Factors Affecting School Quality In Florida

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ABSTRACT

This paper examines the factors that are theorized to be determinants of school quality in the 67 counties of Florida from 2000 to 2011. The model constructed for this purpose is comprised of a mix of independent variables that include county educational attainment (number of high school graduates and State University System enrollees) and economic factors (median household income, unemployment rate, number of housing starts, and property tax revenue per student). Furthermore, the model also considers 4 demographic/social variables (percent of population from 5 to 17 years old, percent white, percent female, and crime rate), as well as a variable for trend. The trend variable allows inferences to be made about the impact of the No Child Left Behind Act of 2001. It is hypothesized that these 11 variables will explain the variation in school quality by county over the observed time period.

Keywords: No Child Left Behind Act of 2001; Florida School Quality; Educational Attainment and School Quality

INTRODUCTION

School quality has been an area of interest to researchers for several reasons. There have been studies examining the relationship between school quality and earnings (Wachtel, 1975; Card & Kreuger, 1990; Betts, 1995), residential choice (Barrow, 2002; Bayoh & Haab, 2006), housing values (Jud & Watts, 1981; Haurin & Brasington, 1996; Kane, Riegg, & Staiger, 2006) and choice of business location (Love & Crompton, 1999; Gabe & Bell, 2004).

The passage of the No Child Left Behind (NCLB) Act of 2001 has provided another reason to investigate school quality. In the state of Florida, every public school is assigned a letter grade based on its quality. Children attending chronically underperforming schools have the option of transferring to another public school in the district.

DATA

This study was performed on a sample consisting of 12 years of observations (from 2000 to 2011) on the 67 counties of Florida, yielding a data set with 804 observations. One hundred of these observations had missing values for variables of interest for the analysis, so the analysis was performed using a sample of size 704. The school quality data, consisting of letter grades for each school in every county in the sample, was obtained from the Florida Department of Education. The remainder of the data, consisting of demographic, socio-economic, and educational attribute data was provided by the Bureau of Economic and Business Research at the University of Florida.

MODEL

The model used to analyze the determinants of school quality consists of 12 variables. Table 1 provides a listing and brief description of the variables used in the analysis. A more in-depth discussion follows the table.

Table 1: Variables in Model

Name	Description
GPA (dependent)	average of individual school grades for all public schools in county
HS	number of county's residents graduated from high school each year, per 1,000 residents
SUS	number of county's residents enrolled in a State University System school, per 1,000 residents
WHITE	percent white
FEMALE	percent female
SCHOOL AGE	percent of county's residents from between ages of 5 and 17 inclusive
TREND	year 2000 = 0, year 2011 = 12
STARTS	housing starts per 1,000 residents
CRIME	crimes per 100,000 residents
INCOME	median household income ($1,000)
TAX	local tax revenue per student ($1,000)
UNEMPLOYMENT	percent unemployed

Linear regression is used to investigate the factors that cause variation in school quality. The response variable for the model, GPA, was constructed from information provided by the Florida Department of Education. Each school in each county is assigned a letter grade as a way to measure school quality. These letters (A, B, C, D, and F) have their usual meaning. In order to use linear regression, the letters were transformed into numeric values in the same way that it is done at most institutions of higher education. A was recoded to 4.0, B was recoded to 3.0, and so on. Then, an overall average or GPA was calculated for each county for each year in the sample. This is used as a measure of school quality for the entire county for that year.

The model has 11 independent variables. These variables are thought to be systematically related to the dependent variable of the model. Two of these variables, HS and SUS, are measures of educational attainment in the counties. HS is the number of high school graduates each year, per 1,000 residents. SUS is the number of the county's residents enrolled in the Florida State University System, per 1,000 residents. It is thought that communities with high values for HS and SUS would be more interested in having high performing schools in their counties.

Another group of independent variables, UNEMPLOYMENT, STARTS, INCOME, and TAX are included because they measure economic conditions in the counties. UNEMPLOYMENT is the county's unemployment rate, and presumably high unemployment would reduce the resources available to the county's school system. STARTS is the number of housing starts per 1,000 residents. A larger value suggests a healthier economic environment in the county, which should make more resources available to the county's schools.

INCOME is median per capita income in the county, in thousands of dollars. A higher median income should affect school quality in two ways. First, more resources can be made available to the school system. Second, income is known to be highly correlated with educational attainment. It may be that counties with higher median per capita income have extra interest in providing quality schools for their communities.

Finally, TAX is calculated by multiplying the school millage rate by the total value of the county's property. This number is then divided by the county's school age population, resulting in measure of property tax revenue per student. Finally, this number is divided by 1,000 to give property tax revenue per student in thousands of dollars. It is expected that the relationship between TAX and GPA should be positive.

Another group of independent variables, WHITE, FEMALE, SCHOOL AGE, and CRIME capture demographic and social factors that may impact school quality. While there is no reason to expect white students to outperform other races on the basis of ability, the percent white in a county has a significant positive correlation with INCOME ($r = 0.266$, p-value = 0.000) and a very strong, significant positive relationship with TAX ($r = 0.408$, p-value = 0.000). Because of the interrelationship between these independent variables of the model, WHITE is likely to be picking up some of the impact that would normally be associated with INCOME and TAX.

Since the late 1970s, females have made up a larger proportion of college enrollments than males. In 2008, the percentage of female enrollments in public institutions was 56%, while in private schools females accounted for

59% of enrollments (Forbes, 2012). Given this information, it is presumed that the higher the proportion of females in a county, the higher will be the quality of the county's schools.

The variable SCHOOL AGE is the percentage of the county's population with ages between 5 and 17 years inclusive. It may be that a county with a larger proportion of its population in school would have its resources stretched more thin, resulting in a degradation in school quality.

