the effects of social capital on students' academic achievement may differ from student to student.

Intuition suggests that social capital aids students in connecting with resources that enhance educational attainment. As a thought experiment, compare a student in a community with no social capital to a student surrounded by numerous social organizations. The former student is likely to be somewhat isolated outside the classroom and relegated to study largely on their own. The latter student can more readily learn about community learning resources and connect with group study options. On average, you might expect the student surrounded by more social capital to learn more and perform better in the classroom. This leads to the following null hypothesis:

Hypothesis. The degree of social capital available within a community will have no effect on student performance in local public schools, *ceteris paribus*.

A rejection of this null hypothesis would suggest that social capital is associated with greater student performance. This result could have policy implications as communities allocate resources. Both public and private sectors within a community have the capacity to increase social capital. In some cases social organizations may be directly funded by either or both sectors. There might also be more indirect means of support through community infrastructure that promotes social interaction. The analysis in this study should provide insight on the likely effectiveness of allocating resources to social organizations within a community.

The remainder of the paper proceeds as follows. Section 2 presents the background literature on social capital. Section 3 examines the methodology to measure social capital and explores the data used in the study, while Section 4 presents results. Section 5 concludes by synthesizing the key findings from the results.

2. Background and literature

The generally accepted definition of social capital is “the set of social resources of a community that increases the welfare of that community” (Glaeser, 2001). Various types of organizations, including religious, political, and social, foster social capital through norms and networks. Social capital has received a great deal of recent attention in the literature and is generally considered as an exogenous factor (Fukuyama, 1995; Putnam, 1993), endogenous influence (Knack and Keefer, 1997), or both an exogenous and endogenous factor (Radnitz et al., 2009). Although researchers often hold different views about social capital formation, they all agree about its direction of influence on other socio-economic factors.

Much research on public school performance attempts to address concerns, such as class size, teachers' training and salary, curriculum, and school productivity related programs. Generally, local and state policy makers focus only on school reform programs and resource allocation. The importance of social capital on public school performance and efficiency is often overlooked. Among the few studies available, Coleman (1988) and Putman (2000) show the existence of a positive relationship between social capital and economic activities. Glaeser (2001) argues that social capital can influence some unobserved characteristics that drive observed socio-economic factors in a community. For example, connectedness between child, family member, community member, and school enhance academic achievement (Coleman, 1988).

Following Coleman's initial investigation of social capital, economists and social scientists have studied the relationship between social capital and educational attainment or academic performance. Glaeser (2001) finds a robust direct relationship between social capital and individual schooling. Meier (2009) finds that social capital influences students' grade point average and student dropout rates. Meier uses parental involvement, participation in extracurricular activities, and family composition as his social capital variables when looking at grade point average; he finds a positive relationship. Hence, increasing social capital stock increases students' performance.

In an international setting, research in rural Bangladesh using micro-data shows that social capital, defined as parental sociability, Non-Government Organization (NGO) membership, and community work does not increase the probability of school attendance (Asadullah, 2008). To date, the literature in public school performance has given little importance to social capital, although a few studies find a significant positive relation between students' academic outcome and social capital. Thus, in the current investigation we will explore the social capital effect on public school performance.

3. Methodology

3.1. Measuring social capital

Measuring social capital is not straightforward. We need to know about the levels of social capital before measuring the stock of social capital in a community. The micro level, the meso level and the macro level are the three levels of social capital that can be analyzed in society (Hjellund and Svendsen, 2000). This paper analyzed

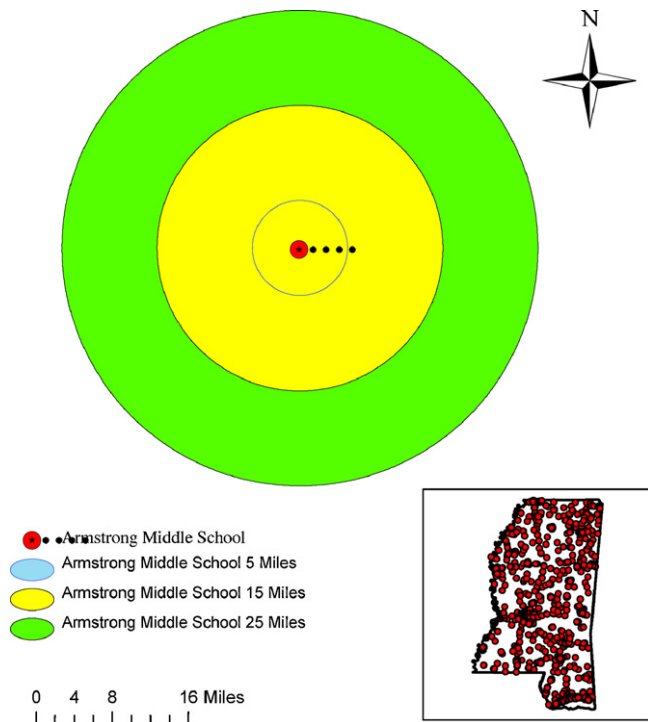


Fig. 1. Social capital index for Armstrong Middle School, Starkville, MS.

social capital at the meso level, which is basically accumulated from institutions including sports clubs, political organizations, religious organizations, social associations, etc.

We gathered this variable from the Northeast Regional Center for Rural Development (NRCRD). Rupasingha and Stephan (2008) developed this variable from 1990 to 2005 at the county level. Similar to Rupasingha et al. (2006) and Rupasingha and Stephan (2007) we are also employing the social capital variable of the year 2005 for this study. They have used several social units to compute this index. The types of social units include bowling centers, civic and social associations, physical fitness facilities, religious organizations, sports clubs, political organizations, professional organizations, business associations, and other labor organizations in a county. County level data are not ideal to use in this paper since the analysis is based on the school level data, but this is the closest data set available to the public. Another justification to use this data is its nature. If social capital accumulation in a community is based on social networking, then it is unlikely that it is bound in a political boundary. Therefore, accessing these social, political or educational associations is not limited to any individual in a community. Hence, following Misra and Chi (2011) and Misra et al. (2012) we create a geographically bounded community with the help of GIS (Geographical Information Systems) around a school instead of following the political boundary. Then we develop an index of social capital stock in that community for each school. To measure the effect of social stock we create communities in three different sizes, i.e. a community with 5-mile, 15-mile or 25-mile area, where we include all previously mentioned social organizations (Fig. 1). This technique creates a location specific measure that is more relevant than the traditional approach of counting social organizations within an arbitrary political boundary. Rather than ignore the location of the school, the social capital index should provide a more appropriate measure and enhance the analysis of the relationship between social capital and student performance.

3.2. Data

The data used in this study are obtained from reports compiled by the Mississippi Department of Education. The data are for the academic year 2005–2006. Most of the variables are collected from the Mississippi Report Card (MRC), published annually by the Mississippi Board of Education. The data include the number of proficient performers on the Mississippi Curriculum Test (MCT) examinations, enrollment, students' demography, and the number of students' receiving reduced price or free lunches.

We exclude a few schools from the sample since their output from the MCT examination and some other variables are not available. The final sample data set includes 344 primary schools. The MCT examination at the time of this study includes three different subjects, reading, language and mathematics. Output in the production function, is the proportional score, namely, the Overall proportion score on the MCT examination (Mississippi Curriculum Test) for primary schools. MCT is the standardized test conducted by the Mississippi Board of Education, and the testing process is homogenous across schools in the state. Following Cho (2009), we employ the overall average and individual subject score⁴ in the MCT test as an output. For this paper we follow Marlow (1997, 2000) and Arum (1996) to select graduating grade data for primary schools.

Student performance should indicate the overall learning experience which helps a student to develop his or her analytical, mathematical, and comprehensive skills. In this paper we use different measures of educational performance as output. The different available measures included the average score in overall, and language examinations for primary schools. The average score for these examinations are 81.12, and 81.30 for the graduating grade, respectively. Detailed definitions for these various outputs are reported in Table 1.

We divided the explanatory variables into two categories: inputs, and other explanatory variables. The inputs, which are directly related to the school's daily operations, included general expenditures per student, textbook and instructional expenditures per student, number of teachers per student, percent of black teachers, percent of female teachers, percent of master teachers, percent of black students and percent of free lunch students. For the primary school graduating grade, average school enrollment is 517 students; and mean school employment is 32.48 full-time and part-time teachers for the academic year. On average, primary schools spent \$200.83 per student on general expenditures, which included school maintenance costs and other costs. Textbook expenditures, which include textbooks and related materials expenditures average almost \$76.33 per student. As Table 1 shows, on average, 28% of primary schools teachers are black and almost 92% of total teachers are female with an average of 12.84 years of teaching experience. The mean percent of master teachers in primary schools is 38. The mean percent of black students in primary school is 56% and almost 69% of the total students received free lunches.