CRIME provides a measure of number of major crimes per 1,000 population in a county. It is presumed that a high crime environment would not be conducive to school quality, so this variable is expected to be negatively related to school quality.

Finally, a variable measuring trend is one of the model's independent variables. This variable provides a way to see if the provisions of the NCLB Act of 2001 are having an impact on school quality, holding all other factors constant.

RESULTS

Table 2 shows the results of the regression analysis for the full model, with 11 independent variables. While there may be theoretical justification for the inclusion of these variables in the model, the regression procedure and sample data will allow us to determine which variables are significantly related to the dependent variable, and therefore should be retained in the model, and which variables are not significantly related to the dependent variable. This latter group of variables should be dropped from the analysis.

An evaluation of the overall model is done by considering computed value of the F statistic and its corresponding p-value, as well as the value of adjusted R^2. The F test indicates that the regression model used in the analysis has significant explanatory power, and adjusted R^2 shows that it explains almost 53% of the variation in the dependent variable. However, an examination of the t-ratios (and their associated p-values) indicates that there is no statistical justification for the inclusion of some of the independent variables, using the standard five percent level of significance.

Table 2: Results for Full Model

Variable	Estimated Coefficient	T Statistic	P-Value
Constant	0.36	1.31	0.191
HS	0.05	3.67	0.000
SUS	0.04	9.16	0.000
WHITE	0.03	13.45	0.000
FEMALE	-0.01	-1.80	0.072
SCHOOL AGE	-0.05	-3.91	0.000
TREND	0.04	5.79	0.000
STARTS	0.01	2.57	0.010
CRIME	-0.00	-1.38	0.167
INCOME	0.01	2.19	0.029
TAX	-0.01	-0.36	0.722
UNEMPLOYMENT	0.01	0.79	0.430
Computed F = 71.88	P-Value = 0.000	Adjusted R^2 = 52.6%	

Independent variables with a p-value greater than five percent were dropped from the model one at a time. The order of the dropped variables was determined by the p-values associated with their t-ratios, where the variable with the largest p-value is dropped first. Table 3 summarizes the iterative process that leads to the final regression model.

Table 3: Variables Removed From the Model

Variable	Step	P-Value
TAX	1	0.722
UNEMPLOYMENT	2	0.435
CRIME	3	0.152
FEMALE	4	0.083

The removal of these variables from the model leaves the final model, which only includes independent variables that are significantly related to the dependent variable (that is, have p-values less than five percent). The results for the final model are summarized in Table 4.

Table 4: Results for Final Model

Variable	Estimated Coefficient	T Statistic	P-Value
CONSTANT	-0.02	-0.08	0.935
HS	0.05	4.35	0.000
SUS	0.04	9.24	0.000
WHITE	0.03	13.82	0.000
SCHOOL AGE	-0.05	-4.51	0.000
TREND	0.05	6.98	0.000
STARTS	0.01	2.36	0.019
INCOME	0.01	2.16	0.031
Computed F = 107.43	P-Value = 0.000	Adjusted R^2 = 51.3%	

The summary statistics suggest that the final model has good explanatory power. The value of computed F is 107.43, with a p-value of 0.000. Accordingly, it can be concluded that the final model has significant power in explaining variation in school quality. Additionally, based on the value of adjusted R^2 of 51.3%, the model explains more than half of the variation in the dependent variable.

DISCUSSION

The model provides evidence that the higher the educational attainment in a county, the better the school quality, holding all other variables constant. Based on the results of this multiple regression, for every one extra high school graduate per 1,000 residents, it is expected that a county's school quality measure (GPA) will increase by 0.05. The variable SUS, number of state university enrollments per 1,000 residents, has a similar effect on a county's school quality.

For example, in 2011 Duval County had a population of 864,601. If the county's public school system had 865 more students graduate from high school that year, the value of the variable HS would have been larger by one. This increase in high school graduates would have resulted in an estimated increase in the county's school quality measure (GPA) of 0.05. To put the number 865 in perspective, it accounts for about 13% of the 6,800 students scheduled to graduate with Duval County's class of 2011 that failed to do so (The Florida Times-Union, 2012).

The evidence also indicates that stronger economic conditions result in higher school quality, since INCOME, STARTS, and WHITE all exhibit a significant positive relationship with school quality. The inclusion of percent white in the economic category is based on the previously reported positive correlations with income and local tax revenue.

Finally, the variable TREND has an estimated coefficient of 0.05. Holding all other variables constant, with the passage of each year it is expected for the measure of school quality GPA to increase by 0.05. It is reasonable to attribute at least some of this increase in school quality over the time period 2000 to 2011 to the enactment of the provisions of the NCLB act of 2001.

CONCLUSIONS

The model used in this study provides insight into some of the determinants of school quality in the 67 counties of Florida from 2000 to 2011. Some of these factors can be affected by the stakeholders in the school systems of the counties. Administrators can work to develop programs and policies that reduce dropouts and increase the number of students going to college.

Unfortunately, many of the factors affecting school quality cannot be affected by enacting policies and programs. Economic factors such as county income and economic activity impact school quality, but are unaffected by the decisions made by school boards and school administrators.

The positive impact that policies can have on school quality may be captured by the variable TREND. As noted above, over time school quality has increased in Florida, and it seems plausible that at least some of this increase can be attributed to the passage and implementation of the NCLB Act of 2001.

RECOMMENDATIONS

It seems likely that a better model of school quality could be developed looking at more highly disaggregated data, in particular data from the neighborhood level for the school. This would permit an investigation of the grade received by an individual school, and its relationship with the educational attributes, economic conditions, and demographics of the area from which the school draws its students.

AUTHOR INFORMATION

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