Other explanatory variables that are indirectly related to the student's performance are school location and social capital. School geographical location and social capital index are used in this paper as exogenous factors. 79% of the total primary schools in the sample are located in small-city/rural areas. For the other exogenous variables, we use markets with a 5-mile radius; 15-mile radius, and 25-mile radius. Therefore, the mean for these exogenous variables varied with the market size employed. On average, social capital indices are 7.91, 40.63, and 71.43 for the market of 5, 15, and 25 mile radiuses, respectively, for primary schools in Mississippi.

⁴ Only overall proportional and language scores are included in this study.

Table 1
Variable descriptions and summary statistics for primary schools (graduating grade).

Dependent variable	Variable definition and source	Mean	Standard deviation
MCT overall score	Graduating grade's mean Mississippi Curriculum Test score across all subjects, as a percentage. (reading + mathematics + language/total possible points in all examinations in that grade)	0.81	0.03
MCT language score	Graduating grade's mean Mississippi Curriculum Test score in language examination, as a percentage. (language/total possible points in language examination in that grade)	0.79	0.04
General expenditures per student	Total general expenditure including school maintenance cost and other supplies in dollar/total students	200.82	119.02
Textbook expenditures per student	Total text book and instructional expenditure in dollar/Total students	76.33	73.26
Students per teacher	Mean number students per teachers in a school	15.38	76.92
Percent of black teachers	Percentage of teachers that is black (total number of black teachers/total number of teachers)	0.28	0.28
Percent of female teachers	Percentage of teachers that is female (total number of female teachers/total number of teachers)	0.92	0.08
Teacher's experience	Mean number of years experience	12.84	2.98
Percent of master teachers	Percentage of teachers with master degree (total number if master degree holder teachers/total number of teachers)	0.38	0.12
Percent of black students	Percentage of students that is black (total number of black students/total number of students)	0.56	0.34
Percent of free lunch students	Percentage of students receiving free lunch (total number of students receiving free lunch/total number of students in a school)	0.69	0.25
Small-city rural	School Location Dummy 0 = urban fringe of a mid-size city, urban fringe of a large city, mid-size city, suburb-Midsize. 1 = small city, large town, rural, rural inside CBSA, rural outside CBSA, rural distant, rural fringe, rural remote, small town, town remote	0.79	0.41
Social capital	Number of social organizations around		
	5 miles of a public school	7.91	17.76
	15 miles of a public school	40.63	68.59
	25 miles of a public school	71.43	92.88

4. Results

The school-level analysis uses the score based on the MCT Overall examination in the graduating grade, as a dependent variable, which is a proxy for primary school output. The graduating grade regression results are reported in Table 2. This table shows how different factors influenced student academic performance. The variables teachers per student, the percent of black students, the percent of free lunch students, and social capital are significant at least at the 10% level with the expected signs regardless of market size. At the same time, other variables such as teachers' gender, race, experience and education, and school location are insignificant in this model.

Although the degree of human capital (experience and education) and gender held by teachers has no effect on students' academic achievement after controlling for other factors in the

model, the teachers per student variable is significant and positively associated with the overall score. Therefore, primary schools' academic performance is related significantly to the number of teachers rather than their educational qualification and experience. Therefore, holding everything else at a constant level, on average increasing the number of teachers per student by a unit will increase the overall score by 0.38 units, 0.44 units and 0.43 units, respectively, in the MCT examination for primary schools in Mississippi as the community size increases from 5 miles, 15 miles and 25 miles. The findings for primary schools is very similar to Bomotti et al. (1999), Ching (2000) and Crawford (2001) where they show number of teachers is equally important as the teachers' educational background and experience.

The proportional score is smaller for the schools with more black students and students receiving free lunches. The results from the primary schools analysis indicate that the percent of free lunch

Table 2
Social capital and school performance.

Variable	Graduating grade Overall score 5 miles	Graduating grade Overall score 15 miles	Graduating grade Overall score 25 miles	Graduating grade Language score 5 miles	Graduating grade Language score 15 miles	Graduating grade Language score 25 miles
Constant	0.85 ^a (0.02)	0.83 ^a (0.03)	0.83 ^a (0.03)	0.81 ^a (0.03)	0.78 ^a (0.03)	0.78 ^a (0.03)
General expenditures per student	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	0.00 (0.00)
Textbooks expenditures per student	0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
Teachers per student	0.38 ^a (0.11)	0.44 ^a (0.11)	0.43 ^a (0.11)	0.45 ^a (0.15)	0.51 ^a (0.15)	0.51 ^a (0.15)
Percent of black teachers	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)
Percent of female teachers	−0.03 (0.02)	−0.03 (0.02)	−0.03 (0.02)	−0.01 (0.02)	−0.01 (0.02)	−0.01 (0.02)
Teacher's experience	−0.00 (0.00)	−0.00 (0.00)	0.00 (0.00)	−0.02 (0.00)	−0.00 (0.00)	0.00 (0.00)
Square teacher experience	0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)
Percent of master teachers	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.02 (0.01)	0.02 (0.01)
Percent of black students	−0.04 ^a (0.01)	−0.04 ^a (0.01)	−0.04 ^a (0.01)	−0.02 ^b (0.01)	−0.02 ^b (0.01)	−0.02 ^b (0.01)
Percent of free lunch students	−0.02 ^a (0.01)	−0.01 (0.01)	−0.02 ^b (0.01)	−0.03 ^a (0.01)	−0.02 ^c (0.01)	−0.02 ^b (0.01)
Small-city rural	−0.00 (0.00)	0.00 (0.004)	0.00 (0.00)	−0.01 ^b (0.00)	−0.01 (0.00)	−0.01 (0.00)
Social capital	0.00 ^b (0.00)	0.00 ^a (0.00)	0.00 ^b (0.00)	0.00 ^a (0.00)	0.00 ^a (0.00)	0.00 ^a (0.00)
Adj.R-Sq	0.30	0.31	0.30	0.26	0.27	0.25
Number	344	344	344	344	344	344

^a Indicates statistical significance at 1%, standard errors are in the parenthesis. Heteroskedasticity tested and corrected models.

^b Indicates statistical significance at 5%, standard errors are in the parenthesis. Heteroskedasticity tested and corrected models.

^c Indicates statistical significance at 10%, standard errors are in the parenthesis. Heteroskedasticity tested and corrected models.

students relate to the score negatively, which leads one to believe that the socio-economic status of students' enrollment has an effect on public school performance. A 1% increase in the number of free lunch students will decrease the overall score around 2 units in the most cases, while holding all other variables constant. This result is similar to previous education studies by Ching (2000) and Dee (1998). The degree of racial and ethnic student enrollment, which is the percent of black students in a school, also has a significant negative relationship to primary school performance. A percent increase in the number of black students will decrease the overall score around 4 units regardless of the community size, while holding all other variables constant. Thus, primary school performance is lower if the percent of black students is relatively large. Hence, the degree of racial and ethnic student enrollment is negatively related to a school's overall academic achievement. This finding is similar to other studies (Adkins and Moomaw, 2005; Fairlie, 2006) where they show that students' racial and ethnic backgrounds are related to their academic performance.

Among all other exogenous factors, the social capital variable is significant and positively associated with school performance. The central hypothesis addressed in this paper is the relationship between social capital and school performance. Since the effects of social capital have a significant and positive relationship on public school performance, higher social capital is associated with an increased performance. This result supports previous literature, for example, in Meier (2009), and Glaeser (2001), where the authors argued that there is a direct relationship between social capital and academic performance. Despite the statistically significant result, however, the economic significance of social capital is minor. The magnitude of these effects is quite small; even a 10% increase in the quantity of social organizations would not be enough to raise the proportional score by one point. Hence, the social capital stock in a community has a statistically significant yet economically small impact on primary school performance.

The public school location is measured with a dummy variable for rural areas. The coefficient for this variable is insignificant, which leads one to believe that primary school location in Mississippi does not have a significant impact on a student's academic performance. Therefore, primary school students' academic achievement does not depend on geographical or political location. This result confirmed the findings by Kleinfeld et al. (1985), but it differs from other studies. Snyder and West (1992) and Alspaugh (1992) argue that urban public schools are better than rural public schools while Alspaugh and Harting (1995) and Haller et al. (1993) find the opposite result.

4.1. Robustness checks

The primary schools MCT Score variable is employed to measure the students' academic performance. Although this is not a perfect proxy, this is the closest approximation available in this data set. In the specification test section, different outputs from graduating grades are employed and the results at the individual subject level are no different than at the overall subject level. Most of the factors, however, remain robust across outputs in that grade.⁵ For example, the number of teachers per student, the percent of black students, the percent of free lunch students and the social capital variables are extremely significant in all models. Results are also checked by employing different market sizes and interestingly we find similar results in these different markets. Several factors remained insignificant including general expenditures per student and textbook expenditures per student. Most interestingly, these variables

are insignificant in all models. The magnitude of the impact of social capital remained consistently small throughout, even though the variable was found statistically significant.

Hence, social capital in the school community has a very minor impact on academic performance. Results also suggested that students' race and socio-economic status are very important factors, and both are negatively related to the proportional score. As expected, the percent of black students and the percent of free lunch enrollment in primary schools are found with lower performance in overall and language examinations.

5. Concluding remarks

The purpose of this study is to examine whether social capital is related to school performance. This is not a new research agenda, but measuring the effect of social capital based on the redefined market is something never explored before. Previous research in education lacks a proper definition of a school market and this issue drives the interest and provides the scope for this paper. We followed Misra and Chi (2011) and Misra et al. (2012) to define a school market and then analyze the relationship between social capital and school performance. School level data from the Mississippi Board of Education is employed in this empirical model for the year 2005–2006. The overall score on the MCT examination is used to reflect the performance of students as a basis for measuring school output. The graduating grade's overall score on the MCT tests is employed as a dependent variable in the primary schools model. Analyses of these models are conducted using different market areas of 5 miles, 15 miles and 25 miles.

The following part of the summary is drawn from the ordinary least square model where several explanatory variables are regressed on the overall score. The number of teachers per student, the percent of free lunch students, the percent of black students, and the social capital variables are extremely significant in these models. Hence, we conclude that these variables are primary school performance determinants. The effect of social capital in a primary school is significant.

It appears that the human capital held by teachers, such as teaching experience and education attainment, are insignificant in primary schools. The degree of effectiveness may depend on student population. Middle or high schools students are mostly teenagers; therefore an effective teaching or instructional leadership style may have been needed by experienced teachers with higher levels of education. However, in primary schools where mostly children are served, experience and higher education held by teachers might not have mattered as much for the students' academic success.

Using these results, student academic performance is significantly related to the teacher's race which is consistent with Hanushek (1999) and King (1993). At the same time, it failed to support the results presented in Dee (2004) that racial parity between a teacher and students supposedly increases student academic performance. Unfortunately, the results presented in this paper concluded that racial parity does not matter in student performance. Hence, restructuring school personnel may not be important to improving school performance.

Not surprisingly, the percent of black students and the percent of free lunch enrollment variables are significant in different models, regardless of market size and output. These results further confirmed previous findings that a student's family background and income are important factors to academic performance. Previous research has pointed out a number of reasons why black and poor students are at risk of poor academic performance. For example, Ching (2000) mentioned that a student's cognitive abilities are related to family income and a high number of black students'

⁵ In the interest of brevity of space we are only able to include the language examination score to check the robustness.

families live below the poverty line in this state.⁶ A number of interventions could be used to improve the performance of these students, including effective teaching, parental education, reward programs, etc., which will guide these students toward success.

Social capital is significant in all models for primary schools with the expected sign. A school located in a community with less social capital stock tended to have lower performing students. This impact, however was very small, suggesting that the returns to building social capital in a community are minor and not likely to exceed any non-negligible costs of developing new organizations. Therefore, the allocation of local resources into fostering more social capital is likely a poor investment if increased student performance is the objective.

The results from this analysis should provide better conclusions since this is a school level analysis rather than by public school district, or at the county or state level. State and local policy makers should carry out local policy programs instead of a common policy for all schools across the state. These customized local school policies will ultimately help increase individual school performance. In summary, examining the affects of social capital on public school efficiency informs policymakers that future funding for community development is required.

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⁶ Source: State Health Facts.Org. Retrieved on April 13, 2010, from: <http://statehealthfacts.org/profileind.jsp?ind=14&cat=1&rgn=26&cmpgrn=1>.